



Jawaharlal Nehru Technological University Anantapur

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Ananthapuramu-515 002 (A.P) India

B.Tech. in Electronics & Communication Engineering Course Structure and Syllabi under R19 Regulations

JNTUACurriculum
Electronics and Communication EngineeringB. Tech Course Structure

S.No.	Course Name	Category	L-T-P-C
1	Physical Activities -- Sports, Yoga and Meditation, Plantation	MC	0-0-6-0
2	Career Counselling	MC	2-0-2-0
3	Orientation to all branches -- career options, tools, etc.	MC	3-0-0-0
4	Orientation on admitted Branch -- corresponding labs, tools and platforms	EC	2-0-3-0
5	Proficiency Modules & Productivity Tools	ES	2-1-2-0
6	Assessment on basic aptitude and mathematical skills	MC	2-0-3-0
7	Remedial Training in Foundation Courses	MC	2-1-2-0
8	Human Values & Professional Ethics	MC	3-0-0-0
9	Communication Skills -- focus on Listening, Speaking, Reading, Writing skills	BS	2-1-2-0
10	Concepts of Programming	ES	2-0-2-0

Semester - I (Theory - 4, Lab - 4)					
S.No	Course No	Course Name	Category	L-T-P	Credits
1.	19A54101	Algebra & Calculus	BS	3-1-0	4
2.	19A56101T	Applied Physics	BS	3-0-0	3
3.	19A05101T	Problem Solving & Programming	ES	3-1-0	4
4.	19A52101T	Communicative English 1	HS	2-0-0	2
5.	19A04101	Electronics & Communication Engineering Workshop	LC	0-0-2	1
6.	19A56101P	Applied Physics Lab	BS	0-0-3	1.5
7.	19A05101P	Problem Solving & Programming Lab	ES	0-0-3	1.5
8.	19A52101P	Communicative English 1 Lab	HS	0-0-2	1
Total					18

Semester - II (Theory - 4, Lab - 5)					
S.No	Course No	Course Name	Category	L-T-P	Credits
1.	19A04201T	Network Theory	ES	3-0-0	3
2.	19A54201	Differential Equations and Vector Calculus	BS	3-1-0	4
3.	19A51102T	Chemistry	BS	3-0-0	3
4.	19A05201T	Data Structures	ES	3-0-0	3
5.	19A03101	Engineering Workshop	LC	0-0-2	1
6.	19A03102	Engineering Graphics Lab	ES	1-0-4	3
7.	19A04201P	Network Theory Lab	ES	0-0-3	1.5
8.	19A51102P	Chemistry Lab	BS	0-0-3	1.5
9.	19A05201P	Data Structures Lab	ES	0-0-3	1.5
Total					21.5

Semester – III(Theory - 6, Lab –3, MC-1)					
S.No	Course No	Course Name	Category	L-T-P	Credits
1.	19A54302	Complex Variables and Transforms	BS	3-0-0	3
2.	19A04301	Signals & Systems	PC	3-0-0	3
3.	19A04302T	Electronic Devices and Circuits	PC	3-0-0	3
4.	19A04303	Probability Theory and Stochastic Processes	PC	3-0-0	3
5.	19A04304	Digital Electronics and Logic Design	PC	3-0-0	3
6.	19A02304T	Electrical Technology	ES	3-0-0	3
7.	19A04302P	Electronic Devices and Circuits Lab	PC	0-0-3	1.5
8.	19A04305	Basic Simulation Lab	PC	0-0-2	1
9.	19A02304P	Electrical Technology Lab	ES	0-0-2	1
10.	19A99302	Biology For Engineers	HS	3-0-0	0
Total					21.5

Semester – IV (Theory - 7, Lab –2, MC-1)					
S.No	Course No	Course Name	Category	L-T-P	Credits
1.	19A04401	Electromagnetic Waves and Transmission lines	PC	3-0-0	3
2.	19A04402T	Electronic Circuits – Analysis and Design	PC	3-0-0	3
3.	19A02404	Control Systems	ES	3-0-0	3
4.	19A04403T	Analog Communications	PC	3-0-0	3
5.	19A05304T	Python Programming	ES	2-1-0	3
6.	19A04404	Computer Architecture and Organization	PC	3-0-0	3
7.	19A52301	Universal Human Values	HS	2-0-0	2
8.	19A04402P	Electronic Circuits – Analysis and Design Lab	PC	0-0-3	1.5
9.	19A04403P	Analog Communications Lab	PC	0-0-3	1.5
10.	19A99301	Environmental Science	BS	3-0-0	0
Total					23

Semester - V (Theory - 6, Lab - 3)					
S.No	Course No	Course Name	Category	L-T-P	Credits
1.	19A04501T	Integrated Circuits and Applications	PC	2-0-0	2
2.	19A04502	Antennas and Wave Propagation	PC	3-0-0	3
3.	19A52601T	English Language Skills	HS	3-0-0	3
4.	19A04503T	Digital Communications	PC	3-0-0	3
5.	19A05403T 19A02403 19A05303T 19A04504a 19A04504b	Professional Elective-I Operating Systems Power Electronics Object Oriented Programming Through Java Data Communications and Networks Nano Electronics	PC	3-0-0	3
6.	19A01506a 19A01506b 19A02506a 19A03506a 19A03506b 19A05506a 19A05506b 19A27506a 19A27506b 19A54506a 19A52506a 19A51506a	Open Elective-I Experimental stress analysis. Building Technology Electrical Engineering Materials Introduction to Hybrid and Electric Vehicles Rapid Prototyping Free and Open Sources Systems Computer Graphics and Multimedia Animation Brewing Technology Computer Applications in Food Industry Optimization Techniques Technical Communication and Presentation Skills Chemistry of Energy Materials	OE	3-0-0	3
7.	19A04501P	Integrated Circuits and Applications Lab	PC	0-0-3	1.5
8.	19A52601P	English Language Skills Lab	HS	0-0-3	1.5
9.	19A04503P	Digital Communications Lab	PC	0-0-2	1
10.	19A04507	Socially Relevant Project		0-0-1	0.5
11.	19A99601	Research Methodology (Mandatory course)		3-0-0	0
Total					21.5

Semester – VI (Theory - 6, Lab –2, MC-1)					
S.No	Course No	Course Name	Category	L-T-P	Credits
1.	19A04601T	Microprocessors and Microcontrollers	PC	3-0-0	3
2.	19A04602T	Digital Signal Processing	PC	3-0-0	3
3.	19A04603	Digital System Design through VHDL	PC	3-0-0	3
4.	19A04605a 19A04605b 19A04605c 19A04605d 19A04605e	Professional Elective-II (MOOC) Introduction to Wireless and Cellular Communications (IITMadras) Fabrication Techniques for MEMs-based sensors (IISc, Bangalore) Integrated Photonics Devices And Circuits Electrical Measurement and Electronic Instruments (IIT KGP) Principles and Techniques of Modern Radar Systems (offered by IIT KGP)	PC	3-0-0	3
5.	19A01604a 19A01604b 19A02604a 19A02604b 19A03604a 19A03604b 19A05604a 19A05604b 19A27604a 19A27604b 19A54604a 19A52604a 19A51604a	Open Elective-II Industrial waste and wastewater management. Building Services & Maintenance Industrial Automation System Reliability Concepts Introduction to Mechatronics Optimization techniques through MATLAB Fundamentals of VR/AR/MR Data Science Food Toxicology Food Plant Equipment Design Wavelet Transforms & its applications Soft Skills Chemistry of Polymers and Its Applications	OE	3-0-0	3
6.	19A52602a 19A52602b 19A52602c 19A52602d 19A52602e	Humanities Elective-I Entrepreneurship & Incubation Managerial Economics and Financial Analysis Business Ethics and Corporate Governance Enterprise Resource Planning Supply Chain Management	HS	3-0-0	3
7.	19A04602P	Digital Signal Processing Lab	PC	0-0-3	1.5
8.	19A04601P	Microprocessors and Microcontrollers Lab	PC	0-0-3	1.5
9.	19A04606	Socially Relevant Project		0-0-1	0.5
10.	19A99501	Constitution of India (Mandatory Course)		3-0-0	0
11.	19A04607	Comprehensive online examination	PR	-----	0
				Total	21.5

Semester – VII (Theory - 5, Lab -2)					
S.No	Course No	Course Name	Category	L-T-P	Credits
1.	19A04701T	Microwave Engineering and Optical Communications	PC	3-0-0	3
2.	19A04702T	VLSI Design	PC	3-0-0	3
3.	19A04703a 19A04703b 19A04703c 19A04703d 19A04703e	Professional Elective-III Satellite Communications Digital TV Engineering Embedded Systems Image Processing Advanced Digital Signal Processing	PE	3-0-0	3
4.	19A01704a 19A01704b 19A02704a 19A02704b 19A03704a 19A03704b 19A05704a 19A05704b 19A27704a 19A27704b 19A54704a 19A51704a	Open Elective-III Air pollution and control. Basics of civil Engineering Renewable Energy Systems Electric Vehicle Engineering Finite element methods Product Marketing Fundamentals of Game Development Cyber Security Corporate Governance in Food Industries Process Technology for Convenience & RTE Foods Numerical Methods for Engineers (ECE , CSE, IT &CE) Chemistry of Nanomaterials and Applications	OE	3-0-0	3
5.	19A52701a 19A52701b 19A52701c 19A52701d 19A52701e	Humanities Elective-II Organizational Behavior Management Science Business Environment Strategic Management E-Business	HS	3-0-0	3
6.	19A04701P	Microwave and Optical Communications Lab	PC	0-0-3	1.5
7.	19A04702P	VLSI Design Lab	PC	0-0-3	1.5
8.	19A04705	Industrial Training/Skill Development/Research Project	PR	-----	2
Total					20

Semester – VIII(Theory - 2)					
S.No	Course No	Course Name	Category	L-T-P	Credits
1.	19A04801a	Professional Elective-IV Advanced 3G and 4G Wireless Mobile Communications	PE	3-0-0	3
	19A04801b	Introduction to Internet of Things			
	19A04801c	Fuzzy sets, logic and systems and Applications			
	19A04801d	Biomedical Signal Processing			
	19A04801e	Analog IC design			
2.	19A01802a	Open Elective-IV Disaster Management.	OE	3-0-0	3
	19A01802b	Global Warming and climate changes			
	19A02802a	IoT Applications in Electrical Engineering			
	19A02802b	Smart Electric Grid			
	19A03802a	Energy conservation and management			
	19A03802b	Non destructive testing			
	19A05802a	Block Chain Technology and Applications			
	19A05802b	MEAN Stack Technology			
	19A27802a	Food Plants Utilities & Services			
	19A27802b	Nutraceuticals & Functional Foods			
	19A54802a	Mathematical Modeling & Simulation			
	19A51802a	Green Chemistry and Catalysis for Sustainable Environment			
3.	19A04803	Project	PR	-----	7
Total					13

Honours Degree in ECE

S.No.	Course No.	Course Name	L	T	P	Credits
1.	19A04H01	Automotive Electronics	3	1	0	4
2.	19A04H02	Low power VLSI Design.	3	1	0	4
3.	19A04H03	Pattern Recognition	3	1	0	4
4.	19A04H04	Micro Electromechanical Systems	3	1	0	4
5.	19A04H05	VLSI Testing and Testability	3	1	0	4
Total						20

Minor Degree in ECE

S.No.	Course No.	Course Name	L	T	P	Credits
1.	19A04301	Signals and Systems	3	0	0	3
2.	19A04302T	Electronics Devices and Circuits	3	0	0	3
3.	19A04304	Digital Electronics and Logic Design	3	0	0	3
4.	19A04503T	Digital Communications	3	0	0	3
5.	19A04602T	Digital Signal Processing	3	0	0	3
6.	19A04M01	Minor Discipline Project	-	-	-	5
Total						20

(19A54101) ALGEBRA & CALCULUS
(Common to all branches of Engineering)

Course Objectives:

- This course will illuminate the students in the concepts of calculus and linear algebra.
- To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications.

Bridge Course: Limits, continuity, Types of matrices

Unit 1:Matrices

10 hrs

Rank of a matrix by echelon form, solving system of homogeneous and non-homogeneous equations linear equations. Eigen values and Eigen vectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, diagonalisation of a matrix, quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical forms by orthogonal transformation.

Learning Outcomes:

At the end of this unit, the student will be able to

- solving systems of linear equations, using technology to facilitate row reduction determine the rank, eigenvalues and eigenvectors, diagonal form and different factorizations of a matrix; (L3)
- identify special properties of a matrix, such as positive definite, etc., and use this information to facilitate the calculation of matrix characteristics; (L3)

Unit 2: Mean Value Theorems

6 hrs

Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof);

Learning Outcomes:

At the end of this unit, the student will be able to

- Translate the given function as series of Taylor's and Maclaurin's with remainders (L3)
- analyze the behaviour of functions by using mean value theorems (L3)

Unit 3:Multivariable calculus

8 hrs

Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

Learning Outcomes:

At the end of this unit, the student will be able to

- Find partial derivatives numerically and symbolically and use them to analyze and interpret the way a function varies. (L3)
- Acquire the Knowledge maxima and minima of functions of several variable (L1)
- Utilize Jacobian of a coordinate transformation to deal with the problems in change of variables (L3)

Unit 4: Multiple Integrals

10hrs

Double integrals, change of order of integration, double integration in polar coordinates, areas enclosed by plane curves. Evaluation of triple integrals, change of variables between Cartesian, cylindrical and spherical polar co-ordinates.

Learning Outcomes:

- At the end of this unit, the student will be able to
- Evaluate double integrals of functions of several variables in two dimensions using Cartesian and polar coordinates (L5)
- Apply double integration techniques in evaluating areas bounded by region (L4)
- Evaluate multiple integrals in Cartesian, cylindrical and spherical geometries (L5)

Unit 5: Special Functions

6 hrs

Beta and Gamma functions and their properties, relation between beta and gamma functions, evaluation of definite integrals using beta and gamma functions.

Learning Outcomes:

At the end of this unit, the student will be able to

- understand beta and gamma functions and its relations (L2)
- Conclude the use of special function in evaluating definite integrals (L4)

Text Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.

Reference Books:

1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
3. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 201.
4. Micheael Greenberg, Advanced Engineering Mathematics, 9th edition, Pearson edn
5. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press

6. Peter O'neil, Advanced Engineering Mathematics, Cengage Learning.
7. R.L. Garg Nishu Gupta, Engineering Mathematics Volumes-I &II, Pearson Education
8. B. V. Ramana, Higher Engineering Mathematics, Mc Graw Hill Education
9. H. k Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand.
10. N. Bali, M. Goyal, C. Watkins, Advanced Engineering Mathematics, Infinity Science Press.

Course Outcomes:

At the end of the course, the student will be able to

- develop the use of matrix algebra techniques that is needed by engineers for practical applications (L6)
- Utilize mean value theorems to real life problems (L3)
- familiarize with functions of several variables which is useful in optimization (L3)
- Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional coordinate systems (L5)
- Students will become familiar with 3- dimensional coordinate systems and also learn the utilization of special functions

(19A56101T) APPLIED PHYSICS
(ECE, CSE, EEE & IT Branches)

Course Objectives:

- To identify the importance of the optical phenomenon i.e. interference, diffraction and polarization related to its Engineering applications.
- To explain the significant concepts of dielectric and magnetic materials this leads to potential applications in the emerging micro devices.
- To impart knowledge in basic concepts of electromagnetic waves and its propagation in optical fibers along with its Engineering applications.
- To identify the importance of semiconductors in the functioning of electronic devices.
- To teach the concepts related to superconductivity which lead to their fascinating applications.
- To familiarize the applications of nanomaterials relevant to engineering branches.

Unit-I : Wave Optics

8hrs

Interference-Principle of Superposition-Interference of light-Conditions for sustained Interference -Interference in thin films (reflected light)-Newton's Rings-Determination of Wavelength- Engineering applications of Interference

Diffraction-Fraunhofer Diffraction-Single and Double slits - Diffraction Grating – Grating Spectrum -Determination of Wavelength - Engineering applications of diffraction

Polarization-Polarization by double refraction-Nicol's Prism--Half wave and Quarter wave plate- Engineering applications of Polarization.

Unit Outcomes:

The students will be able to

- **explain** the need of coherent sources and the conditions for sustained interference (L2)
- **identify** engineering applications of interference including homodyne and heterodyne detection (L3)
- **analyze** the differences between interference and diffraction with applications (L4)
- **illustrate** the concept of polarization of light and its applications (L2)
- **classify** ordinary polarized light and extraordinary polarized light (L2)

Unit-II : Dielectric and Magnetic Materials

(8hrs)

Introduction--Dielectric polarization-Dielectric polarizability, Susceptibility and Dielectric constant- Types of polarizations: Electronic and Ionic, (Quantitative), Orientation Polarizations (Qualitative) - Frequency dependence of polarization-Lorentz (internal) field-Claussius -Mosotti equation-Applications of Dielectrics: Ferroelectricity.

Introduction-Magnetic dipole moment-Magnetization-Magnetic susceptibility and permeability- Origin of permanent magnetic moment -Classification of Magnetic materials- Weiss theory of ferromagnetism (qualitative)-Hysteresis-soft and hard magnetic materials-Magnetic device applications (Magnetic bubble memory).

Unit Outcomes:

The students will be able to

- **explain** the concept of dielectric constant and polarization in dielectric materials (L2)
- **summarize** various types of polarization of dielectrics (L2)
- **interpret** Lorentz field and Clausius- Mosotti relation in dielectrics (L2)
- **classify** the magnetic materials based on susceptibility and their temperature dependence (L2)
- **explain** the applications of dielectric and magnetic materials (L2)
- **Apply** the concept of magnetism to magnetic devices (L3)

Unit – III: Electromagnetic Waves and Fiber Optics

10hrs

Divergence and Curl of Electric and Magnetic Fields- Gauss' theorem for divergence and Stokes' theorem for curl- Maxwell's Equations (Quantitative)- Electromagnetic wave propagation (Non-conducting medium) -Poynting's Theorem.

Introduction to Optical Fibers-Total Internal Reflection-Critical angle of propagation-Acceptance angle-Numerical Aperture-Classification of fibers based on Refractive index profile –Propagation of electromagnetic wave through optical fiber – modes -importance of V-number- Attenuation, Block Diagram of Fiber optic Communication -Medical Applications-Fiber optic Sensors.

Unit Outcomes:

The students will be able to

- **apply** the Gauss' theorem for divergence and Stokes' theorem for curl (L3)
- **evaluate** the Maxwell's equations, Maxwell's displacement current and correction in Ampere's law (L5)
- **asses** the electromagnetic wave propagation and its power in non-conducting medium (L5)
- **explain** the working principle of optical fibers (L2)
- **classify** optical fibers based on refractive index profile and mode of propagation (L2)
- **identify** the applications of optical fibers in medical, communication and other fields (L2)
- **Apply** the fiber optic concepts in various fields (L3).

Unit – IV: Semiconductors

8 hrs

Origin of energy bands - Classification of solids based on energy bands – Intrinsic semiconductors - density of charge carriers-Fermi energy – Electrical conductivity - extrinsic semiconductors - P-type & N-type - Density of charge carriers - Dependence of Fermi energy

on carrier concentration and temperature- Direct and Indirect band gap semiconductors-Hall effect- Hall coefficient - Applications of Hall effect - Drift and Diffusion currents - Continuity equation - Applications of Semiconductors.

Unit Outcomes:

The students will be able to

- **classify** the energy bands of semiconductors (L2)
- **outline** the properties of n-type and p-type semiconductors and charge carriers (L2)
- **interpret** the direct and indirect band gap semiconductors (L2)
- **identify** the type of semiconductor using Hall effect (L2)
- **identify** applications of semiconductors in electronic devices (L2)

Unit – V: Superconductors and Nanomaterials

8 hrs

Superconductors-Properties- Meissner's effect-BCS Theory-Josephson effect (AC &DC)- Types of Super conductors-Applications of superconductors.

Nano materials – Significance of nanoscale – Properties of nanomaterials: Physical, Mechanical, Magnetic, Optical – Synthesis of nanomaterials: Top-down-Ball Milling, Bottom-up -Chemical vapour deposition – characterization of nanomaterials: X-Ray Diffraction (XRD), Scanning Electron Microscope (SEM) - Applications of Nano materials.

Unit Outcomes:

The students will be able to

- **explain** how electrical resistivity of solids changes with temperature (L2)
- **classify** superconductors based on Meissner's effect (L2)
- **explain** Meissner's effect, BCS theory & Josephson effect in superconductors (L2)
- **identify** the nano size dependent properties of nanomaterials (L2)
- **illustrate** the methods for the synthesis and characterization of nanomaterials (L2)
- **Apply** the basic properties of nanomaterials in various Engineering branches (L3).

Text Books:

1. M. N. Avadhanulu, P.G. Kshirsagar & TVS Arun Murthy” A Text book of Engineering Physics”- S. Chand Publications, 11th Edition 2019.
2. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2012.

Reference Books:

1. Shatendra Sharma, Jyotsna Sharma, “ Engineering Physics”, Pearson Education, 2018
2. David J.Griffiths, “Introduction to Electrodynamics”- 4/e, Pearson Education, 2014
3. T Pradeep “A Text book of Nano Science and Nano Technology”- Tata Mc GrawHill 2013

Course Outcomes:

The students will be able to

- **identify** the wave properties of light and the interaction of energy with the matter (L3)
- **apply** electromagnetic wave propagation in different guided media (L2)
- **asses** the electromagnetic wave propagation and its power in different media (L5)
- **calculate** conductivity of semiconductors (L3)
- **interpret** the difference between normal conductor and superconductor (L2)
- **demonstrate** the application of nanomaterials (L2)

(19A05101T) PROBLEM SOLVING AND PROGRAMMING
(Common to All Branches of Engineering)

Course Objectives:

1. Introduce the internal parts of a computer, and peripherals.
2. Introduce the Concept of Algorithm and use it to solve computational problems
3. Identify the computational and non-computational problems
4. Teach the syntax and semantics of a C Programming language
5. Demonstrate the use of Control structures of C Programming language
6. Illustrate the methodology for solving Computational problems

Unit 1:

Computer Fundamentals: What is a Computer, Evolution of Computers, Generations of Computers, Classification of Computers, Anatomy of a Computer, Memory revisited, Introduction to Operating systems, Operational overview of a CPU.

Introduction to Programming, Algorithms and Flowcharts: Programs and Programming, Programming languages, Compiler, Interpreter, Loader, Linker, Program execution, Fourth generation languages, Fifth generation languages, Classification of Programming languages, Structured programming concept, Algorithms, Pseudo-code, Flowcharts, Strategy for designing algorithms, Tracing an algorithm to depict logic, Specification for converting algorithms into programs.

Unit Outcomes:

Student should be able to

1. Identify the different peripherals, ports and connecting cables in a PC (L2)
2. Illustrate the working of a Computer (L3)
3. Select the components of a Computer in the market and assemble a computer (L4)
4. Solve complex problems using language independent notations (L3)

Unit 2:

Introduction to computer problem solving: Introduction, the problem-solving aspect, top-down design, implementation of algorithms, the efficiency of algorithms, the analysis of algorithms.

Fundamental algorithms: Exchanging the values of two variables, counting, summation of a set of numbers, factorial computation, sine function computation, generation of the Fibonacci sequence, reversing the digits of an integer.

Learning Outcomes: Student should be able to

1. Solve Computational problems (L3)
2. Apply Algorithmic approach to solving problems (L3)
3. Analyze the algorithms (L4)

Unit 3:

Types, Operators, and Expressions: Variable names, data types and sizes, constants, declarations, arithmetic operators, relational and logical operators, type conversions, increment and decrement operators, bitwise operators, assignment operators and expressions, conditional expressions precedence and order of evaluation.

Input and output: standard input and output, formatted output-Printf, formatted input-Scanf.

Control Flow: Statements and blocks, if-else, else-if, switch, Loops-while and for, Loops-Do-while, break and continue, Goto and labels.

Functions and Program Structure: Basics of functions, functions returning non-integers, external variables, scope variables, header variables, register variables, block structure, initialization, recursion, the C processor.

Learning Outcomes: Student should be able to

1. Recognize the programming elements of C Programming language (L1)
2. Select the control structure for solving the problem (L4)
3. Apply modular approach for solving the problem (L3)

Unit 4:

Factoring methods: Finding the square root of a number, the smallest divisor of a number, the greatest common divisor of two integers, generating prime numbers.

Pointers and arrays: Pointers and addresses, pointers and function arguments, pointers and arrays, address arithmetic, character pointers and functions, pointer array; pointers to pointers, Multi-dimensional arrays, initialization of arrays, pointer vs. multi-dimensional arrays, command line arguments, pointers to functions, complicated declarations.

Array Techniques: Array order reversal, finding the maximum number in a set, removal of duplicates from an order array, finding the kth smallest element

Learning Outcomes: Student should be able to

1. Solve mathematical problems using C Programming language (L3)
2. Structure the individual data elements to simplify the solutions (L6)
3. Facilitate efficient memory utilization (L6)

Unit 5:

Sorting and Searching: Sorting by selection, sorting by exchange, sorting by insertion, sorting by partitioning, binary search.

Structures: Basics of structures, structures and functions, arrays of structures, pointers to structures, self-referential structures, table lookup, typedef, unions, bit-fields.

Some other Features: Variable-length argument lists, formatted input-Scanf, file access, Error handling-stderr and exit, Line Input and Output, Miscellaneous Functions.

Learning Outcomes: Student should be able to

1. Select sorting algorithm based on the type of the data (L4)
2. Organize heterogeneous data (L6)
3. Design a sorting algorithm (L6)

Text Books:

1. Pradip Dey, and Manas Ghosh, “Programming in C”, 2018, Oxford University Press.
2. R.G. Dromey, “How to Solve it by Computer”. 2014, Pearson.
3. Brian W. Kernighan, and Dennis M. Ritchie, “The C Programming Language”, 2nd Edition, Pearson.

Reference Books:

1. RS Bichkar “Programming with C”, 2012, Universities Press.
2. Pelin Aksoy, and Laura Denardis, “Information Technology in Theory”, 2017, Cengage Learning.
3. Byron Gottfried and Jitender Kumar Chhabra, “Programming with C”, 4th Edition, 2019, McGraw Hill Education.

Course Outcomes:

1. Construct his own computer using parts (L6).
2. Recognize the importance of programming language independent constructs (L2)
3. Solve computational problems (L3)
4. Select the features of C language appropriate for solving a problem (L4)
5. Design computer programs for real world problems (L6)
6. Organize the data which is more appropriated for solving a problem (L6)

(19A52101T) COMMUNICATIVE ENGLISH I
(Common to All Branches of Engineering)

Introduction

The course is designed to train students in receptive (listening and reading) as well as productive and interactive (speaking and writing) skills by incorporating a comprehensive, coherent and integrated approach that improves the learners' ability to effectively use English language in academic/ workplace contexts. The shift is from *learning about the language* to *using the language*. On successful completion of the compulsory English language course/s in B.Tech., learners would be confident of appearing for international language qualification/proficiency tests such as IELTS, TOEFL, or BEC, besides being able to express themselves clearly in speech and competently handle the writing tasks and verbal ability component of campus placement tests. Activity based teaching-learning methods would be adopted to ensure that learners would engage in actual use of language both in the classroom and laboratory sessions.

Course Objectives

- Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers
- Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
- Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations
- Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information
- Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

Unit 1

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions. **Speaking:** Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others. **Reading:** Skimming to get the main idea of a text; scanning to look for specific pieces of information. **Reading for Writing:** Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph. **Grammar and Vocabulary:** Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countables and uncountables; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentences.

Learning Outcomes

At the end of the module, the learners will be able to

- understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information
- ask and answer general questions on familiar topics and introduce oneself/others
- employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information
- recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
- form sentences using proper grammatical structures and correct word forms

Unit 2

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts. **Speaking:** Discussion in pairs/ small groups on specific topics followed by short structured talks. **Reading:** Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together. **Writing:** Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters. **Grammar and Vocabulary:** Cohesive devices - linkers, sign posts and transition signals; use of articles and zero article; prepositions.

Learning Outcomes

At the end of the module, the learners will be able to

- comprehend short talks on general topics
- participate in informal discussions and speak clearly on a specific topic using suitable discourse markers
- understand the use of cohesive devices for better reading comprehension
- write well structured paragraphs on specific topics
- identify basic errors of grammar/ usage and make necessary corrections in short texts

Unit 3

Listening: Listening for global comprehension and summarizing what is listened to. **Speaking:** Discussing specific topics in pairs or small groups and reporting what is discussed. **Reading:** Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension. **Writing:** Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions. **Grammar and Vocabulary:** Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.

Learning Outcomes

At the end of the module, the learners will be able to

- comprehend short talks and summarize the content with clarity and precision
- participate in informal discussions and report what is discussed
- infer meanings of unfamiliar words using contextual clues
- write summaries based on global comprehension of reading/listening texts
- use correct tense forms, appropriate structures and a range of reporting verbs in speech and writing

Unit4

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video. **Speaking:** Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions. **Reading:** Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data. **Writing:** Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs/tables. **Grammar and Vocabulary:** Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of antonyms

Learning Outcomes

At the end of the module, the learners will be able to

- infer and predict about content of spoken discourse
- understand verbal and non-verbal features of communication and hold formal/informal conversations
- interpret graphic elements used in academic texts
- produce a coherent paragraph interpreting a figure/graph/chart/table
- use language appropriate for description and interpretation of graphical elements

Unit 5

Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension. **Speaking:** Formal oral presentations on topics from academic contexts - without the use of PPT slides. **Reading:** Reading for comprehension. **Writing:** Writing structured essays on specific topics using suitable claims and evidences. **Grammar and Vocabulary:** Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

Learning Outcomes

At the end of the module, the learners will be able to

- take notes while listening to a talk/lecture and make use of them to answer questions
- make formal oral presentations using effective strategies
- comprehend, discuss and respond to academic texts orally and in writing
- produce a well-organized essay with adequate support and detail
- edit short texts by correcting common errors

Text Book

- **English all round: Communication Skills for Undegurdation Learners** Vol. I, Orient BlackSwan Publisers, First Edition 2019.

Reference Books

- Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.
- Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking*. Heinley ELT; 2nd Edition, 2018.
- Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
- Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012.

Sample Web Resources

Grammar/Listening/Writing

1-language.com

<http://www.5minuteenglish.com/>

<https://www.englishpractice.com/>

Grammar/Vocabulary

[English Language Learning Online](http://www.bbc.co.uk/learningenglish/)

<http://www.bbc.co.uk/learningenglish/>

<http://www.better-english.com/>

<http://www.nonstopenglish.com/>

<https://www.vocabulary.com/>

[BBC Vocabulary Games](#)

[Free Rice Vocabulary Game](#)

Reading

<https://www.usingenglish.com/comprehension/>

<https://www.englishclub.com/reading/short-stories.htm>

<https://www.english-online.at/>

Listening

<https://learningenglish.voanews.com/z/3613>

<http://www.englishmedialab.com/listening.html>

Speaking

<https://www.talkenglish.com/>

[BBC Learning English – Pronunciation tips](#)

[Merriam-Webster – Perfect pronunciation Exercises](#)

All Skills

<https://www.englishclub.com/>

<http://www.world-english.org/>

<http://learnenglish.britishcouncil.org/>

Online Dictionaries

[Cambridge dictionary online](#)

[MacMillan dictionary](#)

[Oxford learner's dictionaries](#)

Course Outcomes:

At the end of the course, the learners will be able to

- Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
- Apply grammatical structures to formulate sentences and correct word forms
- Analyze discourse markers to speak clearly on a specific topic in informal discussions
- Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.
- Create a coherent paragraph interpreting a figure/graph/chart/table

(19A04101) ELECTRONICS & COMMUNICATION ENGINEERING WORKSHOP

Course Objectives:

- To introduce electronic components, measuring instruments and tools used in electronic workshop.
- To equip with the knowledge of understanding data sheets of electronic components
- To give practical experience on soldering the electronic components on a PCB
- To introduce EDA tools
- To know about the internal parts of a computer, assembling a computer from the parts, preparing a computer for use by installing the operating system
- To provide training on Productivity tools like word processors, spreadsheets, presentations
- To provide knowledge in understanding working of various communication systems

List of Exercises / Experiments:

1. Familiarization of commonly used Electronic Workshop Tools : Bread board, Solder, cables, relays, switches, connectors, fuses, Cutter, plier, screwdriver set, wire stripper, flux, knife/blade, soldering iron, de-soldering pump etc.
 - Provide some exercises so that electronics hardware tools and instruments are learned to be used by the students
2. Familiarization of Electronic Measuring Instruments like Voltmeters, Ammeters, multimeter, LCR-Q meter, Power Supplies, CRO, DSO, Function Generator, Frequency counter.
 - Provide some exercises so that electronic measuring instruments are learned to be used by the students
3. Electronic Components:
Familiarization/Identification of electronic components (Resistors, Capacitors, Inductors, Diodes, transistors, IC's etc.) – Functionality, type, size, color coding, package, symbol, cost etc.
4. Testing of electronic components like Resistor, Capacitor, Diode, Transistor, ICs etc.
 - Compare values of components like resistors, inductors, capacitors etc with the measured values by using electronic instruments
5. Study of Cathode Ray Oscilloscope (CRO)
 - Find the Amplitude and Frequency of a signal
 - Measure the Unknown Frequency & Phase difference of signals using Lissajous figures

6. Interpret data sheets of discrete components and IC's.
 - Write important specifications/ratings of components & ICs and submit it in the form of a report
7. Introduction to EDA Tools: MULTISIM/PSPICE/TINA schematic capture tool, Learning of basic functions of creating a new project, getting and placing parts, connecting placed parts, simulating the schematic, plotting and analyzing the results.
 - Provide some exercises so that students are familiarized in using EDA tools
8. Assembling and Testing of simple electronic circuits on breadboards; identifying the components and its location on the PCB, soldering of the components, testing the assembled circuit for correct functionality.
9. Familiarization with Computer Hardware & Operating System:
 - Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report.
 - Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods available (eg: beeps). Students should record the process of assembling and trouble shooting a computer.
 - Install Operating system on the computer. Students should record the entire installation process.
10. Familiarization with Office Tools
 - Word Processor: Able to create documents using the word processor tool. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied.
 - Spreadsheet: Able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells.
 - Presentations: creating, opening, saving and running the presentations, Selecting the style for slides, formatting the slides with different fonts, colors, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyper-linking, running the slide show, setting the timing for slide show.
11. Familiarization of PA system with different microphones, loud speakers, mixer etc. Represent the same in the form of diagrams, write specifications and submit it in the form of a report.

12. Understand working of various Communication Systems like Television, Satellite Transmitter & Receiver, Radio Receiver, Mobile Phone. Prepare demo boards/charts of various communication systems.

Course Outcomes:

- Identify discrete components and ICs (L3)
- Assemble simple electronic circuits over a PCB (L3)
- Testing of various components (L4)
- Interpret specifications (ratings) of the component (L5)
- Demonstrate disassembling and assembling a Personal Computer and make the computer ready to use (L2)
- Make use of Office tools for preparing documents, spread sheets and presentations (L3)
- Demonstrate working of various communication systems (L2)

(19A56101P) APPLIED PHYSICS LAB
(ECE, CSE, CSSE, EEE, EIE& IT Branches)

Course Objectives:

- Understands the concepts of interference and diffraction and their applications.
- Understand the role of optical fiber parameters in communication.
- Recognize the importance of energy gap in the study of conductivity and hall effect in a semiconductor.
- Illustrates the magnetic and dielectric materials applications.
- Apply the principles of semiconductors in various electronic devices.

Note: In the following list, out of 15 experiments, any 12 experiments must be performed in a semester

List of Physics Experiments

1. Determine the thickness of the wire using wedge shape method
Experimental outcomes:
operates optical instrument like travelling microscope. (L2)
estimate the thickness of the wire using wedge shape method (L2)
Identifies the formation of interference fringes due to reflected light from non uniform thin film. (L2)
2. Determination of the radius of curvature of the lens by Newton's ring method
Experimental outcomes:
operates optical instrument like travelling microscope. (L2)
estimate the radius of curvature of the lens (L2)
Identifies the formation of interference fringes due to reflected light from non uniform thin film. (L2)
plots the square of the diameter of a ring with no. of rings (L3)
3. Determination of wavelength by plane diffraction grating method
Experimental outcomes:
operates optical instrument like spectrometer. (L2)
estimate the wavelength of the given source (L2)
Identifies the formation of grating spectrum due to diffraction. (L2)
4. Dispersive power of a diffraction grating
Experimental outcomes:
operates optical instrument like spectrometer. (L2)
estimate the wavelength of the given source (L2)
Identifies the formation of grating spectrum due to diffraction. (L2)
5. Resolving power of a grating
Experimental outcomes:
operates optical instrument like spectrometer. (L2)
estimate the resolving power of the grating (L2)
Illustrates the role of resolving power in various optical instruments. (L3)
6. Determination of dielectric constant by charging and discharging method.

- Experimental outcomes:
operates various instruments and connect them as per the circuit. (L2)
estimate the dielectric constant of the given substance. (L2)
Identifies the significance of dielectric constant in various devices. (L2)
7. Magnetic field along the axis of a circular coil carrying current.
Experimental outcomes:
operates various instruments and connect them as per the circuit. (L2)
estimate the magnetic field along the axis of a circular coil carrying current. (L2)
plots the intensity of the magnetic field of circular coil carrying current with distance (L3)
 8. To determine the self inductance of the coil (L) using Anderson's bridge.
Experimental outcomes:
operates various instruments and connect them as per the circuit. (L2)
estimate the self inductance of the coil using Anderson's bridge. (L2)
Identifies the significance of self inductance of the coil in electric devices. (L2)
 9. Study the variation of B versus H by magnetizing the magnetic material (B-H curve)
Experimental outcomes:
operates various instruments and connect them as per the circuit. (L2)
estimate the hysteresis loss, coercivity and retentivity of the ferromagnetic material.. (L2)
classifies the soft and hard magnetic material based on B-H curve. (L2)
plots the magnetic field H and flux density B (L3)
 10. To determine the numerical aperture of a given optical fiber and hence to find its acceptance angle
Experimental outcomes:
operates various instruments and connect them as per the circuit. (L2)
estimate the numerical aperture and acceptance angle of a given optical fiber. (L2)
Identifies the significance of numerical aperture and acceptance angle of a optical fiber in various engineering applications. (L2)
 11. Measurement of magnetic susceptibility by Gouy's method
Experimental outcomes:
operates various instruments and connect them as per the circuit. (L2)
estimate the magnetic susceptibility of the given material. (L2)
Identifies the significance of magnetic susceptibility in various engineering applications. (L2)
 12. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.
Experimental outcomes:
operates various instruments and connect them as per the circuit. (L2)
estimate the charge carrier concentration and mobility in a semiconductor. (L2)
Illustrates the applications of hall effect. (L3)
plots the voltage with current and voltage with magnetic field (L3)
 13. To determine the resistivity of semiconductor by Four probe method

Experimental outcomes:

operates various instruments and connect them as per the circuit. (L2)

estimate the resistivity of a semiconductor. (L2)

Identifies the importance of Four probe method in finding the resistivity of semiconductor. (L3)

14. To determine the energy gap of a semiconductor

Experimental outcomes:

operates various instruments and connect them as per the circuit. (L2)

estimate the energy gap of a semiconductor. (L2)

Illustrates the engineering applications of energy gap . (L3)

plots $1/T$ with $\log R$ (L3)

15. Measurement of resistance with varying temperature.

Experimental outcomes:

operates various instruments and connect them as per the circuit. (L2)

estimate the resistance with varying temperature. (L2)

plots **resistance** R with temperature T (L3)

Course Outcomes:

The students will be able to

- **operate** optical instruments like microscope and spectrometer (L2)
- **determine** thickness of a hair/paper with the concept of interference (L2)
- **estimate** the wavelength of different colors using diffraction grating and resolving power (L2)
- **plot** the intensity of the magnetic field of circular coil carrying current with distance (L3)
- **evaluate** the acceptance angle of an optical fiber and numerical aperture (L3)
- **determine** magnetic susceptibility of the material and its losses by B-H curve (L3)
- **determine** the resistivity of the given semiconductor using four probe method (L3)
- **identify** the type of semiconductor i.e., n-type or p-type using hall effect (L3)
- **calculate** the band gap of a given semiconductor (L3)

References Books:

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.
2. <http://vlab.amrita.edu/index.php> -Virtual Labs, Amrita University

(19A05101P) PROBLEM SOLVING AND PROGRAMMING LAB
(Common to All Branches of Engineering)

Laboratory Experiments#

1. Assemble and disassemble parts of a Computer
2. Design a C program which reverses the number
3. Design a C program which finds the second maximum number among the given list of numbers.
4. Construct a program which finds the kth smallest number among the given list of numbers.
5. Design an algorithm and implement using C language the following exchanges
$$a \leftarrow b \leftarrow c \leftarrow d$$
6. Develop a C Program which counts the number of positive and negative numbers separately and also compute the sum of them.
7. Implement the C program which computes the sum of the first n terms of the series
$$\text{Sum} = 1 - 3 + 5 - 7 + 9$$
8. Design a C program which determines the numbers whose factorial values are between 5000 and 32565.
9. Design an algorithm and implement using a C program which finds the sum of the infinite series
$$1 - x^2/2! + x^4/4! - x^6/6! + \dots$$
10. Design a C program to print the sequence of numbers in which each number is the sum of the three most recent predecessors. Assume first three numbers as 0, 1, and 1.
11. Implement a C program which converts a hexadecimal, octal and binary number to decimal number and vice versa.
12. Develop an algorithm which computes the all the factors between 1 to 100 for a given number and implement it using C.
13. Construct an algorithm which computes the sum of the factorials of numbers between m and n.
14. Design a C program which reverses the elements of the array.
15. Given a list of n numbers, Design an algorithm which prints the number of stars equivalent to the value of the number. The stars for each number should be printed horizontally.
16. Implement the sorting algorithms a. Insertion sort b. Exchange sort c. Selection sort

d.. Partitioning sort.

17. Illustrate the use of auto, static, register and external variables.

18. Design algorithm and implement the operations creation, insertion, deletion, traversing on a singly linked list.

19. Develop a C program which takes two numbers as command line arguments and finds all the common factors of those two numbers.

20. Design a C program which sorts the strings using array of pointers.

The above list is not exhaustive. Instructors may add some experiments to the above list. Moreover, 50% of the experiments are to be changed every academic year. Instructors can choose the experiments, provided those experiments are not repetitions.

Course outcomes: Student should be able to

1. Construct a Computer given its parts (L6)
2. Select the right control structure for solving the problem (L6)
3. Analyze different sorting algorithms (L4)
4. Design solutions for computational problems (L6)
5. Develop C programs which utilize the memory efficiently using programming constructs like pointers.

References:

1. B. Govindarajulu, “IBM PC and Clones Hardware Trouble shooting and Maintenance”, Tata McGraw-Hill, 2nd edition, 2002.
2. R.G. Dromey, “How to Solve it by Computer”. 2014, Pearson.

(19A52101P) COMMUNICATIVE ENGLISH I LAB
(Common to All Branches of Engineering)

Introduction

The course is designed to train students in receptive (listening and reading) as well as productive and interactive (speaking and writing) skills by incorporating a comprehensive, coherent and integrated approach that improves the learners' ability to effectively use English language in academic/ workplace contexts. The shift is from *learning about the language* to *using the language*. On successful completion of the compulsory English language course/s in B.Tech., learners would be confident of appearing for international language qualification/proficiency tests such as IELTS, TOEFL, or BEC, besides being able to express themselves clearly in speech and competently handle the writing tasks and verbal ability component of campus placement tests. Activity based teaching-learning methods would be adopted to ensure that learners would engage in actual use of language both in the classroom and laboratory sessions.

Course Objectives

- To expose the students to variety of self instructional, learner friendly modes of language learning
- To help the students cultivate the habit of reading passages from the computer monitor. Thus providing them with the required facility to face computer based competitive exams like GRE, TOEFL, and GMAT etc.
- To enable them to learn better pronunciation through stress, intonation and rhythm
- To train them to use language effectively to face interviews, group discussions, public speaking
- To initiate them into greater use of the computer in resume preparation, report writing, format making etc

Course Outcomes

- CO1: To remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
- CO2: To apply communication skills through various language learning activities
- CO3: To analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
- CO4: To evaluate and exhibit acceptable etiquette essential in social and professional settings
- CO5: To create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

Unit 1

1. Phonetics for listening comprehension of various accents
2. Reading comprehension
3. Describing objects/places/persons

Learning Outcomes

At the end of the module, the learners will be able to

- understand different accents spoken by native speakers of English
- employ suitable strategies for skimming and scanning on monitor to get the general idea of a text and locate specific information
- learn different professional registers and specific vocabulary to describe different persons, places and objects

Unit 2

1. JAM
2. Small talks on general topics
3. Debates

Learning Outcomes

At the end of the module, the learners will be able to

- produce a structured talk extemporarily
- comprehend and produce short talks on general topics
- participate in debates and speak clearly on a specific topic using suitable discourse markers

Unit 3

1. Situational dialogues – Greeting and Introduction
2. Summarizing and Note making
3. Vocabulary Building

Learning Outcomes

At the end of the module, the learners will be able to

- Learn different ways of greeting and introducing oneself/others
- summarize the content with clarity and precision and take notes while listening to a talk/lecture and make use of them to answer questions
- replenish vocabulary with one word substitutes, homonyms, homophones, homographs to reduce errors in speech and writing

Unit4

1. Asking for Information and Giving Directions
2. Information Transfer
3. Non-verbal Communication – Dumb Charade

Learning Outcomes

At the end of the module, the learners will be able to

- Learn different ways of asking information and giving directions
- Able to transfer information effectively
- understand non-verbal features of communication

Unit 5

1. Oral Presentations
2. Précis Writing and Paraphrasing
3. Reading Comprehension and spotting errors

Learning Outcomes

At the end of the module, the learners will be able to

- make formal oral presentations using effective strategies
- learn different techniques of précis writing and paraphrasing strategies
- comprehend while reading different texts and edit short texts by correcting common errors

Reference Books

- English in Action, 1st Edition, 2019, Maruthi Publications.
- Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.
- Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking*. Heinley ELT; 2nd Edition, 2018.
- Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
- Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012.

Sample Web Resources

Grammar/Listening/Writing

1-language.com

<http://www.5minuteenglish.com/>

<https://www.englishpractice.com/>

Grammar/Vocabulary

[English Language Learning Online](http://www.bbc.co.uk/learningenglish/)

<http://www.bbc.co.uk/learningenglish/>

<http://www.better-english.com/>

<http://www.nonstopenglish.com/>

<https://www.vocabulary.com/>

[BBC Vocabulary Games](#)

[Free Rice Vocabulary Game](#)

Reading

<https://www.usingenglish.com/comprehension/>

<https://www.englishclub.com/reading/short-stories.htm>

<https://www.english-online.at/>

Listening

<https://learningenglish.voanews.com/z/3613>

<http://www.englishmedialab.com/listening.html>

Speaking

<https://www.talkenglish.com/>

[BBC Learning English – Pronunciation tips](#)

[Merriam-Webster – Perfect pronunciation Exercises](#)

All Skills

<https://www.englishclub.com/>

<http://www.world-english.org/>

<http://learnenglish.britishcouncil.org/>

Online Dictionaries

[Cambridge dictionary online](#)

[MacMillan dictionary](#)

[Oxford learner's dictionaries](#)

(19A04201T) NETWORK THEORY
(ECE)

Course Objectives:

- To introduce basic laws, mesh & nodal analysis techniques for solving electrical circuits
- To impart knowledge on applying appropriate theorem for electrical circuit analysis
- To explain transient behavior of circuits in time and frequency domains
- To teach concepts of resonance
- To introduce open circuit, short circuit, transmission, hybrid parameters and their interrelationship.

UNIT 1 Introduction to Electrical Circuits

Passive components and their V-I relations, Energy sources - Ideal, Non-ideal, Independent and dependent sources, Source transformation Kirchoff's laws, Star-to-Delta or Delta-to-Star Transformations, Mesh analysis and Nodal analysis problem solving, Super node and Super mesh for DC Excitations.

Unit Outcomes

- Gain knowledge on basic network elements, voltage and current laws (L1)
- Apply Kirchoff's laws, network reduction techniques on simple electrical circuits with dependent & independent sources (L3)
- Solve complex circuits using mesh and nodal analysis techniques (L3)

UNIT 2 Network Theorems

Superposition theorem, Thevenin & Norton theorems, Maximum power transfer theorem, Reciprocity theorem, Millman theorem, Miller Theorem, Tellegan's Theorem, Compensation theorem - problem solving using dependent sources also, Duality and dual networks.

Unit Outcomes:

- Understand significance of duality and dual networks (L2)
- Select appropriate theorem for network simplification (L5)
- Determine maximum power transfer to the load (L5)

UNIT 3 Transients

First order differential equations, Definition of time constants, R-L circuit, R-C circuit with DC excitation, Evaluating initial conditions procedure, second order differential equations, homogeneous, non-homogeneous, problem solving using R-L-C elements with DC excitation and AC (sinusoidal) excitation, Response as related to s-plane rotation of roots. Solutions using Laplace transform method.

Unit Outcomes:

- Understand behavior of circuit elements under switching conditions (L1)
- Analyze response of RL, RC & RLC circuits in time & frequency domains (L4)
- Evaluate initial conditions in RL, RC & RLC circuits (L5)

UNIT 4 Resonance and Coupled Circuits

Self inductance, Mutual inductance, dot rule, coefficient of coupling, Analysis of multi-winding coupled circuits, series & parallel connection of coupled inductors.

Resonance: Introduction, Definition of Q, Series resonance, Bandwidth of series resonance, Parallel resonance, Condition for maximum impedance, current in anti resonance, Bandwidth of parallel resonance, general case resistance present in both branches, anti resonance at all frequencies.

Unit Outcomes:

- Understand magnetically coupled circuits (L1)
- Determine resonant frequency and bandwidth of a simple series or parallel RLC circuit (L5)
- Determine voltages and currents in a resonant circuit (L5)

UNIT 5 Two Port Networks & Network Functions

Two Port Networks, relationship of two port variables, impedance parameters, admittance parameters, transmission parameters, hybrid and inverse hybrid parameters, relationship between parameters, interconnection of two port networks.

Concept of complex frequency, driving point and transfer functions for one port and two port network, poles & zeros of network functions, Restriction on Pole and Zero locations of network function

Unit Outcomes:

- Determine network parameters for given two port network (L5)
- Relate different two port network parameters (L4)
- Represent transfer function for the given network (L4)

Text Books:

1. W. H. Hayt and J. E. Kemmerly, "Engineering Circuit Analysis", McGraw Hill Education, 2013.
2. M. E. Van Valkenburg, "Network Analysis", Prentice Hall, 2006.

References Books:

1. D. Roy Choudhury, "Networks and Systems", New Age International Publications, 1998.
2. Network lines and Fields by John. D. Ryder 2nd edition, Asia publishing house.
3. Bhise, Chadda, Kulshreshtha, "Engineering network analysis and filter design" Umesh Publication, 2000.
4. Joseph Edminister and Mahmood Nahvi, "Electric Circuits", Schaum's Outline Series, Fourth Edition, Tata McGraw Hill Publishing Company, New Delhi, 2003.

Course Outcomes:

- Solve network problems using mesh and nodal analysis techniques (L3)
- Analyze networks using Thevenin, Norton, Maximum power transfer, Superposition, Miller and Millman theorems (L4)
- Compute responses of first order and second order networks using time & frequency domain analysis (L5)
- Design resonant circuits for given bandwidth (L6)
- Utilize z , y , ABCD and h parameters for analyzing two port circuit behavior (L3)

(19A54201) DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS
(Civil, Mechanical, EEE, ECE and EIE)

Course Objectives:

- 1) To enlighten the learners in the concept of differential equations and multivariable calculus.
- 2) To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.

UNIT 1: Linear differential equations of higher order

8hrs

Definitions, complete solution, operator D, rules for finding complimentary function, inverse operator, rules for finding particular integral, method of variation of parameters.

Learning Outcomes:

At the end of this unit, the student will be able to

- identify the essential characteristics of linear differential equations with constant coefficients (L3)
- solve the linear differential equations with constant coefficients by appropriate method (L3)

UNIT 2: Equations reducible to Linear Differential Equations

8hrs

Cauchy's and Legendre's linear equations, simultaneous linear equations with constant coefficients, Applications to L-C-R Circuit problems and Mass spring system.

Learning Outcomes:

At the end of this unit, the student will be able to

- classify and interpret the solutions of linear differential equations (L3)
- formulate and solve the higher order differential equation by analyzing physical situations (L3)

UNIT 3: Partial Differential Equations

8 hrs

First order partial differential equations, solutions of first order linear and non-linear PDEs. Solutions to homogenous and non-homogenous higher order linear partial differential equations.

Learning Outcomes:

At the end of this unit, the student will be able to

- apply a range of techniques to find solutions of standard PDEs (L3)
- outline the basic properties of standard PDEs (L2)

UNIT4: Vector differentiation

8hrs

Scalar and vector point functions, vector operator ∇ , ∇ applies to scalar point functions-Gradient, ∇ applied to vector point functions-Divergence and Curl, vector identities.

Learning Outcomes:

At the end of this unit, the student will be able to

- apply ∇ to Scalar and vector point functions (L3)
- illustrate the physical interpretation of Gradient, Divergence and Curl (L3)

UNIT 5: Vector integration

8hrs

Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and applications of these theorems.

Learning Outcomes:

At the end of this unit, the student will be able to

- find the work done in moving a particle along the path over a force field (L4)
- evaluate the rates of fluid flow along and across curves (L4)
- apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals (L3)

Text Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.

Reference Books:

1. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2011.
2. Michael Greenberg, Advanced Engineering Mathematics, 2/e, Pearson, 2018
3. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
4. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
5. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.
6. Michael Greenberg, Advanced Engineering Mathematics, 9th edition, Pearson edn
7. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press
8. Peter O'Neil, Advanced Engineering Mathematics, Cengage Learning.
9. R.L. Garg Nishu Gupta, Engineering Mathematics Volumes-I & II, Pearson Education
10. B. V. Ramana, Higher Engineering Mathematics, Mc Graw Hill Education.
11. H. K. Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand.
12. N. Bali, M. Goyal, C. Watkins, Advanced Engineering Mathematics, Infinity Science Press.

Course Outcomes:

At the end of the course, the student will be able to

- solve the differential equations related to various engineering fields (L6)
- Identify solution methods for partial differential equations that model physical processes (L3)
- interpret the physical meaning of different operators such as gradient, curl and divergence (L5)
- estimate the work done against a field, circulation and flux using vector calculus (L6)

(19A51102T) CHEMISTRY
(CSE, CSSE, ECE, EIE, EEE and IT)

Course Objectives:

- To familiarize engineering chemistry and its applications
- To train the students on the principles and applications of electrochemistry and polymers
- To introduce instrumental methods, molecular machines and switches

Unit 1: Structure and Bonding Models:

(10 hrs)

Planck's quantum theory, dual nature of matter, Schrodinger equation, significance of Ψ and Ψ^2 , applications to hydrogen, particle in a box and their applications for conjugated molecules, molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules – energy level diagrams of O_2 and CO, etc. π -molecular orbitals of butadiene and benzene, calculation of bond order, crystal field theory – salient features – splitting in octahedral and tetrahedral geometry, magnetic properties and colour, band theory of solids – band diagrams for conductors, semiconductors and insulators, role of doping on band structures.

Learning Outcomes:

At the end of this unit, the students will be able to

- **apply** Schrodinger wave equation to hydrogen and particle in a box (L3)
- **illustrate** the molecular orbital energy level diagram of different molecular species (L2)
- **explain** the band theory of solids for conductors, semiconductors and insulators (L2)
- **discuss** the magnetic behaviour and colour of complexes (L3)

Unit 2: Electrochemistry and Applications:

(10 hrs)

Electrodes – concepts, reference electrodes (Calomel electrode, Ag/AgCl electrode and glass electrode) electrochemical cell, Nernst equation, cell potential calculations, numerical problems, potentiometry- potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations), photovoltaic cell – working and applications, photogalvanic cells with specific examples. Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples.

Primary cells – Zinc-air battery, Fuel cells, hydrogen-oxygen, methanol fuel cells – working of the cells.

Secondary cells – lead acid, and lithium ion batteries- working of the batteries including cell reactions.

Learning Outcomes:

At the end of this unit, the students will be able to

- **apply** Nernst equation for calculating electrode and cell potentials (L3)

- **differentiate** between pH metry, potentiometric and conductometric titrations (L2)
- **explain** the theory of construction of battery and fuel cells (L2)
- **solve** problems based on cell potential (L3)

Unit 3: Polymer Chemistry:

(10 hrs)

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, copolymerization (stereospecific polymerization) with specific examples and mechanisms of polymer formation.

Plastics - Thermoplastics and Thermosettings, Preparation, properties and applications of – Bakelite, urea-formaldehyde, Nylon-66, carbon fibres, Elastomers–Buna-S, Buna-N–preparation, properties and applications.

Conducting polymers – polyacetylene, polyaniline, polypyrroles – mechanism of conduction and applications.

Learning Outcomes:

At the end of this unit, the students will be able to

- **explain** the different types of polymers and their applications (L2)
- **explain** the preparation, properties and applications of Bakelite, Nylon-66, and carbon fibres (L2)
- **describe** the mechanism of conduction in conducting polymers (L2)
- **discuss** Buna-S and Buna-N elastomers and their applications (L2)

Unit 4: Instrumental Methods and Applications

(10 hrs)

Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. Principle and applications of pH metry, potentiometry, conductometry, UV-Visible, IR and NMR Spectroscopies. Principles of Gas Chromatography (GC) and High Performance Liquid Chromatography (HPLC), separation of gaseous mixtures and liquid mixtures

Learning outcomes:

After completion of Module IV, students will be able to

- **explain** the different types of spectral series in electromagnetic spectrum (L2)
- **understand** the principles of different analytical instruments (L2)
- **explain** the different applications of analytical instruments (L2)

Unit 5: Molecular Machines and Molecular Switches:

(10 hrs)

Concepts and terms of supra molecular chemistry, complementarity, Basic Lock and Key principle, examples of Supramolecules, Molecular recognition- cation binding, anion binding, simultaneous cation and anion binding, supramolecular reactivity and catalysis

Self assembly in biological systems, Synthetic systems- catenanes, rotaxanes, metal ion assisted assemblies, template synthesis of macrocyclic ligands

Applications of Supramolecular Devices- Ionic devices, Electronic devices, Switching devices

Learning Outcomes:

At the end of this unit, the students will be able to

- **explain** the band theory of solids for conductors, semiconductors and insulators (L2)
- **explains** supramolecular chemistry and self assembly (L2)
- **demonstrate** the application of Rotaxanes and Catenanes as artificial molecular machines (L2)

Text Books:

1. Jain and Jain, Engineering Chemistry, 16/e, Dhanpat Rai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

Reference Books:

1. J. D. Lee, Concise Inorganic Chemistry, 5/e, Oxford University Press, 2008.
2. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.
3. J.M. Lehn, Supra Molecular Chemistry, VCH Publications

Course Outcomes:

At the end of the course, the students will be able to

- **compare** the materials of construction for battery and electrochemical sensors (L2)
- **explain** the preparation, properties, and applications of thermoplastics & thermosetting, elastomers & conducting polymers. (L2)
- **explain** the principles of spectrometry, GC and HPLC in separation of gaseous and liquid mixtures (L2)
- **apply** the principle of supramolecular chemistry in application of molecular machines and switches (L3)

(19A05201T) DATA STRUCTURES
(Common to All Branches of Engineering)

Course Objectives:

1. To teach the representation of solution to the problem using algorithm
2. To explain the approach to algorithm analysis
3. To introduce different data structures for solving the problems
4. To demonstrate modeling of the given problem as a graph
5. To elucidate the existing hashing techniques

Unit – 1: Introduction

Algorithm Specification, Performance analysis, Performance Measurement. Arrays: Arrays, Dynamically Allocated Arrays. Structures and Unions. Sorting: Motivation, Quick sort, How fast can we sort, Merge sort, Heap sort

Learning Outcomes :

Student should be able to

1. Analyze the given algorithm to find the time and space complexities.(L4)
2. Select appropriate sorting algorithm (L4)
3. Design a sorting algorithm (L6)

Unit – 2: Stack, Queue and Linked lists

Stacks, Stacks using Dynamic Arrays, Queues, Circular Queues Using Dynamic Arrays, Evaluation of Expressions, Multiple Stacks and Queues. Linked lists: Singly Linked Lists and Chains, Representing Chains in C, Linked Stacks and Queues, Additional List Operations, Doubly Linked Lists.

Learning outcomes: Student should be able to

1. Evaluate expressions (L5)
2. Develop the applications using stacks and queues (L3)
3. Construct the linked lists for various applications (L6)

Unit – 3 :Trees

Introduction, Binary Trees, Binary Tree Traversals, Additional Binary Tree Operations, Binary Search Trees, Counting Binary Trees, Optimal Binary search Trees, AVL Trees. B-Trees: B-Trees, B + Trees.

Learning outcomes

1. Explain the concept of a tree (L2)
2. Compare different tree structures (L4)
3. Apply trees for indexing (L3)

Unit – 4 : Graphs and Hashing

The Graph Abstract Data Type, Elementary Graph Operations, Minimum Cost Spanning Trees, Shortest Paths and Transitive Closure

Hashing: Introduction to Hash Table, Static Hashing, Dynamic Hashing.

Learning outcomes:

Student should be able to

1. Recognize the importance of Graphs in solving real world problems (L2)
2. Apply various graph traversal methods to applications (L3)
3. Design a minimum cost solution for a problem using spanning trees (L6)
4. Select the appropriate hashing technique for a given application (L5)
5. Design a hashing technique (L6)

Unit – 5: Files and Advanced sorting

File Organization: Sequential File Organization, Direct File Organization, Indexed Sequential File Organization.

Advanced sorting: Sorting on Several keys, List and Table sorts, Summary of Internal sorting, External sorting.

Learning outcomes: Student should be able to

1. Organize data in the form of Files (L6)
2. Apply sorting on large amount of data (L3)

Text Books:

1. Ellis Horowitz, Sartaj Sahni and Susan Anderson Freed “Fundamentals of Data Structures in C”, 2nd Edition, University Press, 2007.
2. Alan L. Tharp, “File Organization and Processing”, Wiley and Sons, 1988.

Reference Books:

1. D. Samanta, “Classic Data Structures”, 2nd Edition, Prentice-Hall of India, Pvt. Ltd., India, 2012.
2. Peter Bras, “Advanced Data Structures”, Cambridge University Press, 2016
3. Richard F.Gilberg, Behrouz A.Forouzan, “Data Structures A Pseudo code Approach with C”, Second Edition, Cengage Learning 2005.

Course Outcomes:

Students should be able to

1. Select Appropriate Data Structure for solving a real world problem (L4)
2. Select appropriate file organization technique depending on the processing to be done (L4)
3. Construct Indexes for Databases (L6)
4. Analyse the Algorithms (L4)
5. Develop Algorithm for Sorting large files of data (L3)

(19A03101) ENGINEERING WORKSHOP
(Common to all branches)

Course Objective:

To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills

Wood Working:

Familiarity with different types of woods and tools used in wood working and make following joints

- a) Half – Lap joint
- b) Mortise and Tenon joint
- c) Corner Dovetail joint or Bridle joint

Sheet Metal Working:

Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets

- a) Tapered tray
- b) Conical funnel
- c) Elbow pipe
- d) Brazing

Fitting:

Familiarity with different types of tools used in fitting and do the following fitting exercises

- a) V-fit
- b) Dovetail fit
- c) Semi-circular fit
- d) Bicycle tire puncture and change of two wheeler tyre

Electrical Wiring:

Familiarities with different types of basic electrical circuits and make the following connections

- a) Parallel and series
- b) Two way switch
- c) Godown lighting
- d) Tube light
- e) Three phase motor
- f) Soldering of wires

Course Outcomes:

After completion of this lab the student will be able to

1. apply wood working skills in real world applications. (L3)
2. build different parts with metal sheets in real world applications. (L3)
3. apply fitting operations in various applications. (L3)
4. apply different types of basic electric circuit connections. (L3)
5. demonstrate soldering and brazing. (L2)

(19A03102) ENGINEERING GRAPHICS LAB
(Common to All Branches of Engineering)

Course Objectives:

- Bring awareness that Engineering Drawing is the Language of Engineers.
- Familiarize how industry communicates technical information.
- Teach the practices for accuracy and clarity in presenting the technical information.
- Develop the engineering imagination essential for successful design.
- Instruct the utility of drafting & modeling packages in orthographic and isometric drawings.
- Train the usage of 2D and 3D modeling.
- Instruct graphical representation of machine components.

Part A: Manual Drawing: (7 Classes)

Introduction to Engineering graphics: Principles of Engineering Graphics and their significance-Conventions in drawing-lettering - BIS conventions.

- a) Conic sections including the rectangular hyperbola- general method only,
- b) Cycloid, epicycloids and hypocycloid
- c) Involute

(2L + 6P hrs)

Projection of points, lines and planes: Projection of points in any quadrant, lines inclined to one or both planes, finding true lengths, angle made by line. Projections of regular plane surfaces. **(2L + 6P hrs)**

Projections of solids: Projections of regular solids inclined to one or both planes by rotational or auxiliary views method. **(1L + 3P hrs)**

Sections of solids: Section planes and sectional view of right regular solids- prism, cylinder, pyramid and cone. True shapes of the sections. **(1L + 3P hrs)**

Development of surfaces: Development of surfaces of right regular solids-prism, cylinder, pyramid, cone and their sectional parts. **(1L + 6P hrs)**

Part B: Computer Aided Drafting: (6 Classes)

Introduction to AutoCAD: Basic drawing and editing commands: line, circle, rectangle, erase, view, undo, redo, snap, object editing, moving, copying, rotating, scaling, mirroring, layers, templates, polylines, trimming, extending, stretching, fillets, arrays, dimensions.
(1L + 3P hrs)

Dimensioning principles and conventional representations.

Orthographic Projections: Systems of projections, conventions and application to orthographic projections. (3L + 9P hrs)

Isometric Projections: Principles of isometric projection- Isometric scale; Isometric views: lines, planes, simple solids. (2L + 6P hrs)

Text Books:

1. K.L.Narayana & P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.
2. Venugopal, Engineering Drawing and Graphics, 3/e, New Age Publishers, 2000

Reference Books:

1. Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2009
2. N.D.Bhatt, Engineering Drawing, 53/e, Charotar Publishers, 2016.
3. Shah and Rana, Engineering Drawing, 2/e, Pearson Education, 2009
4. K.C.John, Engineering Graphics, 2/e, PHI, 2013
5. Basant Agarwal & C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

Course Outcomes:

After completing the course, the student will be able to

- draw various curves applied in engineering. (L2)
- show projections of solids and sections graphically. (L2)
- draw the development of surfaces of solids. (L3)
- use computers as a drafting tool. (L2)
- draw isometric and orthographic drawings using CAD packages. (L3)

Note:

1. Manual (part A) and Computer Aided Drafting (part B) classes can be held in alternative weeks for optimal utilization of computer facilities.
2. External examinations to be conducted both manual and computer mode with equal weight of marks.

Additional Sources

1. Youtube: <http://sewor.carleton.ca/kardos/88403/drawings.html> conic sections-online, red woods.edu

**(19A04201P) NETWORK THEORY LAB
(ECE)**

Course Objectives:

- To gain hands on experience in verifying Kirchoff's laws and network theorems
- To analyze transient behavior of circuits
- To study resonance characteristics
- To determine 2-port network parameters

List of Experiments:

Any 10 of the following experiments are to be conducted in Hardware & Simulation (Multisim/Open source software):

1. Verification of Kirchoff's Laws
2. Apply Mesh & Nodal Analysis techniques for solving electrical circuits (problems with dependent sources also)
3. Verification of Superposition & Reciprocity Theorem
4. Verification of Thevenin's and Norton's Theorem
5. Verification of Maximum Power Transfer Theorem
6. Verification of Millman and Miller Theorem
7. Measure and calculate RC time constant for a given RC circuit
8. Measure and calculate RL time constant for a given RL circuit
9. Measure and analyze (settling time, overshoot, undershoot, etc.) step response of for a given series RLC circuit for following cases:
 - (i) $\zeta = 1$ (critically damped system)
 - (ii) $\zeta > 1$ (over damped system)
 - (iii) $\zeta < 1$ (under damped system)Choose appropriate values of R, L, and C to obtain each of above cases one at a time.
10. Design a series RLC resonance circuit. Plot frequency response and find resonance frequency, Bandwidth, Q – factor.
11. Design a parallel RLC resonance circuit. Plot frequency response and find resonance frequency, Bandwidth, Q – factor.
12. Measure and calculate Z, Y parameters of two-port network.
13. Measure and calculate ABCD & h parameters of two-port network.

Course Outcomes:

- Verify Kirchoff's laws and network theorems (L4)
- Measure time constants of RL & RC circuits (L3)
- Analyze behavior of RLC circuit for different cases (L4)
- Design resonant circuit for given specifications (L6)

Characterize and model the network in terms of all network parameters (L3)

(19A51102P) CHEMISTRY LAB
(CSE, CSSE, ECE, EIE, EEE and IT)

Course Objectives:

- Verify the fundamental concepts with experiments

List of Experiments:

1. Measurement of $10Dq$ by spectrophotometric method
2. Models of potential energy surfaces
3. Conductometric titration of (i) strong acid vs. strong base, (ii) weak acid vs. strong base
4. Determination of cell constant and conductance of solutions
5. Potentiometry - determination of redox potentials and emfs
6. Determination of Strength of an acid in Pb-Acid battery
7. Preparation of a polymer
8. Verify Lambert-Beer's law
9. Thin layer chromatography
10. Identification of simple organic compounds by IR and NMR
11. HPLC method in separation of gaseous and liquid mixtures
12. Estimation of Ferrous Iron by Dichrometry.

Course Outcomes:

At the end of the course, the students will be able to

- **determine** the cell constant and conductance of solutions (L3)
- **prepare** advanced polymer materials (L2)
- **measure** the strength of an acid present in secondary batteries (L3)
- **analyse** the IR and NMR of some organic compounds (L3)

(19A05201P) DATA STRUCTURES LAB
(Common to All Branches of Engineering)

Course Objectives:

1. To introduce to the different data structures
2. To elucidate how the data structure selection influences the algorithm complexity
3. To explain the different operations that can be performed on different data structures
4. To introduce to the different search and sorting algorithms.

Laboratory Experiments

1. String operations using array of pointers
2. Searching Algorithms (With the Number of Key Comparisons) Sequential, Binary and Fibonacci Search Algorithms.
3. Sorting Algorithms: Insertion Sort, Selection Sort, Shell Sort, Bubble Sort, Quick Sort, Heap Sort, Merge Sort, and Radix Sort. Using the system clock, compute the time taken for sorting of elements. The time for other operations like I/O etc should not be considered while computing time.
4. Implementation of Singly Linked List, Doubly Linked List, Circular Linked List
5. Stack implementation using arrays
6. Stack implementation using linked lists
7. Queue implementation using arrays. Implement different forms of queue. While implementing you should be able to store elements equal to the size of the queue. No positions should be left blank.
8. Queue implementation using linked lists
9. Creation of binary search tree, performing operations insertion, deletion, and traversal.
10. Breadth first search
11. Depth first search
12. Travelling sales man problem
13. File operations
14. Indexing of a file
15. Reversing the links (not just displaying) of a linked list.
16. Consider a linked list consisting of name of a person and gender as a node. Arrange the linked list using 'Ladies first' principle. You may create new linked lists if necessary.
17. An expression can be represented in three ways: infix, prefix and postfix. All the forms are necessary in different contexts. Write modules to convert from one form to another form.
18. A table can be defined as a collection of rows and columns. Each row and

column may have a label. Different values are stored in the cells of the table. The values can be of different data types. Numerical operations like summation, average etc can be performed on rows/columns which contain numerical data. Such operations are to be prevented on data which is not numeric. User may like to insert row/columns in the already existing table. User may like to remove row/column. Create table datatype and support different operations on it.

Course Outcomes:

At the end of the course students should be able to

1. Select the data structure appropriate for solving the problem (L5)
2. Implement searching and sorting algorithms (L3)
3. Design new data types (L6)
4. Illustrate the working of stack and queue (L4)
5. Organize the data in the form of files (L6)

(19A54302) COMPLEX VARIABLES AND TRANSFORMS

(Common to ECE & EEE)

Course Objective:

This course aims at providing the student to acquire the knowledge on the calculus of functions of complex variables. The student develops the idea of using continuous/discrete transforms.

Unit-I:Complex Variable – Differentiation:

Introduction to functions of complex variable-concept of Limit & continuity- Differentiation, Cauchy-Riemann equations, analytic functions (exponential, trigonometric, logarithm), harmonic functions, finding harmonic conjugate-construction of analytic function by Milne Thomson method-Conformal mappings-standard and special transformations ($\sin z$, e^z , $\cos z$, z^2) Mobius transformations (bilinear) and their properties.

Unit Outcomes:

Students will be able to

- Understand functions of Complex variable and its properties.
- Find derivatives of complex functions.
- Understand the analyticity of complex functions .
- Understand the conformal mappings of complex functions.

Unit-II: Complex Variable – Integration:

Line integral-Contour integration, Cauchy's integral theorem, Cauchy Integral formula, Liouville's theorem (without proof) and Maximum-Modulus theorem (without proof);power series expansions: Taylor's series, zeros of analytic functions, singularities, Laurent's series; Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals (around unit circle, semi circle with $f(z)$ not having poles on real axis).

Unit Outcomes:

Students will be able to

- Understand the integration of complex functions.
- Apply Cauchy's integral theorem and Cauchy's integral formula.
- Understand singularities of complex functions.
- Evaluate improper integrals of complex functions using Residue theorem.

Unit-III: Laplace Transforms

Definition-Laplace transform of standard functions-existence of Laplace Transform – Inverse transform – First shifting Theorem, Transforms of derivatives and integrals – Unit step function – Second shifting theorem – Dirac's delta function – Convolution theorem – Laplace transform of Periodic function. Differentiation and integration of transform – solving Initial value problems to ordinary differential equations with constant coefficients using Laplace transforms.

Unit Outcomes:

Students will be able to

- Understand the concept of Laplace transforms and find the Laplace transforms of elementary functions.
- Find the Laplace transforms of general functions using its properties.
- Understand Laplace transforms of special functions(Unit step function, Unit Impulse & Periodic).
- Apply Laplace transforms to solve Differential Equations.

Unit-IV: Fourier series

Determination of Fourier coefficients (Euler's) – Dirichlet conditions for the existence of Fourier series – functions having discontinuity-Fourier series of Even and odd functions – Fourier series in an arbitrary interval – Half-range Fourier sine and cosine expansions- typical wave forms - Parseval's formula- Complex form of Fourier series.

Unit Outcomes:

Students will be able to

- Understand finding Fourier series expression of the given function.
- Determine Fourier coefficients (Euler's) and identify existence of fourier series of the given function.
- Expand the given function in Fourier series given in Half range interval.
- Apply Fourier series to establish Identities among Euler coefficients.
- Find Fourier series of wave forms.

Unit-V: Fourier transforms & Z Transforms:

Fourier integral theorem (without proof) – Fourier sine and cosine integrals-complex form of Fourier integral. Fourier transform – Fourier sine and cosine transforms – Properties – Inverse transforms – convolution theorem .

Z-transform – Inverse z-transform – Properties – Damping rule – Shifting rule – Initial and final value theorems. Convolution theorem – Solution of difference equations by z-transforms.

Unit Outcomes:

Students will be able to

- Find Fourier Sine and cosine integrals.
- Understand Fourier transforms.
- Apply properties of Fourier transforms.
- Understand Z transforms.
- Apply properties of Z transforms.
- Apply Z transforms to solve difference equations.

Course Outcomes:

After the completion of course, students will be able to

- Understand the analyticity of complex functions and conformal mappings.
- Apply Cauchy's integral formula and Cauchy's integral theorem to evaluate improper integrals along contours.
- Understand the usage of Laplace Transforms, Fourier Transforms and Z transforms.
- Evaluate the Fourier series expansion of periodic functions.

Text Books:

1. B.S.Grewal, "Higher Engineering Mathematics", Khanna publishers.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India

Reference Books:

1. B.V.Ramana, Higher, "Engineering Mathematics", Mc Graw Hill publishers.
2. Alan Jeffrey, "Advanced Engineering Mathematics", Elsevier.

(19A04301) SIGNALS AND SYSTEMS

Course Objectives:

- To introduce students to the basic idea of signal and system analysis and its characterization in time and frequency domains.
- To present Fourier tools through the analogy between vectors and signals.
- To teach concept of sampling and reconstruction of signals.
- To analyze characteristics of linear systems in time and frequency domains.
- To understand Laplace and z-transforms as mathematical tool to analyze continuous and discrete-time signals and systems.

Unit I

Signals & Systems: Basic definitions and classification of Signals and Systems (Continuous time and discrete time), operations on signals, Concepts of Convolution and Correlation of signals, Analogy between vectors and signals-Orthogonality, mean square error, Fourier series: Trigonometric & Exponential, Properties of Fourier series, concept of discrete spectrum, Illustrative Problems.

Unit Outcomes:

- Understand different types of signals and systems. (L1)
- State principles of vector spaces and concept of Orthogonality. (L2)
- Describe continuous time signal and discrete time signal. (L2)
- Analyze the periodic signals by applying Fourier series. (L3)

Unit II

Continuous Time Fourier Transform: Definition, Computation and properties of Fourier transform for different types of signals and systems, Inverse Fourier transform. Statement and proof of sampling theorem of low pass signals, Illustrative Problems.

Unit Outcomes:

- Identify system properties based on impulse response and Fourier analysis. (L1)
- Analyze the spectral characteristics of signals. (L3)
- Illustrate signal sampling and its reconstruction. (L2)
- Apply Fourier transform to solve problems. (L2)

Unit III

Discrete Time Fourier Transform: Definition, Computation and properties of Discrete Time Fourier transform for different types of signals and systems, Illustrative Problems.

Unit Outcomes:

- Understand the properties of the discrete-time Fourier transform. (L1)
- Analyse the spectral characteristics of signals using Fourier transform. (L3)
- Evaluate the Fourier transform of Discrete-time signals. (L2)

Unit IV

Signal Transmission Through Linear Systems: Linear system, impulse response, Response of a linear system for different input signals, linear time-invariant (LTI) system, linear time variant (LTV) system, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, System bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Paley-Wiener criterion for physical realization, Relationship between bandwidth and rise time, Energy and Power spectral densities, Illustrative Problems.

Unit Outcomes:

- Understand the impulse response, transfer characteristics of LTI system and various filters. (L1)
- Analyse filter characteristics and physical realisation of LTI system. (L3)
- Apply the relation between bandwidth and rise time & energy and power spectral densities in various applications. (L2)

Unit V

Laplace Transform: Definition, ROC, Properties, Inverse Laplace transforms, the S-plane and BIBO stability, Transfer functions, System Response to standard signals, Solution of differential equations with initial conditions.

Z-Transform: Definition, ROC, Properties, Poles and Zeros in Z-plane, The inverse Z-Transform, System analysis, Transfer function, BIBO stability, System Response to standard signals, Solution of difference equations with initial conditions, Illustrative Problems.

Unit Outcomes:

- Understand the limitations of Fourier transform and need for Laplace transform and develop. (L1)
- Apply transform techniques to analyse discrete-time signals and systems. (L2)

- Evaluate response of linear systems to known inputs by using Laplace transforms. (L2)
- Analyze the continuous-time and discrete-time signals and systems using Laplace and Z- transforms.(L3)

Course Outcomes:

After completion of the course, student will be able to

CO1: Understand the mathematical description and representation of continuous-time and discrete-time signals and systems. Also understand the concepts of various transform techniques. (L1)

CO2: Apply sampling theorem to convert continuous-time signals to discrete-time signals and reconstruct back, different transform techniques to solve signals and system related problems. (L2)

CO3: Analyze the frequency spectra of various continuous-time and discrete-time signals using different transform methods. (L3)

CO4: Classify the systems based on their properties and determine the response of them. (L4)

Text Books:

1. A.V. Oppenheim, A.S. Willsky and S.H. Nawab, “Signals and Systems”, 2nd Edition, PHI, 2009.
2. Simon Haykin and Van Veen, “Signals & Systems”, 2nd Edition, Wiley, 2005.

References:

1. BP Lathi, “Principles of Linear Systems and Signals”, 2nd Edition, Oxford University Press, 015.
2. Matthew Sadiku and Warsame H. Ali, “Signals and Systems A primer with MATLAB”, CRC Press, 2016.
3. Hwei Hsu, “Schaum's Outline of Signals and Systems”, 4th Edition, TMH, 2019.

(19A04302T) ELECTRONIC DEVICES AND CIRCUITS

Course Objectives:

- To acquire fundamental knowledge and expose to the field of semiconductor theory and devices and their applications.
- To introduce different types of semiconductor devices, viz., diodes and special diodes.
- To explain application of diodes as rectifiers, clippers, clampers and regulators.
- To describe operation and characteristics of Bipolar Junction Transistor & Field Effect Transistor.
- To analyze the various biasing circuits using BJTs & FETs.

Unit I:

Semiconductor Diode: Open circuited PN junction, PN junction as a rectifier, Current components in a PN diode, Diode Equation and its mathematical derivation, Volt-Ampere Characteristics, Energy band diagram of PN diode, Temperature dependence of Volt-Ampere Characteristics, Diode resistance (Static and Dynamic resistance), Transition capacitance, Diffusion capacitance, Step graded junction.

Unit Outcomes:

- Study the characteristics and operation of p-n junction diode. (L1)
- Explain the energy band diagram & effect of temperature on the characteristics of diode. (L2)
- Derive the expression for transition capacitance and diffusion capacitance. (L2)

Unit II:

Special Devices: Avalanche breakdown, V-I Characteristics of Zener diode, Zener breakdown, Principle of operation and characteristics of Tunnel diode with the help of Energy band diagram, Photo diode, LED, PIN diode and Varactor diode, Silicon Controlled Rectifier (SCR) and its V-I characteristics, DIAC, TRIAC, Schottky Barrier diode, solar cell, Uni-Junction Transistor (UJT) and its V-I Characteristics, Problem solving.

Unit Outcomes:

- Study the characteristics operation and applications of Zener diode. (L1)
- Explain V-I Characteristics of Tunnel diode, Photo diode, SCR, UJT and other special diodes. (L2)
- Apply concepts of semiconductor devices and solve problems. (L2).

Unit III:

Diode Applications: Diode as switch, Rectifier – Half wave and Full wave rectifier, Bridge rectifier, Ripple factor, PIV, Filters – Inductor and Capacitor Filter, L-section filter, pi-Filter, Zener as voltage regulator, Clipping and Clamping circuits, Detector, Voltage doubler, Problem solving related to diode applications.

Unit Outcomes:

- Understand the circuit operation involving p-n junction and Zener diodes. (L1)
- Analyze the performance of rectifiers with and without filters. (L3)
- Design half wave and full wave rectifier circuits, clippers, clampers and voltage regulator. (L4)
- Compare the various rectifier circuits in terms of their parameter metrics. (L5)

Unit IV:

Bipolar Junction Transistor (BJT):

Transistor – Structure, current components and their relationship, PNP and NPN transistors- Active mode of operation, symbols and conventions, Transistor equations, Transistor as an amplifier, input and output characteristics of Common Base, Common Emitter and Common collector configurations. DC analyses of Common Base, Common Emitter and Common collector circuits.

BJT Biasing: Load line and modes of operations, operating point, Bias stability, fixed bias, self bias, stabilization against variations in I_{CO} , V_{BE} , β , Bias compensation, Thermal runaway, condition for Thermal stability, Problem solving.

Applications: As a switch, as an amplifier.

Unit Outcomes:

- Understand the current components and their relationships in BJT. (L1)
- Explain principle, operation and applications of Bipolar Junction Transistor. (L2)
- Describe input and output Characteristics of Bipolar Junction Transistor. (L2)
- Derive the expression for stability factor of various biasing circuits. (L3)
- Analyse the different configurations (CB,CC,CE).(L3)

Unit V:

Field-Effect Transistors (FET) : Metal Oxide Semiconductor Field-effect Transistor (MOSFET) - structures and V-I characteristics of n-channel Enhancement mode MOSFET, p-channel Enhancement mode MOSFET, n-channel depletion mode MOSFET, p-channel depletion mode MOSFET, symbols and conventions, Complementary MOSFETs (CMOSFETs) - structure, V-I characteristics, symbols and conventions, structure and V-I

characteristics of n-channel and p-channel Junction Field Effect Transistors (JFET), Problem solving.

Biasing Circuits Using MOSFETs and JFETs: Different configurations using MOSFETs and JFET, load line and modes of operation, different biasing circuits (self-bias, voltage divider bias) using MOSFETs and JFETs, DC Analysis of n-channel and p-channel MOSFETs (both Enhancement and Depletion modes), DC analysis of n-channel and p-channel JFETs, Problem solving.

Applications: MOSFETs, JFET as switch and small signal amplifier, CMOS as a switch.

Unit Outcomes:

- Understand the current components and their relationships in Field effect transistors (JFET, MOSFETs). (L1)
- Explain principle, operation and applications of Field effect transistors. (L2)
- Describe input and output Characteristics of Field effect transistors. (L2)
- Analyse the different configurations (CS,CG,CD) and biasing circuits.(L3)

Course Outcomes:

After the completion of the course students will able to

CO1: Understand principle, operation, characteristics and applications of Bipolar Junction Transistor and Field Effect Transistor (L1)

CO2: Describe basic operation and characteristics of various semiconductor devices. (L2)

CO3: Analyze diode circuits for different applications such as rectifiers, clippers and clampers also analyze low frequency and high frequency models of BJT and FET. (L3)

CO4: Design various biasing circuits for BJT and FET. (L4)

CO5: Compare the performance of various semiconductor devices. (L5)

TEXT BOOKS:

1. Donald A Neamen, “Electronic Circuits – analysis and design”, 3rd Edition, McGraw Hill (India), 2019.
2. J. Milliman and C Halkias, “Integrated electronics”, 2nd Edition, Tata McGraw Hill, 1991.

REFERENCES:

1. Behzad Razavi, “Microelectronics”, 2nd edition, Wiley, 2013.
2. R.L. Boylestad and Louis Nashelsky, “Electronic Devices and Circuits,” 9th Edition, Pearson, 2006.
3. Jimmie J Cathey, “Electronic Devices and Circuits,” Schaum’s outlines series, 3rd edition, McGraw-Hill (India), 2010.

Prerequisites: Semiconductor Physics

Emphasis on this terminology: Energy band diagram of Insulators, Semiconductors and Metals, Mobility and Conductivity, Electrons and Holes in Intrinsic semiconductor, Donor and Acceptor impurities, drift and diffusion currents, charge densities and semiconductor. Fermi-Dirac function, Carrier concentrations, Fermi level in an intrinsic semiconductor, Fermi level in a semiconductor having impurities.

(19A04303) PROBABILITY THEORY AND STOCHASTIC PROCESSES

Course Objectives:

- To gain the knowledge of the basic probability concepts and acquire skills in handling situations involving more than one random variable and functions of random variables.
- To understand the principles of random signals and random processes.
- To be acquainted with systems involving random signals.
- To gain knowledge of standard distributions that can describe real life phenomena.

Unit I

Probability Introduced Through Sets and Relative Frequency: Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Probability as a Relative Frequency, Joint Probability, Conditional Probability, Total Probability, Bayes' Theorem, Independent Events, Problem Solving.

Definition of a Random Variable, Conditions for a Function to be a Random Variable, Discrete, Continuous, Mixed Random Variable, Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh, Conditional Distribution, Methods of defining Conditioning Event, Conditional Density, Properties, Problem Solving.

Unit Outcomes:

- Understand the fundamental concepts of probability theory, random variables, and conditional probability. (L1)
- Evaluate the different probability distribution and density functions. (L2)

Unit II

Operations on Single Random Variable: Introduction, Expectation of a random variable, moments-moments about the origin, Central moments, Variance and Skew, Chebyshev's inequality, moment generating function, characteristic function, transformations of random variable.

Multiple Random Variables: Vector Random Variables, Joint Distribution Function, Properties of Joint Distribution, Marginal Distribution Functions, Conditional Distribution and Density – Point Conditioning, Interval conditioning, Statistical Independence, Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem, (Proof not expected), Unequal Distribution, Equal Distributions.

Unit Outcomes:

- Apply the knowledge to the sum of random variables, central limit theorem in communication system (L2).
- Evaluate the single and multiple random variable concepts to expectation, variance and moments (L4).

Unit III

Operations on Multiple Random Variables: Expected Value of a Function of Random Variables, Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties of Gaussian random variables, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

Unit Outcomes:

- Apply the different operations to multiple random variables (L2).
- Understand the concepts of linear transformation of Gaussian random variables (L1).

Unit IV

Random Processes-Temporal Characteristics: The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, concept of Stationarity and Statistical Independence, First-Order Stationary Processes, Second-Order and Wide-Sense Stationarity, N-Order and Strict-Sense Stationarity. Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes, Autocorrelation Function and Its Properties, Cross-Correlation Function and its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process.

Random Processes-Spectral Characteristics: The Power Density Spectrum and its Properties, Relationship between Power Spectrum and Autocorrelation Function, The Cross-Power Density Spectrum and its Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function.

Unit Outcomes:

- Understand and analyze continuous and discrete-time random processes (L1).
- Analyze the concepts and its properties of auto correlation, cross correlation functions and power spectral density (L3).

Unit V

Random Signal Response Of Linear Systems: System Response – Convolution, Mean and Mean squared Value of System Response, autocorrelation Function of Response, Cross-Correlation Functions of Input and Output, Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectrums of Input and Output, Band pass, Band Limited and Narrowband Processes, Properties.

Noise Definitions: White Noise, colored noise and their statistical characteristics, Ideal low pass filtered white noise, RC filtered white noise.

Unit Outcomes:

- Describe the theory of stochastic processes to analyze linear systems (L2).
- Apply the knowledge to linear systems; low pass and band pass noise models for random processes (L2).

Course Outcomes:

After completion of the course, student will be able to

CO1: Understanding the concepts of Probability, Random Variables, Random Processes and their characteristics learn how to deal with multiple random variables, conditional probability, joint distribution and statistical independence. (L1)

CO2: Formulate and solve the engineering problems involving random variables and random processes. (L2)

CO3: Analyze various probability density functions of random variables. (L3)

CO4: Derive the response of linear system for Gaussian noise and random signals as inputs. (L3)

TEXT BOOKS:

1. Peyton Z. Peebles, “Probability, Random Variables & Random Signal Principles”, 4th Edition, TMH, 2002.
2. Athanasios Papoulis and S. Unnikrishna Pillai, “Probability, Random Variables and Stochastic Processes”, 4th Edition, PHI, 2002.

REFERENCES:

1. Simon Haykin, “Communication Systems”, 3rd Edition, Wiley, 2010.
2. Henry Stark and John W. Woods, “Probability and Random Processes with Application to Signal Processing,” 3rd Edition, Pearson Education, 2002.
3. George R. Cooper, Clave D. MC Gillem, “Probability Methods of Signal and System Analysis,” 3rd Edition, Oxford, 1999.

(19A04304) DIGITAL ELECTRONICS AND LOGIC DESIGN

Course Objectives:

- To teach significance of number systems, conversions, binary codes and functionality of logic gates.
- To discuss different simplification methods for minimizing Boolean functions.
- To impart knowledge on operation, characteristics and various configurations of TTL and CMOS logic families.
- To outline procedures for the analysis and design of combinational and sequential logic circuits.
- To introduce programmable logic devices.

Unit I

Number Systems and Codes: Decimal, Binary, Octal, and Hexa-decimal number systems and their conversions, ASCII code, Excess -3 codes, Gray code.

Binary codes Classification, Error detection and correction – Parity generators and checkers – Fixed point and floating-point arithmetic.

Boolean Algebra & Logic Gates: Boolean operations, Boolean functions, Algebraic manipulations, Min-terms and Maxterms, Sum-of-products and Product-of-sum representations, Two-input logic gates, NAND /NOR implementations.

Minimization of Boolean Functions: Karnaughmap, Don't-care conditions, Prime implicants, Minimization of functions using Quine-McClusky method.

Unit Outcomes:

- Summarize advantages of using different number systems. (L2)
- Explain usefulness of different coding schemes and functionality of logic gates. (L2)
- Apply basic laws and De Morgan's theorems to simplify Boolean expressions. (L3)
- Compare K- Map and Q-M methods of minimizing logic functions. (L5)

Unit II

Combinational Circuits: Introduction, Analysis of combinational circuits, Design Procedure– Binary Adder-Subtractor, Decimal Adder, Multiplier, Comparator, Code Converters, Encoders, Decoders, Multiplexers, Demultiplexers, Illustrative examples.

Sequential Circuits-1: Introduction, Latches –RS latch and JK latch, Flip-flops-RS, JK, T and D flip flops, Master-slave flip flops, Edge-triggered flip-flops, Flip-flop conversions.

Unit Outcomes:

- Apply Boolean algebra for describing combinational digital circuits. (L2)
- Analyze standard combinational circuits such as adders, subtractors, multipliers, comparators etc. (L4)
- Design various Combinational logic circuits. (L4)
- Implement logic functions with decoders and multiplexers. (L5)

Unit III

Sequential Circuits-2: Analysis and Design of Synchronous Sequential Circuits: Moore and Mealy machine models, State Equations, State Table, State diagram, State reduction & assignment, Synthesis using flip flops, Elements of Design style, Top-down design, Algorithmic state Machines (ASM), ASM chart notations.

Registers and Counters: Registers, shift registers, Ripple counters, Synchronous counters, Modulus-n Counter, Ring counter, Johnson counter, Up-Down counter.

Unit Outcomes:

- Describe behaviour of Flip-Flops and Latches.(L2)
- Compare Moore and Mealy machine models.(L5)
- Design synchronous sequential circuits using flip flops and construct digital systems using components such as registers and counters (L4)
- Utilize concepts of state and state transition for analysis and design of sequential circuits (L3)

Unit IV

Memory and Programmable Logic: RAM, Types of Memories, Memory decoding, ROM, Types of ROM, Programmable Logic Devices (PLDs): Basic concepts, PROM as PLD, Programmable Array Logic (PAL) and Programmable Logic Array (PLA), Design of combinational and sequential circuits using PLDs.

Unit Outcomes:

- Define RAM, ROM, PROM, EPROM and PLDs. (L1)
- Describe functional differences between different types of RAM & ROM. (L2)
- Compare different types of Programmable Logic Devices. (L5)
- Design simple digital systems using PLDs. (L4)

Unit V

Digital Logic Families: Unipolar and Bipolar Logic Families, Transistor-Transistor Logic (TTL): Operation of TTL, Current sink logic, TTL with active pull up, TTL with open collector output, Shockley TTL, TTL characteristics, I²L, ECL logic Families.

CMOS: CMOS Inverter, CMOS characteristics, CMOS configurations - Wired Logic, Open drain outputs, Interfacing: TTL to CMOS and CMOS to TTL, Tristate Logic, Characteristics of Digital ICs: Speed, power dissipation, figure of merit, fan-out, Current and voltage parameters, Noise immunity, operating temperature range, power supply requirements.

Unit Outcomes:

- Summarize significance of various TTL , I²L, ECL and CMOS subfamilies. (L2)
- Examine Interface aspects of TTL & CMOS logic families. (L5)
- Explain characteristics of digital ICs such as speed, power dissipation, figure of merit, fan-out, noise immunity etc. (L2)
- Compare bipolar and MOS logic families. (L5)

Course Outcomes:

After completion of the course, student will be able to

CO1: Understand various number systems, error detecting, correcting binary codes, logic families, combinational and sequential circuits. (L1)

CO2: Apply Boolean laws, k-map and Q-M methods to minimize switching functions. Also describe the various performance metrics for logic families. (L2)

CO3: Design combinational and sequential logic circuits. (L4)

CO4: Compare different types of Programmable logic devices and logic families. (L5)

TEXTBOOKS:

1. M. Morris Mano and Michael D. Ciletti, "Digital Design", 4th Edition, Pearson Education, 2013.
2. Z. Kohavi and N. K. Jha, "Switching and Finite Automata Theory", 3rd Edition, Tata McGraw Hill, 2010.
3. R. P. Jain, "Modern Digital Electronics", 4th edition, McGraw Hill Education (India Private Limited), 2012.

REFERENCES:

1. Wakerly J.F., "Digital Design: Principles and Practices", 4th Edition, Pearson India, 2008.
2. Charles H Roth (Jr), Larry L. Kinney, "Fundamentals of Logic Design", 5th Edition, Cengage Learning India Edition, 2010.
3. John.M Yarbrough, "Digital Logic Applications and Design", Thomson Learning, 2006.

(19A02304T) ELECTRICAL TECHNOLOGY

Course Objectives: Student can be able to know

- The constructional features of DC machines, different types of DC machines and their characteristic.
- The constructional details of single phase transformer and their performance characteristics by conducting suitable tests.
- The analysis of three phase balanced and unbalanced circuits, Three phase induction motors and their characteristics.
- The constructional feature and operation of synchronous machines.

UNIT- I Dc Generators

D.C. Generators – Principle of Operation – Constructional Features – E. M.F Equation– Numerical Problems – Methods of Excitation – Separately Excited and Self Excited Generators – Build-Up of E.M.F - Critical Field Resistance and Critical Speed - Load Characteristics of Shunt, Series and Compound Generators- Applications

Unit Outcomes:

- To know about principle of operation of a DC machine working as a generator
- To distinguish between self and separately excited generators and classification
- To know how emf is developed
- To distinguish between critical field resistance and critical speed
- To know about various characteristics of different types of generators

UNIT – II D.C. Motors

D.C Motors – Principle of Operation – Back E.M.F.–Torque Equation – Characteristics and Application of Shunt, Series and Compound Motors-Speed Control of D.C. Motors: Armature Voltage and Field Flux Control Methods. Three Point Starter-Losses – Constant & Variable Losses – Calculation of Efficiency - Swinburne's Test.

Unit Outcomes:

- To know about principle of operation of DC machine working as a motor
- To know about torque developed
- To know about how to control speed of DC shunt motor
- To know about necessity of starter
- To know about various load characteristics of various types of DC motors

UNIT-III Single Phase Transformers & Three Phase A.C. Circuits

Introduction - Single Phase Transformers- Constructional Details- Emf Equation - Operation on No Load and on Load - Phasor Diagrams-Equivalent Circuit - Losses and Efficiency- Regulation-OC and SC Tests - Predetermination of Efficiency and Regulation. Analysis of Balanced Three Phase Circuits – Phase Sequence- Star and Delta Connection - Relation between Line and Phase Voltages and Currents in Balanced Systems - Measurement of Active and Reactive Power in Balanced and Unbalanced Three Phase Systems.

Unit Outcomes:

- To understand the principle of operation of 1- ϕ transformer
- To understand computation and predetermination of regulation of a 1- ϕ transformer
- To know about basics of three phase circuits
- To distinguish between phase voltages, currents, line values and phase values
- To distinguish between balanced and unbalanced three phase circuits and power measurement

UNIT-IV 3-Phase Induction Motors

Polyphase Induction Motors-Construction Details of Cage and Wound Rotor Machines- - Principle of Operation – Slip- Rotor Emf and Rotor Frequency - Torque Equation- Torque Slip Characteristics – Losses and efficiency.

Unit Outcomes:

- To know about principle of operation of three phase induction motor
- To distinguish between squirrel cage and slip ring induction motors
- To know about various losses and computation of efficiency of induction motor
- To know about the torque developed by the induction motor
- To understand various characteristics of induction motor

UNIT – V Synchronous Machines

Principle and Constructional Features of Salient Pole and Round Rotor Machines – E.M.F Equation- Voltage Regulation by Synchronous Impedance Method- Theory of Operation of Synchronous Motor.

Unit Outcomes:

- To know about principle of working of alternator
- To distinguish between salient pole and cylindrical rotor machines
- To know about emf equation

- To know about predetermination of regulation of alternator by synchronous impedance method
- To know about principle of operation of synchronous motor

Course Outcomes:

After completing the course, the student should be able to do the following:

CO1: Able to calculate the e.m.f. generated on DC Generator also able to control speed of different DC motors.

CO2: Able to conduct open circuit and short circuit tests on single phase transformer for knowing their characteristics.

CO3: Able to analyse three phase circuits, three induction motor operating principle and know their torque slip characteristics.

CO4: Able to have knowledge on synchronous machine with which he/she can able to apply the above conceptual things to real-world problems and applications

TEXT BOOKS:

1. I.J.Nagrath & D.P.Kothari, “Electric Machines”, 7th Edition, Tata Mc Graw Hill, 2005
2. T.K.Nagsarkar and M.S. Sukhija, “ Basic Electrical Engineering”, 3rd Edition, Oxford University Press 2017.

REFERENCE BOOKS:

1. B. R. Gupta, “Fundamentals of Electric Machines”, Vandana Singhal, 3rd Edition, New age International Publishers, 2005.
2. S. Kamakashiah, “Electromechanics – III”, overseas publishers Pvt. Ltd.
3. V.K. Mehta and Rohit Mehta, “Principles of Electrical Engineering”, S.Chand Publications, 2005.

Course Objectives:

- To verify the theoretical concepts practically from all the experiments.
- To analyze the characteristics of diodes, UJT, BJT, FET, SCR.
- To Model the electronic circuits using tools such as PSPICE/Multisim.

LIST OF EXPERIMENTS:

1. Verification of Volt- Ampere characteristics of a PN junction diode and find static, dynamic and reverse resistances of the diode from the graphs obtained.
2. Design a full wave rectifier for the given specifications with and without filters, and verify the given specifications experimentally. Vary the load and find ripple factor. Draw suitable graphs.
3. Verify various clipping and clamper circuits using PN junction diode and draw the suitable graphs.
4. Design a Zener diode based **voltage regulator** against variations of supply and load. Verify the same from the experiment.
5. Study and draw the **output** and **transfer** characteristics of MOSFET (Enhance mode) in Common Source Configuration experimentally. Find **Threshold voltage (V_T)**, **g_m** , & **K** from the graphs.
6. Study and draw the **output** and **transfer** characteristics of MOSFET (Depletion mode) or JFET in Common Source Configuration experimentally. Find **I_{DSS}** , **g_m** , & **V_P** from the graphs.
7. Verification of the input and output characteristics of BJT in **Common Emitter** configuration experimentally and find required **h – parameters** from the graphs.
8. Study and draw the input and output characteristics of BJT in **Common Base** configuration experimentally, and determine required **h – parameters** from the graphs.
9. Verify the Volt Ampere characteristics of SCR experimentally and **determine holding current and break over voltage** from the graph.
10. Study and draw the Volt Ampere characteristics of UJT and determine **η , I_P , I_V , V_P , & V_V** from the experiment.
11. Design and analysis of voltage- divider bias/self bias circuit using BJT.
12. Design and analysis of voltage- divider bias/self bias circuit using JFET.
13. Design and analysis of self bias circuit using MOSFET.
14. Design a suitable circuit for switch using CMOSFET/JFET/BJT.

Tools / Equipment Required: Software Toollike Multisim/ Pspice or Equivalent, DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices

Note: All the experiments shall be implemented using both Hardware and Software. Student has to perform minimum of any 12 experiments

Course Outcomes:

CO1: Understand the basic characteristics and applications of basic electronic devices. (L1)

CO2: Observe the characteristics of electronic devices by plotting graphs (L2)

CO3: Analyze the Characteristics of UJT, BJT, FET, and SCR (L3).

CO3: Design FET based amplifier circuits/BJT based amplifiers for the given specifications.(L4)

CO4: Simulate all circuits in PSPICE /Multisim. (L5).

(19A04305) BASIC SIMULATION LAB

Course Objectives:

- To provide practical exposure with generation and simulation of basic signals using standardized tools.
- To teach analysing signals and sequences using Fourier, Laplace and Z-transforms.
- To enable to write programs for signal processing applications.

List of Experiments:

1. Write a program to generate various Signals and Sequences: Periodic and Aperiodic, Unit Impulse, Unit Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc function.
2. Perform operations on Signals and Sequences: Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
3. Write a program to find the trigonometric & exponential Fourier series coefficients of a rectangular periodic signal. Reconstruct the signal by combining the Fourier series coefficients with appropriate weightages- Plot the discrete spectrum of the signal.
4. Write a program to find Fourier transform of a given signal. Plot its amplitude and phase spectrum.
5. Write a program to convolve two discrete time sequences. Plot all the sequences.
6. Write a program to find autocorrelation and cross correlation of given sequences.
7. Write a program to verify Linearity and Time Invariance properties of a given Continuous/Discrete System.
8. Write a program to generate discrete time sequence by sampling a continuous time signal. Show that with sampling rates less than Nyquist rate, aliasing occurs while reconstructing the signal.
9. Write a program to find magnitude and phase response of first order low pass and high pass filter. Plot the responses in logarithmic scale.
10. Write a program to find response of a low pass filter and high pass filter, when a speech signal is passed through these filters.
11. Write a program to generate Complex Gaussian noise and find its mean, variance, Probability Density Function (PDF) and Power Spectral Density (PSD).
12. Generate a Random data (with bipolar) for a given data rate (say 10kbps). Plot the same for a time period of 0.2 sec.
13. To plot pole-zero diagram in S-plane/Z-plane of given signal/sequence and verify its stability.

Note: All the experiments are to be simulated using MATLAB or equivalent software.

Course Outcomes:

- CO1:** Understand the basic concepts of programming in MATLAB and explain use of built-in functions to perform assigned task. (L1)
- CO2:** Generate signals and sequences, Input signals to the systems to perform various operations (L2)
- CO3:** Analyze signals using Fourier, Laplace and Z-transforms. (L3)
- CO4:** Compute Fourier transform of a given signal and plot its magnitude and phase spectrum.(L3)
- CO5:**Verify Sampling theorem, Determine Convolution and Correlation between signals and sequences. (L5)

(19A02304P) ELECTRICAL TECHNOLOGY LAB

Course Objectives:

- To do experiments on DC generators
- To do experiments on DC motors
- To do experiments on 1- ϕ transformer
- To do power measurements in 3- ϕ balanced and unbalanced circuits
- To do tests on 3- ϕ Induction motors
- To do experiment on Alternator
- To do experiment on Synchronous motor

List of Experiments:

1. OCC of a separately excited DC generator
2. Load characteristics of DC shunt generator
3. Load characteristics of DC shunt motor
4. Swinburne's test
5. Speed control of DC shunt motor
6. OC & SC tests on a 1- ϕ transformer
7. Measurement of Active and reactive powers in a 3- ϕ balanced circuit
8. Measurement of 3- ϕ power using two wattmeter method in unbalanced circuit
9. Load test on Squirrel cage Induction motor
10. Load test on Slip ring Induction motor
11. Predetermination of regulation of alternator by Synchronous impedance method
12. V and Inverted V curves of Synchronous motor

Note: Student has to perform at least 10 experiments

Course Outcomes:

- To understand various characteristics of DC generators and DC motors
- To predetermine the efficiency and regulation of a 1- ϕ transformer
- To know power measurement in 3- ϕ circuits
- To understand various characteristics of Induction motors, Synchronous machines

(19A99302) BIOLOGY FOR ENGINEERS

Course Objectives: To provide basic understanding about life and life Process. Animal and plant systems. To understand what biomolecules are, their structures and functions. Application of certain biomolecules in Industry.

- Brief introduction about human physiology and bioengineering.
- To understand hereditary units, i.e. DNA (genes) and RNA and their synthesis in living organism.
- How biology Principles can be applied in our daily life using different technologies.
- Brief introduction to the production of transgenic microbes, Plants and animals.

Unit I: Introduction to Basic Biology

Cell as Basic unit of life, cell theory, Cell shapes, Cell structure, Cell cycle. Chromosomes. Prokaryotic and eukaryotic Cell. Plant Cell, Animal Cell, Plant tissues and Animal tissues, Brief introduction to five kingdoms of classification.

Unit Outcomes:

After completing this unit, the student will be able to

- Summarize the basis of life. (L1)
- Understand the difference between lower organisms (prokaryotes) from higher organisms (eukaryotes). (L2)
- Understand how organisms are classified. (L3)

Unit II: Introduction to Biomolecules

Carbohydrates, lipids, proteins, Vitamins and minerals, Nucleic acids (DNA and RNA) and their types. Enzymes, Enzyme application in Industry. Large scale production of enzymes by Fermentation.

Unit Outcomes:

After completing this unit, the student will be able to

- Understand what are biomolecules? their role in living cells, their structure, function and how they are produced. (L1)
- Interpret the relationship between the structure and function of nucleic acids. (L2)
- Summarize the applications of enzymes in industry. (L3)
- Understand what is fermentation and its applications of fermentation in industry. (L4)

Unit III: Human Physiology

Nutrition: Nutrients or food substances. Digestive system, Respiratory system, (aerobic and anaerobic Respiration). Respiratory organs, respiratory cycle. Excretory system.

Unit Outcomes:

After completing this unit, the student will be able to

- Understand what nutrients are (L1)
- Understand the mechanism and process of important human functions (L2 & L3)

Unit IV: Introduction to Molecular Biology and recombinant DNA Technology

Prokaryotic gene and Eukaryotic gene structure. DNA replication, Transcription and Translation. rDNA technology. Introduction to gene cloning.

Unit Outcomes:

After completing this unit, the student will be able to

- Understand and explain about gene structure and replication in prokaryotes and Eukaryotes (L1)
- How genetic material is replicated and also understands how RNA and proteins are synthesized. (L2)
- Understand about recombinant DNA technology and its application in different fields.(L3)
- Explain what is cloning. (L4)

Unit V: Application of Biology

Brief introduction to industrial Production of Enzymes, Pharmaceutical and therapeutic Proteins, Vaccines and antibodies. Basics of biosensors, biochips, Bio fuels, and Bio Engineering. Basics of Production of Transgenic plants and animals.

Unit Outcomes:

After completing this unit, the student will be able to Understand.

- How biology is applied for production of useful products for mankind.(L1)
- What are biosensors, biochips etc. (L2)
- Understand transgenic plants and animals and their production (L3)

Course Outcomes:

After studying the course, the student will be able to:

- Explain about cells and their structure and function. Different types of cells and basics for classification of living Organisms.
- Explain about biomolecules, their structure and function and their role in the living organisms. How biomolecules are useful in Industry.
- Briefly about human physiology.
- Explain about genetic material, DNA, genes and RNA how they replicate, pass and preserve vital information in living Organisms.

- Know about application of biological Principles in different technologies for the production of medicines and Pharmaceutical molecules through transgenic microbes, plants and animals.

Text books:

1. P.K.Gupta, Cell and Molecular Biology, 5th Edition, Rastogi Publications -
2. U. Satyanarayana. Biotechnology, Books & Allied Ltd 2017

Reference Books:

1. N. A. Campbell, J. B. Reece, L. Urry, M. L. Cain and S. A. Wasserman, “Biology: A Global Approach”, Pearson Education Ltd, 2018.
2. T Johnson, Biology for Engineers, CRC press, 2011
3. J.M. Walker and E.B. Gingold, Molecular Biology and Biotechnology 2nd ed.. Panima Publications. PP 434.
4. David Hames, Instant Notes in Biochemistry –2016
5. Phil Tunner, A. Mctennan, A. Bates & M. White, Instant Notes – Molecular Biology – 2014

(19A04401) ELECTROMAGNETIC WAVES AND TRANSMISSION LINES

Course Objectives:

- To introduce fundamentals of static and time varying electromagnetic fields.
- To teach problem solving in Electromagnetic fields using vector calculus.
- To demonstrate wave concept with the help of Maxwell's equations.
- To introduce concepts of polarization and fundamental theory of electromagnetic waves in transmission lines and their practical applications.
- To analyze reflection and refraction of electromagnetic waves propagated in normal and oblique incidences.

Unit I

Vector Analysis: Coordinate systems and transformation-Cartesian, Cylindrical and Spherical coordinates

Vector Calculus: Differential length area and volume, line surface and volume integrals, del operator, gradient, divergent and curl operations.

Coulomb's Law, Electric Field Intensity – Fields due to Different Charge Distributions, Electric Flux Density, Gauss Law and Applications, Divergence Theorem, Electric Potential, Relations Between E and V, Maxwell's Two Equations for Electrostatic Fields, Energy Density, Convection and Conduction Currents, Dielectric Constant, Isotropic and Homogeneous Dielectrics, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations, Capacitance – Parallel Plate, Coaxial, Spherical Capacitors, Illustrative Problems.

Unit Outcomes:

- Understand basic laws of static electric field. (L1)
- Derive the Maxwell's equations for electrostatic fields. (L3)
- Solve problems applying laws of electrostatics. (L3)

Unit II

Biot-Savart Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magneto static Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Magnetic dipole, Ampere's Force Law, Inductances and Magnetic Energy, Illustrative Problems.

Faraday's Law and Transformer e.m.f, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's equations for time varying fields, Maxwell's Equations in Different Final Forms and Word Statements, Illustrative Problems

Unit Outcomes:

- Understand basic laws of static magnetic field. (L1)
- Derive the Maxwell's equations for magnetic fields. (L3)
- Solve problems applying laws of magneto statics. (L3)
- Derive the Maxwell's equations for electromagnetic fields. (L3)
- Apply the boundary conditions of electromagnetic fields at the interface of different media. (L2)

Unit III

Boundary Conditions of Electromagnetic fields: Dielectric-Dielectric and Dielectric-Conductor Interfaces, Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, All Relations between E & H, Sinusoidal Variations, Wave Propagation in Lossless and Conducting Media, Conductors & Dielectrics – Characterization, Wave Propagation in Good Conductors and Good Dielectrics, Polarization, Illustrative Problems.

Unit Outcomes:

- Understand concept of wave propagation through the Maxwell's equations. (L1)
- Derive wave equations for different media. (L3)
- Explain concept of polarization of electromagnetic wave. (L2)

Unit IV

Reflection and Refraction of Plane Waves – Normal and Oblique Incidences, for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance, Poynting Vector, and Poynting Theorem – Applications, Power Loss in a Plane Conductor, Illustrative Problems.

Unit Outcomes:

- Understand principles of reflections and refraction for different incidences. (L1)
- State concept of power flow using Poynting vector. (L2)
- Calculate Brewster angle, power flow and surface impedance. (L3)

Unit V

Transmission Lines: Introduction, Transmission line parameters, Transmission line equivalent circuit, Transmission line equations and their solutions in their phasor form, input impedance, standing wave ratio, Transmission of finite length- half wave, quarter wave transmission line, Smith chart, graphical analysis of transmission lines using Smith chart, stub matching- single and double stub matching, Illustrative Problems.

Unit Outcomes:

- Understand the principles of transmission lines and concept of smith chart.(L1)
- Derive the input impedance of transmission line.(L3)
- Finding the line parameters through problem solving.(L4)
- Study the applications of different lengths of transmission lines.(L2)

Course Outcomes:

After completion of the course, student will be able to

CO1: Explain basic laws of electromagnetic fields and know the wave concept. (L2)

CO2: Solve problems related to electromagnetic fields. (L3)

CO3: Analyze electric and magnetic fields at the interface of different media. (L3)

CO4: Derive Maxwell's equations for static and time varying fields. (L3)

CO5: Analogy between electric and magnetic fields. (L5)

CO6: Describes the transmission lines with equivalent circuit and explain their characteristic with various lengths. (L2)

TEXT BOOKS:

1. Matthew N.O. Sadiku, "Elements of Electromagnetics", 4th edition. Oxford Univ. Press, 2008.
2. William H. Hayt Jr. and John A. Buck, "Engineering Electromagnetics", 7th edition., TMH, 2006.

REFERENCES:

1. E.C. Jordan and K.G. Balmain, "Electromagnetic Waves and Radiating Systems", 2nd Edition, PHI, 2000.
2. John D. Krauss, "Electromagnetics", 4th Edition, McGraw- Hill publication 1999.
3. Electromagnetics, Schaum's outline series, 2nd Edition, Tata McGraw-Hill publications, 2006.

(19A04402T) ELECTRONIC CIRCUITS-ANALYSIS AND DESIGN

Course Objectives:

- To design and analyze single and multi stage amplifiers using BJT & FET at low and high frequencies.
- To discuss cascading of single stage amplifiers.
- To explain effect of negative feedback on amplifier characteristics.
- To teach basic principles for analysing RC & LC oscillator circuits.
- To introduce different types of large signal amplifiers and tuned amplifiers.

Unit I

Small Signal Amplifiers Using MOSFETS: Graphical analysis, Load line and small signal parameters, Small signal equivalent circuit, Small signal analysis of Common source, Common drain, Common gate amplifiers, Comparison of the three basic amplifier configurations, Problem solving.

JFET Small Signal Amplifiers: Small signal analysis of common source, common drain, common gate amplifiers, JFET as voltage variable resistor, Problem solving.

BJT Small Signal Models: Bipolar linear amplifier, Graphical and ac equivalent circuit, Small signal hybrid- π equivalent circuit, Hybrid- π equivalent circuit including the early effect, other small signal parameters and equivalent circuits-h-parameters.

Small Signal Analysis: Basic CE amplifier circuit, Circuit with Emitter resistance, ac load line analysis, maximum symmetrical swing, Small signal analysis-input and output impedances, Voltage gain, Current gain of CB, CC amplifiers, Problem solving.

Unit Outcomes:

- Understand the concepts and equivalent circuit models of small signal amplifiers. (L1)
- Analyze low frequency and high frequency models of BJT and FET. (L3)
- Design BJT and FET amplifier circuits.(L4)
- Determine performance parameters of BJT and FET amplifiers. (L2)

Unit II

Frequency Response: Amplifier frequency response-different ranges, short circuit and open circuit time constants, time response, transistor amplifiers with circuit capacitors-coupling capacitor effects, load capacitor effects, Bypass capacitor effects, Problem solving, combined effects of coupling and bypass capacitor, high-frequency response model for BJT and MOSFETs, short circuit current gain, Miller effect and its applications, unity-gain bandwidth in BJT and FET amplifiers, CE and CS circuits, CB and CG circuits, Cascode amplifier analysis, emitter and source follower circuits, high frequency response- design application.

Unit Outcomes:

- Analyze the frequency response of single stage amplifiers using BJT & FET at high and low frequencies. (L3)
- Design of single stage amplifiers using BJT and FET with and without coupling capacitors. (L4)
- Explore the various effects of load , bypass and coupling capacitor on the performance of amplifier circuits.(L5)

Unit III

Differential and Multistage Amplifiers: Differential amplifier, basic BJT differential pair and its qualitative description, DC transfer characteristics, small signal equivalent circuit analysis, CMRR, differential and common mode gains, differential and common mode input impedances.

Basic differential FET pair, small signal equivalent circuit analysis, JFET differential amplifier, differential amplifier with active load, MOSFET differential amplifier with active load, two stage RC coupled amplifier, Darlington pair and simple emitter follower output, voltage gain, input and output impedances, simplified BJT operational amplifier circuit, design applications-CMOS differential amplifier.

Unit Outcomes:

- Understand basic concepts and need of Differential and multistage amplifiers. Also various inter-stage coupling in multi-stage amplifiers. (L1)
- Analyze and examine few common two stage transistor amplifier circuits viz., Cascade amplifiers, Cascode amplifiers, Darlington pairs. (L3)
- Design multiple stage amplifier circuits. (L4)

Unit IV

Feedback Amplifiers: General Considerations, Properties of Negative Feedback, Types of Amplifiers, Sense and Return Techniques, Polarity of Feedback , Feedback Topologies, Effect of Nonideal I/O Impedances, Stability in Feedback Systems , Analysis of a feedback Amplifiers - Voltage – Series, Current Series, Current-shunt and Voltage-shunt , Illustrative problems.

Oscillators: General Considerations, LC Oscillators, Phase Shift Oscillator, Wien-Bridge Oscillator, Crystal Oscillators, Illustrative Problems.

Unit Outcomes:

- Understand concept of different feedback topologies. (L1)
- Determine the effect of feedback on amplifier characteristics .(L2)

- Analyse characteristics of various types of feedback configurations (L3)
- Explore working principle of oscillator. Also examine different types of oscillators, RC & LC, with detailed mathematical analysis and illustrations. (L2)

Unit V

Power Amplifiers:

Classes of amplifiers-Operations of Class A, B, AB, C, class-A: Inductively coupled amplifier, transformer-coupled common emitter amplifier, transformer-coupled emitter-follower amplifier,

Class-AB Push-pull complementary output stages-class-AB output stage with diode biasing, class-AB biasing using the V_{BE} multiplier, class-AB output stage with input buffer transistors, class –AB output stage utilizing the Darlington configuration, Illustrative Problems.

Tuned Amplifiers: Introduction to tuned amplifiers, Role of Q-Factor, Single-tuned, Double-tuned and Stagger-tuned amplifiers.

Unit Outcomes:

- Know most common classes of power amplifier and their basic characteristics. (L2)
- Understand various distortions of amplifiers and the concept of heat sink.(L1)
- Analyse complementary symmetry topologies. (L3)
- Evaluate conversion efficiency of various topologies. (L4)
- Analyse different types of distortions in power amplifiers. (L3)
- Evaluate the resonant frequency for tuned amplifiers. Analyse characteristics of tuned amplifiers (L5)

Course Outcomes:

CO1: Understand the working principle of multistage amplifiers, Feedback amplifiers, power amplifiers, tuned amplifiers, Multivibrator and Time base generators (L1)

CO2: Analyse multistage amplifiers, multistage amplifiers, feedback amplifiers, power amplifiers, tuned amplifier and Multivibrators. (L3)

CO3: Design multistage amplifiers, feedback amplifiers, oscillators, Multivibrator, power amplifiers and tuned amplifiers for given specification.(L4)

CO5: Evaluate efficiency of large signal (power) amplifiers and voltage regulators (L5)

TEXT BOOKS:

1. Donald A Neamen, “Electronic Circuits – Analysis and Design,” 3rd Edition, McGraw Hill (India), 2019.
2. J. Millman, C Chalkias, “Integrated Electronics”, 4th Edition, McGraw Hill Education (India) Private Ltd., 2015.

3. K.Lal Kishore, “Electronic Circuit Analysis”, 2nd Edition, B S Publications, 2008.

REFERENCE BOOKS:

1. Behzad Razavi, “Fundamentals of Micro Electronics”, Wiley, 2010.
2. Millman and Taub, Pulse, “Digital and Switching Waveforms”, 3rd Edition, Tata McGraw-Hill Education, 2011
3. Robert L. Boylestad and Louis Nashelsky, “Electronic Devices and Circuits Theory”, 9th Edition, Pearson/Prentice Hall, 2006.

(19A02404) CONTROL SYSTEMS

Course Objectives:

To make the students learn about:

- Merits and demerits of open loop and closed loop systems; the effect of feedback
- The use of block diagram algebra and Mason's gain formula to find the overall transfer function
- Transient and steady state response, time domain specifications and the concept of Root loci
- Frequency domain specifications, Bode diagrams and Nyquist plots
- State space modelling of Control system

UNIT – I CONTROL SYSTEMS CONCEPTS

Open loop and closed loop control systems and their differences- Examples of control systems- Classification of control systems, Feedback characteristics, Effects of positive and negative feedback, Mathematical models – Differential equations of translational and rotational mechanical systems and electrical systems, Analogous Systems, Block diagram reduction methods – Signal flow graphs - Reduction using Mason's gain formula. Principle of operation of DC and AC Servo motor, Transfer function of DC servo motor - AC servo motor, Synchros.

Unit Outcomes:

At the end of the unit, the student will be able to

- Write the differential equations for mechanical and electrical systems
- Obtain the transfer function from block diagrams, servo motors and signal flow graphs

UNIT-II TIME RESPONSE ANALYSIS

Step Response - Impulse Response - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants, P, PI, PID Controllers.

Unit Outcomes:

At the end of the unit, the student will be able to

- Analyze the time domain specifications
- Calculate the steady state errors

- Understand about Proportional, Integral and Derivative controllers along with combinations

UNIT – III STABILITY ANALYSIS IN TIME DOMAIN

The concept of stability – Routh’s stability criterion – Stability and conditional stability – limitations of Routh’s stability. The Root locus concept - construction of root loci-effects of adding poles and zeros to $G(s)H(s)$ on the root loci.

Unit Outcomes:

At the end of the unit, the student will be able to

- Analyze the concept of stability in time domain
- Apply the concept of Routh’s stability and Root locus in time domain

UNIT – IV FREQUENCY RESPONSE ANALYSIS

Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Stability Analysis from Bode Plots. Polar Plots-Nyquist Plots- Phase margin and Gain margin-Stability Analysis. Compensation techniques – Lag, Lead, Lag-Lead Compensator design in frequency Domain.

Unit Outcomes:

At the end of the unit, the student will be able to

- Evaluate the frequency domain specifications from Bode, Polar and Nyquist plots
- Design Compensators for various systems
- Deducing transfer functions from Bode Plots
- Understand difference between Phase and Gain margins

UNIT – V STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS

Concepts of state, state variables and state model, state models - differential equations & Transfer function models - Block diagrams. Diagonalization, Transfer function from state model, Solving the Time invariant state Equations- State Transition Matrix and it’s Properties. System response through State Space models. The concepts of controllability and observability, Duality between controllability and observability.

Unit Outcomes:

At the end of the unit, the student will be able to

- Understand the concept of state space, controllability and observability
- Obtain the transfer function from state space and vice versa
- Understand the state transition method of solving time invariant state equations

Course Outcomes:

After completing the course, the student should be able to:

- CO1** Understand the concepts of control systems classification, feedback effect, mathematical modelling, time response and frequency response characteristics, state space analysis
- CO2** Apply the concepts of Block diagram reduction, Signal flow graph method and state space formulation for obtaining mathematical and Root locus, Bode, Nyquist, Polar plots for stability calculations, controllability and observability and demonstrate the use of these techniques.
- CO3** Analyse time response analysis, error constants, and stability characteristics of a given mathematical model using different methods.
- CO4** Design and develop different compensators, controllers and their performance evaluation for various conditions. Implement them in solving various engineering applications.

TEXT BOOKS:

1. Katsuhiko Ogata, “Modern Control Engineering”, 5th edition, Prentice Hall of India Pvt. Ltd., 2010.
2. I. J. Nagrath and M. Gopal, “Control Systems Engineering”, 5th edition, New Age International (P) Limited Publishers, 2007.

REFERENCE BOOKS:

1. M.Gopal, “Control Systems Principles & Design”, 4th Edition, Mc Graw Hill Education, 2012.
2. B. C. Kuo and Farid Golnaraghi, “Automatic Control Systems”, 8th edition, John wiley and sons, 2003.
3. Joseph J Distefano III, Allen R Stubberud & Ivan J Williams, “Feedback and Control Systems”, 2nd Edition, Schaum's outlines, Mc Graw Hill Education, 2013.
4. Graham C. Goodwin, Stefan F. Graebe and Mario E. Salgado, “Control System Design” Pearson, 2000.
5. Gene F. Franklin, J.D. Powell and Abbas Emami-Naeini, Feedback “Control of Dynamic Systems”, 6th Edition, Pearson, 2010.

(19A04403T) ANALOG COMMUNICATIONS

Course Objectives

- To introduce various modulation and demodulation techniques of analog communication system.
- To analyze different parameters of analog communication techniques.
- Know Noise Figure in AM & FM receiver systems.
- Understand Function of various stages of AM, FM transmitters and Know Characteristics of AM & FM receivers.
- Understand the concepts of information theory.

Unit – I

Introduction: Elements of communication systems, Information, Messages and Signals, Modulation, Modulation Methods, Modulation Benefits and Applications.

Amplitude Modulation & Demodulation: Baseband and carrier communication, Amplitude Modulation (AM), Rectifier detector, Envelope detector, Double sideband suppressed carrier (DSB-SC) modulation & its demodulation, Switching modulators, Ring modulator, Balanced modulator, Frequency mixer, sideband and carrier power of AM, Generation of AM signals, Single sideband (SSB) transmission, Time domain representation of SSB signals & their demodulation schemes (with carrier, and suppressed carrier), Generation of SSB signals, Vestigial sideband (VSB) modulator & demodulator, Frequency division multiplexing (FDM), Illustrative Problems.

Unit Outcomes:

- Understand the concepts of Amplitude Modulation and demodulation techniques. (L1)
- Apply the concepts to solve problems in Amplitude modulation Schemes. (L2)
- Analyse frequency spectra of modulated signals used in various amplitude modulation (L3)
- Compare the Performance of different amplitude modulation techniques. (L4)

Unit – II

Angle Modulation & Demodulation: Concept of instantaneous frequency, Generalized concept of angle modulation, Bandwidth of angle modulated waves – Narrow band frequency modulation (NBFM) and Wide band FM (WBFM), Phase modulation, Verification of Frequency modulation bandwidth relationship, Features of angle modulation, Generation of FM waves-Indirect method, Direct generation; Demodulation of FM, Band pass limiter, Practical frequency demodulators, Small error analysis, Pre-emphasis, & De-emphasis filters, FM Capture Effect, Illustrative Problems.

Unit Outcomes:

- Understand the concepts of Angle modulation and demodulation techniques. (L1)
- Understand importance Pre-emphasis & de-emphasis circuit in FM modulation. (L1)
- Apply the concepts to solve problems in Angle modulation Schemes. (L2)
- Analyse frequency spectra of modulated signals used in various angle modulation (L3)

Unit – III

Noise in Communication Systems: Thermal noise, Time domain representation of narrowband noise, filtered white noise, Quadrature representation of narrowband noise, Envelope of narrowband noise plus sine wave, Signal to noise ratio & probability of error, Noise equivalent bandwidth, Effective noise temperature, and Noise figure, Baseband systems with channel noise, Performance analysis (i.e. finding SNR expression) of AM, DSB-SC, SSB-SC, FM, PM in the presence of noise, Illustrative Problems.

Unit Outcomes:

- Understand different types of noise and sources that effect the performance of the communication system. [L1]
- Analyse performance of analog communication system in the presence of noise. [L3]
- Compare the performance of communication system by evaluating figure of merit for different schemes of modulation. [L4]

Unit – IV

Analog Pulse Modulation Schemes: Pulse amplitude modulation – Natural sampling, flat top sampling and Pulse amplitude modulation (PAM) & demodulation, Pulse-Time Modulation – Pulse Duration and Pulse Position modulations, and demodulation schemes, PPM spectral analysis, Illustrative Problems.

Radio Receiver: Working principle of Super heterodyne AM and FM Receivers along with suitable block diagrams, Sensitivity, Selectivity and fidelity.

Unit Outcomes:

- Understand the concepts of Analog Pulse Modulation and Demodulation techniques. [L1]
- Understand the concepts of AM and FM receivers. [L1]
- Apply the concepts to solve problems in Analog pulse modulation schemes. [L2]
- Analyse the performance of AM and FM receivers.[L3]
- Compare the Performance of different Analog Pulse Modulation techniques.[L4]

Unit – V

Information Theory: Introduction, Information and Entropy, and its properties, source coding Theorem, Data Compaction – Prefix coding, Huffman coding, Discrete Memoryless channels, Mutual Information, and its properties, Channel capacity, Channel coding Theorem, Application to binary symmetric channels, differential entropy and mutual information, Information capacity theorem, implication of information capacity theorem, Rate Distortion, Illustrative problems.

Unit Outcomes:

- Understand the concepts of information theory and different coding techniques.[L1]
- Analyse Binary symmetric channel. [L3]
- Design the channel performance using information theory. [L4]
- Derive equation for Entropy, Mutual information and channel capacity for all types of channels. [L2]

Course Outcomes

After completion of the course, student will be able to

CO1: Understand the concepts of various Amplitude, Angle and Pulse Modulation schemes.

Understand the concepts of information theory with random processes. (L1)

CO2: Apply the concepts to solve problems in analog and pulse modulation schemes. (L2)

CO3: Analysis of analog communication system in the presence of noise. (L3)

CO4: Compare and contrast design issues, advantages, disadvantages and limitations of various modulation schemes in analog communication systems.(L4)

CO5: Solve basic communication problems & calculate information rate and channel capacity of a discrete communication channel (L5)

TEXT BOOKS:

1. B. P. Lathi, “Modern Digital and Analog Communication Systems,” 3rd Edition, Oxford Univ. press, 2006.
2. John Wiley & Sons Simon Haykin, “Communication Systems,” 3rd Edition, 2010.
3. Sham Shanmugam, “Digital and Analog Communication Systems”, Wiley-India edition, 2006.(edition)

REFERENCES:

1. Bruce Carlson, & Paul B. Crilly, "Communication Systems – An Introduction to Signals & Noise in Electrical Communication", 5th Edition, McGraw-Hill International Edition, 2010.
2. Herbert Taub & Donald L Schilling, "Principles of Communication Systems", 3rd Edition, Tata McGraw- Hill, 2009.
3. R.E. Ziemer & W.H. Tranter, "Principles of Communication-Systems Modulation & Noise", 5th edition, Jaico Publishing House 2001.
4. George Kennedy and Bernard Davis, "Electronics & Communication System", TMH, 2004. (edition)

(19A05304T) PYTHON PROGRAMMING

Course Objectives:

- To learn the fundamentals of Python
- To elucidate problem-solving using a Python programming language
- To introduce a function-oriented programming paradigm through python
- To get training in the development of solutions using modular concepts
- To introduce the programming constructs of python

Unit – I

Introduction: What is a program, Running python, Arithmetic operators, Value and Types.

Variables, Assignments and Statements: Assignment statements, Script mode, Order of operations, string operations, comments.

Functions: Function calls, Math functions, Composition, Adding new Functions, Definitions and Uses, Flow of Execution, Parameters and Arguments, Variables and Parameters are local, Stack diagrams, Fruitful Functions and Void Functions, Why Functions.

Unit Outcomes:

Student should be able to

- List the basic constructs of Python.
- Solve the problems by applying modularity principle.

Unit – II

Case study: The turtle module, Simple Repetition, Encapsulation, Generalization, Interface design, Refactoring, docstring.

Conditionals and Recursion: floor division and modulus, Boolean expressions, Logical operators, Conditional execution, Alternative execution, Chained conditionals, Nested conditionals, Recursion, Infinite Recursion, Keyboard input.

Fruitful Functions: Return values, Incremental development, Composition, Boolean functions, More recursion, Leap of Faith, Checking types,

Unit Outcomes:

Student should be able to

- Apply the conditional execution of the program.
- Apply the principle of recursion to solve the problems.

Unit - III

Iteration: Reassignment, Updating variables, The while statement, Break, Square roots, Algorithms.

Strings: A string is a sequence, len, Traversal with a for loop, String slices, Strings are immutable, Searching, Looping and Counting, String methods, The in operator, String comparison.

Case Study: Reading word lists, Search, Looping with indices.

Lists: List is a sequence, Lists are mutable, Traversing a list, List operations, List slices, List methods, Map filter and reduce, Deleting elements, Lists and Strings, Objects and values, Aliasing, List arguments.

Unit Outcomes:

Student should be able to

- Use the data structure list.
- Design programs for manipulating strings.

Unit – IV

Dictionaries: A dictionary is a mapping, Dictionary as a collection of counters, Looping and dictionaries, Reverse Lookup, Dictionaries and lists, Memos, Global Variables.

Tuples: Tuples are immutable, Tuple Assignment, Tuple as Return values, Variable-length argument tuples, Lists and tuples, Dictionaries and tuples, Sequences of sequences.

Files: Persistence, Reading and writing, Format operator, Filename and paths, Catching exceptions, Databases, Pickling, Pipes, Writing modules.

Classes and Objects: Programmer-defined types, Attributes, Instances as Return values, Objects are mutable, Copying.

Classes and Functions:

Unit Outcomes:

Student should be able to

- Apply object orientation concepts.
- Use data structure dictionaries.
- Organize data in the form of files.

Unit – V

Classes and Functions: Time, Pure functions, Modifiers, Prototyping versus Planning

Classes and Methods: Object oriented features, Printing objects, The init method, The __str__ method, Operator overloading, Type-based Dispatch, Polymorphism, Interface and Implementation

Inheritance: Card objects, Class attributes, Comparing cards, decks, Printing the Deck, Add Remove shuffle and sort, Inheritance, Class diagrams, Data encapsulation.

The Goodies: Conditional expressions, List comprehensions, Generator expressions, any and all, Sets, Counters, defaultdict, Named tuples, Gathering keyword Args,

Unit Outcomes:

Student should be able to

- Plan programs using object orientation approach.
- Illustrate the principle of inheritance.

Course Outcomes:

Student should be able to

- Apply the features of Python language in various real applications.
- Select appropriate data structure of Python for solving a problem.
- Design object oriented programs using Python for solving real-world problems.
- Apply modularity to programs.

TEXT BOOKS:

1. Allen B. Downey, “Think Python”, 2nd edition, SPD/O’Reilly, 2016.

REFERENCE BOOKS:

1. Martin C.Brown, “The Complete Reference: Python”, McGraw-Hill, 2018.
2. Kenneth A. Lambert, B.L. Juneja, “Fundamentals of Python”, CENGAGE, 2015.
3. R. Nageswara Rao, “Core Python Programming”, 2nd edition, Dreamtech Press, 2019

(19A04404) COMPUTER ARCHITECTURE AND ORGANIZATION

Course Objectives:

- To discuss organization and design of a digital computer.
- To explain how to use RTL to represent memory and Arithmetic/ Logic/ Shift operations
- To introduce computer languages, machine, symbolic and assembly levels
- To present organization of central processing unit and concepts of micro-programmed control
- To explain how input-output devices communicate with the other components and methods of data transfer
- To teach different types of addressing modes and memory organization.

Unit I

Data Representation: Data Types, Complements, Fixed-Point Representation, Conversion of Fractions, Floating-Point Representation, Other Binary Codes

Register Transfer and Micro-operations: Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro-operations, Logic Micro-operations, Shift Micro-operations, Arithmetic Logic Shift Unit

Unit Outcomes:

- Represent various data types found in digital computers in binary form (L2)
- Emphasize representation of numbers employed in arithmetic operations and on binary coding of symbols used in data processing (L5)
- Express micro-operations in symbolic form by using register transfer language (L2)
- Develop composite arithmetic logic shift unit to show hardware design of micro-operations (L3)

Unit II

Basic Computer Organization and Design: Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input-Output and Interrupt, Complete Computer Description, Design and Accumulator Logic.

Programming the Basic Computer: Machine Language, Assembly Language, the Assembler, Program Loops, programming arithmetic and logic operations

Unit Outcomes:

- Describe organization and design of a basic digital computer (L2)
- Illustrate techniques used in assembly language programming (L2)
- Show translation from symbolic code to an equivalent binary program using basic operations of an assembler (L2)

Unit III

Central Processing Unit: Introduction, General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer (RISC).

Unit Outcomes:

- Develop execution unit to show general register organization of a typical CPU (L3)
- Explain operation of a memory stack (L2)
- Illustrate various instruction formats together with a variety of addressing modes (L2)
- Discuss characteristics and advantages of reduced instruction set computer(RISC) (L6)

Unit IV

Micro-programmed Control: Control Memory, Address Sequencing, Micro-program example, Design of Control Unit.

Computer Arithmetic: Introduction, Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating-Point Arithmetic Operations

Unit Outcomes:

- Develop specific micro-programmed control unit to show how to write microcode for a typical set of instructions (L3)
- Design control unit including the hardware for the micro-program sequencer (L6)
- Show procedures for implementing arithmetic algorithms for addition, subtraction, multiplication and division with digital hardware (L2)
- Discuss algorithms to specify the sequence of micro-operations and control decisions required for implementation (L6)

UNIT V

Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access (DMA), Input-Output Processor (IOP), Serial Communication.

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory.

Unit Outcomes:

- Explain how processor interacts with external peripherals through Interface units (L2)
- Compare different modes of data transfer (L4)
- Illustrate procedures for serial data transmission (L2)
- Describe concept of memory hierarchy composed of cache memory, main memory, and auxiliary memory (L2)
- Explain organization and operation of associative memories (L2)

Course Outcomes:

- CO1:** Conceptualize basics of organizational and architectural issues of a digital computer (L4)
- CO2:** Emphasize representation of data types, numbers employed in arithmetic operations and binary coding of symbols used in data processing (L5)
- CO3:** Develop low-level programs to perform different basic instructions (L5)
- CO4:** Evaluate various modes of data transfer between CPU and I/O devices (L5)
- CO5:** Analyze various issues related to memory hierarchy (L3)
- CO6:** Design basic computer system using the major components (L4)

TEXT BOOKS:

1. M. Morris Mano, “Computer System Architecture”, 3rd edition, Pearson Education, 2017.

REFERENCES:

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, “Computer Organization”, 5th Edition McGraw Hill,
2. John D. Carpinelli, “Computer Systems Organization and Architecture”, 15th reprint Pearson Education, 2018,
3. William Stallings, “Computer Organization and Architecture: Designing for Performance”, 8th Edition, Pearson

(19A52301)UNIVERSAL HUMAN VALUES 2: UNDERSTANDING HARMONY

(Common to all)

Introduction:

This course discusses the role of human values in one's family. It, very briefly, touches issues related to their role in the society and the nature, which needs to be discussed at length in one more semester for which the foundation course names as "H-102 Universal Human Values 2 : "Understanding Harmony" is designed which may be covered in their III or IV Semester.

In the Induction Program, students would get an initial exposure to human values through Universal Human Values-I. This exposure is to be augmented by this compulsory full semester foundation course.

Course Objective:

The objective of the course is four fold:

- Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
- Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
- Strengthening of self-reflection.
- Development of commitment and courage to act.

COURSE TOPICS:

The course has 28 lectures and 14 practice sessions in 5 modules:

Unit 1:

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

- Purpose and motivation for the course, recapitulation from Universal Human Values-I
- Self-Exploration-what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration
- Continuous Happiness and Prosperity- A look at basic Human Aspirations
- Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority
- Understanding Happiness and Prosperity correctly- A critical appraisal of the

current scenario

- Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking

Unit 2:

Understanding Harmony in the Human Being - Harmony in Myself!

- Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
- Understanding the needs of Self ('I') and 'Body' - happiness and physical facility
- Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
- Understanding the characteristics and activities of 'I' and harmony in 'I'
- Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail
- Programs to ensure Sanyam and Health.

Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease

Unit 3:

Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship

- Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
- Understanding the meaning of Trust; Difference between intention and competence
- Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
- Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
- Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Include practice sessions to reflect on relationships in family, hostel and institute as

extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives

Unit 4:

Understanding Harmony in the Nature and Existence - Whole existence as Coexistence

- Understanding the harmony in the Nature
- Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature
- Understanding Existence as Co-existence of mutually interacting units in all-pervasive space
- Holistic perception of harmony at all levels of existence.

Include practice sessions to discuss human being as cause of imbalance in nature (film “Home” can be used), pollution, depletion of resources and role of technology etc.

Unit 5:

Implications of the above Holistic Understanding of Harmony on Professional Ethics

- Natural acceptance of human values
- Definitiveness of Ethical Human Conduct
- Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
- Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems.
- Case studies of typical holistic technologies, management models and production systems
- Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations
- Sum up.

Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. To discuss the conduct as an engineer or scientist etc.

Text Book

1. R R Gaur, R Asthana, G P Bagaria, “A Foundation Course in Human Values and Professional Ethics”, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
2. R R Gaur, R Asthana, G P Bagaria, “Teachers’ Manual for A Foundation Course in Human Values and Professional Ethics”, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

Reference Books

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantik, 1999.
2. A. N. Tripathi, “Human Values”, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. Mohandas Karamchand Gandhi “The Story of My Experiments with Truth”
5. E. F. Schumacher. “Small is Beautiful”
6. Slow is Beautiful –Cecile Andrews
7. J C Kumarappa “Economy of Permanence”
8. Pandit Sunderlal “Bharat Mein Angreji Raj”
9. Dharampal, “Rediscovering India”
10. Mohandas K. Gandhi, “Hind Swaraj or Indian Home Rule”
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland(English)
13. Gandhi - Romain Rolland (English)

MODE OF CONDUCT (L-T-P-C 2-1-0-2)

Lecture hours are to be used for interactive discussion, placing the proposals about the topics at hand and motivating students to reflect, explore and verify them. Tutorial hours are to be used for practice sessions.

While analyzing and discussing the topic, the faculty mentor’s role is in pointing to essential elements to help in sorting them out from the surface elements. In other words, help the students explore the important or critical elements.

In the discussions, particularly during practice sessions (tutorials), the mentor encourages the student to connect with one’s own self and do self-observation, self-reflection and self-exploration.

Scenarios may be used to initiate discussion. The student is encouraged to take up “ordinary” situations rather than “extra-ordinary” situations. Such observations and their analyses are shared and discussed with other students and faculty mentor, in a group sitting.

Tutorials (experiments or practical) are important for the course. The difference is that the laboratory is everyday life, and practicals are how you behave and work in real life. Depending on the nature of topics, worksheets, home assignments and/or activities are

included. The practice sessions (tutorials) would also provide support to a student in performing actions commensurate to his/her beliefs. It is intended that this would lead to development of commitment, namely behaving and working based on basic human values.

OUTCOME OF THE COURSE:

By the end of the course,

- Students are expected to become more aware of themselves, and their surroundings (family, society, nature)
- They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
- They would have better critical ability.
- They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
- It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

(19A04402P) ELECTRONIC CIRCUIT ANALYSIS AND DESIGN LAB

Course Objectives:

- To provide a practical exposure for design& analysis of electronic circuits for generation and amplification input signal.
- To learn the frequency response and finding gain, input & output impedance of multistage amplifiers
- To Design negative feedback amplifier circuits and verify the effect of negative feedback on amplifier parameters.
- To understand the application of positive feedback circuits& generation of signals.
- To understand the concept of design and analysis of Power amplifiers and tuned amplifiers
- To construct and analyse voltage regulator circuits.

LIST OF EXPERIMENTS:

1. MOSFET Amplifier
 - a. Design and simulate MOSFET (Depletion mode) amplifier using PSPICE /Multisim and study the Gain and Bandwidth of amplifier
 - b. Design common source MOSFET (Enhance mode) amplifier with discrete components and calculate the bandwidth of amplifier from its frequency response
2. JFET Amplifier
 - a. Design and simulate common source FET amplifier using PSPICE /Multisim and study the Gain and Bandwidth of amplifier
 - b. Design common source FET amplifier with discrete components and calculate the bandwidth of amplifier from its frequency response
3. Common Emitter Amplifier (Self bias Amplifier)
 - a. Design and simulate a self- bias (Emitter bias) Common Emitter amplifier using PSPICE /Multisim and study the Gain and Bandwidth of amplifier
 - b. Design voltage divider based Common Emitter amplifier with discrete components and calculate the bandwidth of amplifier from its frequency response.
4. Design and simulate two stage RC coupled amplifier for given specifications. Determine Gain and Bandwidth from its frequency response curve.
5. Design and simulate Darlington amplifier. Determine Gain and Bandwidth from its frequency response curve.
6. Design and Simulate CE – CB Cascode amplifier. Determine Gain and Bandwidth from its frequency response curve.
7. Design and simulate voltage series feedback amplifier for the given specifications. Determine the effect of feedback on the frequency response of a voltage series feedback amplifier.

8. Design and simulate current shunt feedback for the given specifications. Determine the effect of feedback on the frequency response of a current shunt feedback amplifier.
 9. Design and simulate RC Phase shift oscillator and Wien bridge oscillator for the given specification. Determine the frequency of oscillation.
 10. Design and simulate Hartley and Colpitts oscillators for the given specifications. Determine the frequency of oscillation.
 11. Design and simulate class A power amplifier and find out the efficiency. Plot the output waveforms.
 12. Design and simulate class B push-pull amplifier and find out the efficiency. Plot the output waveforms.
 13. Design and simulate single tuned amplifier. Determine the resonant frequency and bandwidth of a tuned amplifier.
 14. Design and simulate double tuned amplifier. Determine the resonant frequency and bandwidth of a tuned amplifier.
- Note:** Design & simulate any 12 experiments with Multisim / PSPICE or equivalent software and verify the results in hardware lab with discrete components.

Course Out Comes

After completion of the course, student will be able to

- CO1:** Understand Characteristics and frequency response of various amplifiers (L1)
- CO2:** Analyze negative feedback amplifier circuits, oscillators, Power amplifiers, Tuned amplifiers. (L3)
- CO3:** Determine the efficiencies of power amplifiers (L2)
- CO4:** Design RC and LC oscillators, Feedback amplifier for specified gain and multistage amplifiers for Low, Mid and high frequencies (L4)
- CO3:** Simulate all the circuits and compare the performance.(L5)

(19A04403P) ANALOG COMMUNICATIONS LAB

Course Objectives

- To familiarize the students with basic analog communication systems. Integrate theory with experiments so that the students appreciate the knowledge gained from the theory course.
- Understand all types of analog modulation / demodulation principles.
- Substantiate pulse modulation techniques.
- To design and implement different modulation and demodulation techniques.
- To write and execute programs in MATLAB to implement various modulation techniques.

LIST OF EXPERIMENTS

1. (a) Develop an Amplitude modulation circuit to get modulated signal for various modulation indices. Verify the Spectrum of the modulated signal experimentally and find its Bandwidth.
(b) Design a suitable demodulated circuit to recover original information signal.
2. Generate a DSB - SC signal using suitable circuit diagram. Extract information bearing signal from DSB-SC signal. Calculate the power of the DSB-SC signal.
3. (a) Develop a Frequency modulation circuit to get modulated signal for various modulation depths. Verify the Spectrum of the modulated signal experimentally and find its Bandwidth.
(b) Design a suitable demodulated circuit to recover original information signal.
4. (a) Design a Mixer circuit to verify the principle of operation of Mixer experimentally.
(b) Design a Pre-emphasis & de-emphasis circuit and verify its importance experimentally and plot necessary graph.
5. Construct Pulse Amplitude Modulation circuit and plot modulated signal. Extract the modulated signal by constructing suitable demodulated circuit.
6. Construct Pulse Width Modulation circuit and plot modulated signal. Extract the modulated signal by constructing suitable demodulated circuit.
7. Construct Pulse Position modulation circuit and plot modulated signal. Extract the modulated signal by constructing suitable demodulated circuit.
8. Radio receiver measurements – Sensitivity Selectivity and Fidelity.
9. Simulate AM and FM signals and find power spectrum of each signal. Plot the graphs.
10. Simulate PAM and PWM signals and find power spectrum of each signal. Plot the graphs.
11. Generate a complex Gaussian noise (with zero mean unit variance). And pass through an LTI system. Find the power spectrum density of the noise signal available at the output of LTI system.

12. Make use of AM signal from experiment no. 9 add Gaussian noise (with zero mean and unity variance) to the signal. Extract the information bearing signal using suitable system.
13. Simulate Huffman coding.

Equipment & Software Required:

Software:

1. Computer Systems with latest specifications
2. Connected in LAN (Optional)
3. Operating system (Windows XP)
4. Simulations software (MATLAB)

Equipment:

1. Regulated Power Supply (0-30) V
2. CROs (0-20)MHz
3. Function Generators (0-3) MHz
4. RF Signal Generators (0-1000) MHz
5. Multimeters
6. Required Electronic components(active and passive)for the design of experiments from 1-7
7. Radio Receiver Demo kits or Trainers.
8. RF power meter frequency range 0 – 1000MHz
9. Spectrum Analyzer

Note: Conduct experiments (9-12) using MATLAB software. Student has to perform minimum twelve Experiments

Course Outcomes:

After the completion of the course students able to

CO1: Understand different analog modulation techniques &Radio receiver characteristics.(L1)

CO2: Analyze different analog modulation techniques. (L3)

CO3: Design and implement different modulation and demodulation techniques.(L4)

CO4: Observe the performance of system by plotting graphs & Measure radio receiver characteristics. (L2)

CO5: Simulate all digital modulation and demodulation techniques. (L5)

(19A99301) ENVIRONMENTAL SCIENCE

Course Objectives:

- To make the students to get awareness on environment
- To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life
- To save earth from the inventions by the engineers.

UNIT – I

Multidisciplinary Nature Of Environmental Studies: – Definition, Scope and Importance – Need for Public Awareness.

Natural Resources : Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

Unit Outcomes

- To know the importance of public awareness
- To know about the various resources

UNIT – II

Ecosystems: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

- a. Forest ecosystem.
- b. Grassland ecosystem
- c. Desert ecosystem
- d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity And Its Conservation : Introduction 0 Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at

global, National and local levels – India as a mega-diversity nation – Hot-spots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Course Outcomes:

- To know about various eco systems and their characteristics
- To know about the biodiversity and its conservation

UNIT – III

Environmental Pollution: Definition, Cause, effects and control measures of :

- a. Air Pollution.
- b. Water pollution
- c. Soil pollution
- d. Marine pollution
- e. Noise pollution
- f. Thermal pollution
- g. Nuclear hazards

Solid Waste Management : Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

Course Outcomes:

- To know about the various sources of pollution.
- To know about the various sources of solid waste and preventive measures.
- To know about the different types of disasters and their managerial measures.

UNIT – IV

Social Issues And The Environment: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

Course Outcomes:

- To know about the social issues related to environment and their protection acts.
- To know about the various sources of conservation of natural resources.
- To know about the wild life protection and forest conservation acts.

UNIT – V

Human Population And The Environment: Population growth, variation among nations. Population explosion – Family Welfare Programmes. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

Field Work: Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc..

Unit Outcomes:

- To know about the population explosion and family welfare programmes.
- To identify the natural assets and related case studies.

Course Outcomes:

At the end of the course, the student will be able to

- Grasp multidisciplinary nature of environmental studies and various renewable and nonrenewable resources.
- Understand flow and bio-geo- chemical cycles and ecological pyramids.
- Understand various causes of pollution and solid waste management and related preventive measures.
- About the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation.
- Casus of population explosion, value education and welfare programmes.

TEXT BOOKS :

1. Text book of Environmental Studies for Undergraduate Courses Erach Bharucha for University Grants Commission, Universities Press.
2. Palaniswamy, “Environmental Studies”, Pearson education
3. S.Azeem Unnisa, “Environmental Studies” Academic Publishing Company
4. K.Raghavan Nambiar, “Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus”, Scitech Publications(India), Pvt. Ltd.

REFERENCES :

1. Deeksha Dave and E.Sai Baba Reddy, “Textbook of Environmental Science”, Cengage Publications.
2. M.Anji Reddy, “Text book of Environmental Sciences and Technology”, BS Publication.
3. J.P.Sharma, Comprehensive Environmental studies, Laxmi publications.
4. J. Glynn Henry and Gary W. Heinke, “Environmental Sciences and Engineering”, Prentice hall of India Private limited
5. G.R.Chatwal, “A Text Book of Environmental Studies” Himalaya Publishing House
6. Gilbert M. Masters and Wendell P. Ela, “Introduction to Environmental Engineering and Science, Prentice hall of India Private limited.

(19A04501T)INTEGRATED CIRCUITS AND APPLICATIONS

Course Objectives:

- To introduce basic building blocks of Op-Amps & specialized ICs.
- To explain DC and AC performance characteristics of Op-Amps.
- To impart knowledge on linear and non-linear applications of Op-Amps.
- To describe operation & characteristics of data converters.
- To design various circuits using Op-Amps and 555 timer.
- To familiarise specialised ICs such as VCO, PLL, voltage regulators.

UNIT- I

Operational Amplifier: Introduction, Block diagram, Characteristics and Equivalent circuits of an ideal op-amp, Various types of Operational Amplifiers and their applications, Power supply configurations for OP-AMP applications, Inverting and non-inverting amplifier configurations. The Practical op-amp: Introduction, Input offset voltage, Offset current, Thermal drift, Effect of variation in power supply voltage, common-mode rejection ratio, Slew rate and its Effect, PSRR and Gain – bandwidth product, frequency limitations and compensations, transient response.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand different Offsets present in Op amp & nullification circuits. (L1)
- Examine performance of Op-Amp in open loop and closed configurations. (L2)
- Analyse emitter-coupled differential amplifier. (L3)
- Compare ideal and practical Op-Amps. (L5)

UNIT- II

Applications of Operational Amplifier: Amplifiers: Adder, Integrator, Differentiator, Difference amplifier and Instrumentation amplifier, Converters: Current to voltage and voltage to current converters, Active Filters: First order filters, second order active finite and infinite gain low pass, high pass, band pass and band reject filters, Sine Wave Oscillators: RC phase shift oscillator, Wien bridge oscillator.

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe operation of Op-Amp based Linear application circuits, converters, amplifiers and non-linear circuits. (L2)

- Examine different types of oscillators & active filters with detailed mathematical analysis and illustrations. (L3)
- Design circuits such as amplifiers, comparator, differentiators and integrators using operational amplifiers for various applications, Design active filters and oscillators using Op amp for given specifications. (L4)

UNIT- III

Non-Linear Applications of Operational Amplifier: Comparators: Inverting comparator, non-inverting comparator, zero crossing detector, window detector and level detector, Schmitt Triggers: Inverting Schmitt trigger, non-inverting Schmitt trigger with adjustable threshold levels.

Waveform Generators: Square wave and triangular wave generator with duty cycle modulation, Precision Rectifiers: Half and full wave precision, rectifiers, log and antilog amplifiers, voltage to frequency converter, frequency to voltage converter.

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe operation of Op-Amp based comparators, converters, detectors, rectifiers, sample & hold circuits and waveform generators. (L2)
- Analyse Op-Amp based Comparators, converters, detectors, rectifiers, sample & hold circuits and waveform generators. (L3)
- Design Wave form generators, voltage to frequency converters & frequency to voltage converters for given specification. (L4)

UNIT- IV

Data Converters: Introduction, Basic DAC techniques, Different types of DACs-Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R DAC, Different Types of ADCs - Parallel Comparator Type ADC, Counter Type ADC, Successive Approximation ADC. Dual Slope ADC, DAC and ADC Specifications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain operation principles of different A/D & D/A converters. (L2)
- Compare different types of A/D & D/A converter circuits. (L5)
- Inspect ADC & DAC specifications to select the right converter for an application. (L4)

UNIT -V

Special Purpose Integrated Circuits: Functional block diagram, working, design and applications of Timer 555 (Monostable & Astable), Functional block diagram, working and applications of VCO 566, PLL 565, Fixed and variable Voltage regulators.

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe internal circuit operation of 555 timer, IC voltage regulators (L2)
- Describe functionality of special purpose ICs such as VCO, PLL. (L2)
- Design multi-vibrator circuits using timer. (L4)

Course Outcomes:

- Understand DC and AC characteristics of operational amplifiers & Op amp parameters and functionality of specialized ICs such as 555 TIMER, VCO, PLL & Voltage regulators.
- Make use of Op-Amps and specialized ICs to design circuits for various applications.
- Analyze Op-Amp based Comparators, Waveform generators, Active filters, Converters.
- Design of Op amp based Comparators, Waveform Generators, Active filters, Converters, design various multi-vibrator circuits using IC 555 timer
- Compare different types of A/D and D/A Converter circuits.

TEXTBOOKS:

1. Ramakanth A. Gayakwad, "Op-Amps & Linear ICs", 4th Edition, Pearson, 2017.
2. D. Roy Choudhury, "Linear Integrated Circuits", 2nd Edition, New Age International (p) Ltd, 2003.

REFERENCES:

1. Sergio Franco, "Design with Operational Amplifiers & Analog Integrated Circuits", 3rd edition, McGraw Hill, 1988.
2. Jacob Millman, Christos C. Halkias, "Integrated Electronics - Analog and Digital circuits system", Tata McGraw Hill, 2003.
3. Gray and Meyer, "Analysis and Design of Analog Integrated Circuits", 5th edition Wiley International, 2009.

(19A04502)ANTENNAS AND WAVE PROPAGATION

Course Objectives:

- To introduce radiation mechanisms and basic characteristics of antennas.
- To derive mathematical expressions and their application for complete design of antennas.
- To demonstrate various modes of EM wave propagation.
- To explain measurement of antenna parameters
- To introduce design concepts of various types of antennas including micro strip antenna.

UNIT- I

Antenna Characteristics: Radiation mechanism and current distribution, radiation pattern, directivity, gain, Input impedance, polarization, bandwidth, HPBW. Reciprocity, equivalence of radiation and receive patterns, equivalence of impedances, effective aperture, vector effective length, antenna temperature, Friis transmission formula, problem solving.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand radiation mechanism and basic antenna characteristics. (L1)
- Compute radiation intensity, gain and directivity of antennas. (L2)

UNIT- II

Wire and Antenna Arrays: Wire and antenna arrays: Radiation resistance and directivity and other characteristics of short dipole, monopole, half-wave dipole, small loop antenna.

Linear array and pattern multiplication, two-element array, uniform array, binomial array, broadside and end-fire arrays.

Rhombic antennas, Yagi-Uda array, Turnstile Antenna, Helical antenna - axial and normal modes, log-periodic Array, spiral antenna.

Learning Outcomes:

At the end of this unit, the student will be able to

- Derive expressions for radiation resistance, directivity of wire antennas. (L3)
- Obtain radiation pattern of various array antennas using pattern multiplication. (L3)
- Compare radiation pattern and other antenna parameters of broadside and endfire array antennas. (L5)
- To know the design aspects of antenna arrays. (L4)

UNIT- III

Aperture Antennas and Lens Antennas: Aperture Antennas and Lens Antennas: Slot antenna, pyramidal and conical horn antennas, reflector Antenna: flat plate, corner and parabolic reflectors - common curved reflector shapes, Feed mechanisms.

Lens Antennas - Introduction, Geometry of Non-metallic Dielectric Lenses, Zoning, Tolerances, Applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand basic principles of aperture and lens antennas. (L1)
- Design aperture and lens antennas. (L4)

UNIT- IV

Micro-Strip Antennas And Antenna Measurements: Micro-strip Antennas and Antenna Measurements: Basic characteristics, feeding methods, methods of analysis - Design of Rectangular and Circular Patch Antennas, Introduction to Smart Antennas - Concept of adaptive beam forming, Measurement of Antenna Parameters, basic setup, radiation pattern measurement, gain, directivity.

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe feeding methods for micro-strip antennas. (L2)
- Apply the concepts to measure antenna parameters. (L2)
- Design rectangular and circular patch antennas for given specifications. (L4)

UNIT- V

Wave Propagation - I: Introduction, Definitions, Categorizations and General Classifications, Different Modes of Wave Propagation, Ray/Mode Concepts, Ground Wave Propagation (Quantitative Treatment) - Introduction, Plane Earth Reflections, Space and Surface Waves, Wave Tilt, Curved Earth Reflections, Space Wave Propagation - Introduction, Field Strength Variation with Distance and Height, Effect of Earth's Curvature, Absorption, Super refraction, M- Curves and Duct Propagation, Scattering Phenomena, Tropospheric Propagation.

Wave Propagation - II: Sky Wave Propagation - Introduction, Structure of Ionosphere, Refraction and Reflection of Sky Waves by Ionosphere, Ray Path, Critical Frequency, MUF, LUF, OF, Virtual Height and Skip Distance, Relation between MUF and skip Distance, Multi-hop Propagation, illustrative problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand effects of earth's magnetic field on wave propagation (L1)
- Apply the concepts to solve problems related to wave propagation (L2)

- Analyze tropospheric propagation and derive the expression for received field strength (L3)
- Identify layers in ionosphere and their ionization densities (L1)

Course Outcomes:

- Understand various antenna parameters, principle of operation of various antennas viz. wired, aperture, micro strip antennas.
- Discuss various EM wave propagation methods in ionosphere and troposphere
- Analyze mathematical aspects of wave propagation, Derive expressions related to radiation mechanisms for antennas
- Design various antennas namely array, micro strip, horn, lens and aperture antennas, etc., for a given application.
- Compare performance of various antennas.

TEXT BOOKS:

1. John D. Kraus, Ronald J. Marhefka, Ahmad S. Khan, “Antennas and Wave Propagation”, 4th Edition, TMH, 2010.
2. Jordan, E.C. and Balmain. K. G., “Electromagnetic Waves and Radiating Systems”, Prentice-Hall Publications.

REFERENCES:

1. Constantine A. Balanis, “Antenna Theory-Analysis and Design”, Wiley Publication, 2016.
2. K.D. Prasad, “Antenna & Wave Propagation”, Satya Prakash Publications, 2009.
3. Matthew N.O.Sadiku, “Principle of Electromagnetics”, 4th edition, Oxford (International), 2012.

(19A52601T)ENGLISH LANGUAGE SKILLS

Introduction

The course is designed to train students in receptive (listening and reading) as well as productive and interactive (speaking and writing) skills by incorporating a comprehensive, coherent and integrated approach that improves the learners' ability to effectively use English language skills in academic/ workplace contexts. The shift is from *learning about the language* to *using the language*. They should be able to express themselves clearly in speech and competently handle the writing tasks and verbal ability component of campus placement tests. Activity based teaching-learning methods would be adopted to ensure that learners would engage in actual use of language both in the classroom and laboratory sessions.

Course Objectives

- Facilitate active listening to enable inferential learning through expert lectures and talks
- Impart critical reading strategies for comprehension of complex texts
- Provide training and opportunities to develop fluency in English through participation in formal group discussions and presentations using audio-visual aids
- Demonstrate good writing skills for effective paraphrasing, argumentative essays and formal correspondence
- Encourage use of a wide range of grammatical structures and vocabulary in speech and writing

UNIT -I

Text:

1. **Lines Composed a Few Miles above Tintern Abbey - William Wordsworth**
2. **The Lotos-Eaters - Alfred Tennyson**

Listening: Listening to famous speeches for structure and style

Speaking: Oral presentations on general topics of interest.

Reading: Reading for meaning and pleasure – reading between the lines.

Writing: Appreciating and analyzing a poem –Paraphrasing, note-taking.

Grammar and Vocabulary: Tenses (Advanced Level) Correcting errors in punctuation - Word roots and affixes.

Learning Outcomes

At the end of the module, the learners will be able to

- Understand the purpose of rhythm and rhyme and the use of figures of speech in making the presentation lively and attractive
- Apply the knowledge of structure and style in a presentation, identify the audience and make note of key points
- Make formal structured presentations on general topics using grammatical understanding
- Prioritize information from reading texts after selecting relevant and useful points
- Paraphrase short academic texts using suitable strategies and conventions

UNIT -II

Text: The Model Millionaire – Oscar Wilde

Listening: Following the development of theme; answering questions on key concepts after listening to stories online.

Speaking: Narrating personal experiences and opinions.

Reading: Reading for summarizing and paraphrasing; recognizing the difference between facts and opinions.

Writing: Summarizing, précis writing, letter and note-making

Grammar and Vocabulary: Subject-verb agreement, noun-pronoun agreement, collocations.

Learning Outcomes

At the end of the module, the learners will be able to

- Comprehend academic lectures, take notes and answer questions
- Make formal structured presentations on academic topics
- Distinguish facts from opinions while reading
- Summarize and make a précis of reports
- Use correct English avoiding common errors in formal speech and writing

Unit – III

Text: Speech at IIM Calcutta – Azim Premji

Listening: Identifying views and opinions expressed by different speakers while listening to speeches.

Speaking: Small talks on general topics; agreeing and disagreeing, using claims and examples/ evidences for presenting views, opinions and position.

Reading: Identifying claims, evidences, views, opinions and stance/position.

Writing: Writing structured persuasive/argumentative essays on topics of general interest using suitable claims, examples and evidences.

Grammar and Vocabulary: The use of Active and passive Voice, vocabulary for academic texts

Learning Outcomes

At the end of the module, the learners will be able to

- Critically follow and participate in a discussion
- participate in group discussions using appropriate conventions and language strategies
- comprehend complex texts and identify the author's purpose
- produce logically coherent argumentative essays
- use appropriate vocabulary to express ideas and opinions

UNIT – IV

Text: A Biography of Steve Jobs

Listening: Listening to identify important moments - Understanding inferences; processing of information using specific context clues from the audio.

Speaking: Group discussion; reaching consensus in group work (academic context).

Reading: Reading for inferential comprehension.

Writing: Applying for internship/ job - Writing one's CV/Resume and cover letter.

Grammar and Vocabulary: Phrasal verbs, phrasal prepositions and technical vocabulary.

Learning Outcomes

At the end of the module, the learners will be able to

- Draw inferences and conclusions using prior knowledge and verbal cues
- Express thoughts and ideas with acceptable accuracy and fluency
- Develop advanced reading skills for deeper understanding of texts
- Prepare a cv and write a cover letter to seek internship/ job
- Understand the use of technical vocabulary in academic writing

UNIT –V

Text: How I Became a Public Speaker - George Bernard Shaw

Listening: Understanding inferences - processing of explicit information presented in the text and implicit information inferable from the text or from previous/background knowledge.

Speaking: Formal team presentations on academic/ general topics.

Reading: Intensive and extensive reading.

Writing: Structure and contents of a Report – Abstract – Project report features.

Grammar and Vocabulary: Correcting common errors, improving vocabulary and avoiding clichés and jargons.

Learning Outcomes

At the end of the module, the learners will be able to

- Develop advanced listening skills for in-depth understanding of academic texts
- Collaborate with a partner to make effective presentations
- Understand and apply the structure of project reports
- Demonstrate ability to use grammatically correct structures and a wide range of vocabulary

Course Outcomes

At the end of the course, the learners will be able to

- Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
- Apply grammatical structures to formulate sentences and correct word forms
- Analyze discourse markers to speak clearly on a specific topic in informal discussions
- Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.
- Create a coherent paragraph interpreting a figure/graph/chart/table

TEXT BOOK:

- “Forging Ahead”: A Course Book for B.Tech Students. Orient BlackSwan, 2020.

REFERENCE BOOKS:

- 1) Bailey, Stephen. “Academic writing: A handbook for international students”. Routledge, 2014.
- 2) Chase, Becky Tarver. Pathways: Listening, “Speaking and Critical Thinking”. Heinley ELT; 2nd Edition, 2018.
- 3) Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
- 4) Hewings, Martin. “Cambridge Academic English” (B2). CUP, 2012. (Student Book, Teacher Resource Book, CD & DVD)
- 5). Create a coherent paragraph interpreting a figure/graph/chart/table

(19A04503T) DIGITAL COMMUNICATIONS

Course Objectives:

- To understand the key modules of digital communication systems with emphasis on digital modulation techniques.
- To get introduced to the concept and basics of information theory and the basics of source and channel coding/decoding.
- To prepare mathematical background for communication signal analysis.
- To study signal flow in a digital communication system.
- To analyze error performance of a digital communication system in presence of noise and other interferences.

UNIT- I:

Source Coding Systems: Introduction, sampling process, quantization, quantization noise, conditions for optimality of quantizer, encoding, Pulse-Code Modulation (PCM), Line codes, Differential encoding, Regeneration, Decoding & Filtering, Noise considerations in PCM systems, Time-Division Multiplexing (TDM), Synchronization, Delta modulation (DM)-Granular noise Slope over distortion, Differential PCM (DPCM), Processing gain, Adaptive DPCM (ADPCM), Comparison of the above systems, Illustrative Problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand source coding techniques & pulse modulation techniques. (L1)
- Describe and determine the performance of line codes. (L2)
- Analyze different pulse modulation techniques & Distortions. (L3)
- Compare the performance different pulse modulation Schemes. (L5)

UNIT- II:

Baseband Pulse Transmission: Introduction, Matched filter, Properties of Matched filter, Matched filter for rectangular pulse, Error rate due to noise, Inter-symbol Interference (ISI), Nyquist's criterion for distortion less baseband binary transmission, ideal Nyquist channel, raised cosine filter & its spectrum, Correlative coding – Duo binary & Modified duo binary signalling schemes, Partial response signalling, Baseband M-ary PAM transmission, Eye diagrams, Illustrative Problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyze the performance of baseband pulse transmission system. (L3)

- Describe the generation & detection of pass band modulated signals. (L2)
- Analyze probability of error for various pass band data transmission schemes. (L3)
- Compare the power bandwidth required for various pass band data transmission scheme. (L4)

UNIT- III:

Signal Space Analysis: Introduction, Geometric representation of signals, Gram-Schmidt orthogonalization procedure, Response of bank of correlators to noisy input, Coherent detection of signals in noise - maximum likelihood decoder, Probability of error, Correlation receiver, detection of signals with unknown phase, Illustrative Problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concepts of signal space analysis. (L1)
- Examine the characteristics of maximum likelihood decoder. (L2)
- Analyze correlation receiver. (L3)

UNIT- IV:

Passband Data Transmission: INTRODUCTION, Passband transmission model, Coherent modulation schemes- Generation and detection of binary phase shift keying (BPSK), Quadrature shift keying (QPSK), and Binary Frequency shift keying (BFSK). Analysis of probability of error for BPSK, QPSK, BFSK, Power spectra of above mentioned modulated signals. M-ary PSK, M-ary quadrature amplitude modulation (M-ary QAM), Non-coherent orthogonal modulation schemes - Generation and detection of non-coherent BFSK, DPSK - analysis of probability of error and Comparison of power bandwidth requirements for all the above schemes, Illustrative Problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyse the different digital modulation techniques, generation and detection, power spectra and their probability of error performance. (L3)
- Compare the power bandwidth, bit error probability for various modulation scheme.(L5)

UNIT- V

Channel Coding: Discrete memory less channels, Linear Block Codes-Repetition codes, Syndrome decoding, minimum distance considerations, Cyclic codes- generator polynomial, parity check polynomial, encoder for cyclic code, calculation of syndrome, Convolutional Codes – generator polynomials, state diagrams, Viterbi algorithm, Illustrative problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand various error control encoding and decoding techniques. (L1)
- Apply information theory and linear algebra in source coding and channel coding. (L2)
- Analyse the performance of error control codes. (L3)

Course Outcomes:

- Understand the elements of digital communication system, baseband pulse transmission, pass band digital modulation, geometric representation of signals, basics of information theory and error correcting codes.
- Apply the knowledge of signals and system & statistical theory to evaluate the performance of digital communication systems.
- Analyze the different coding, modulation techniques, Probability of error performance of digital system.
- Compare the performance of different modulation schemes& error correcting codes.

TEXT BOOKS:

1. Simon Haykin, “Communication Systems”, Wiley India Edition, 4th Edition, 2011.
2. B.P. Lathi, & Zhi Ding, “Modern Digital & Analog Communication Systems”, 4th edition, Oxford University Press, International 2010.

REFERENCES:

1. Sam Shanmugam, “Digital and Analog Communication Systems”, 3rd Edition, John Wiley, 2005.
2. Bruce Carlson, and Paul B. Crilly, “Communication Systems – An Introduction to Signals & Noise in Electrical Communication”, 5th Edition, McGraw-Hill International Edition, 2010.
3. Bernard Sklar, “Digital Communications”, 2nd edition, Prentice-Hall PTR, 2001.
4. Herbert Taub and Donald L Schilling, “Principles of Communication Systems”, 3rd Edition, Tata McGraw-Hill, 2009.

(19A05403T) OPERATING SYSTEMS

Professional Elective-I

Course Objectives:

The course is designed to

- Understand basic concepts and functions of operating systems
- Understand the processes, threads and scheduling algorithms.
- Provide good insight on various memory management techniques
- Expose the students with different techniques of handling deadlocks
- Explore the concept of file-system and its implementation issues
- Familiarize with the basics of Linux operating system
- Implement various schemes for achieving system protection and security

UNIT I

Operating Systems Overview: Introduction, Operating system functions, Operating systems operations, Computing environments, Open-Source Operating Systems

System Structures: Operating System Services, User and Operating-System Interface, systems calls, Types of System Calls, system programs, Operating system Design and Implementation, Operating system structure, Operating system debugging, System Boot.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify major components of operating systems
- Understand the types of computing environments
- Explore several open source operating systems
- Recognize operating system services to users, processes and other systems

UNIT II

Process Concept: Process scheduling, Operations on processes, Inter-process communication, Communication in client server systems.

Multithreaded Programming: Multithreading models, Thread libraries, Threading issues, Examples.

Process Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple processor scheduling, Thread scheduling, Examples.

Inter-process Communication: Race conditions, Critical Regions, Mutual exclusion with busy waiting, Sleep and wakeup, Semaphores, Mutexes, Monitors, Message passing, Barriers, Classical IPC Problems - Dining philosophers problem, Readers and writers problem.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the importance, features of a process and methods of communication between processes.
- Improving CPU utilization through multi programming and multithreaded programming
- Examine several classical synchronization problems

UNIT III

Memory-Management Strategies: Introduction, Swapping, Contiguous memory allocation, Paging, Segmentation, Examples.

Virtual Memory Management: Introduction, Demand paging, Copy on-write, Page replacement, Frame allocation, Thrashing, Memory-mapped files, Kernel memory allocation, Examples.

Learning Outcomes:

At the end of this unit, the student will be able to

- Examine the various techniques of allocating memory to processes
- Summarize how paging works in contemporary computer systems
- Understanding the benefits of virtual memory systems.

UNIT IV

Deadlocks: Resources, Conditions for resource deadlocks, Ostrich algorithm, Deadlock detection

And recovery, Deadlock avoidance, Deadlock prevention.

File Systems: Files, Directories, File system implementation, management and optimization.

Secondary-Storage Structure: Overview of disk structure, and attachment, Disk scheduling, RAID structure, Stable storage implementation.

Learning Outcomes:

At the end of this unit, the student will be able to

- Investigate methods for preventing/avoiding deadlocks
- Examine file systems and its interface in various operating systems
- Analyze different disk scheduling algorithms

UNIT V

System Protection: Goals of protection, Principles and domain of protection, Access matrix, Access control, Revocation of access rights.

System Security: Introduction, Program threats, System and network threats, Cryptography as a security, User authentication, implementing security defenses, firewalling to protect systems and networks, Computer security classification.

Case Studies: Linux, Microsoft Windows.

Learning Outcomes:

At the end of this unit, the student will be able to

- Infer various schemes available for achieving system protection.
- Acquiring knowledge about various countermeasures to security attacks
- Outline protection and security in Linux and Microsoft Windows.

Course Outcomes

By the end of this course students will be able to:

- Realize how applications interact with the operating system
- Analyze the functioning of a kernel in an Operating system.
- Summarize resource management in operating systems
- Analyze various scheduling algorithms
- Examine concurrency mechanism in Operating Systems
- Apply memory management techniques in design of operating systems
- Understand the functionality of file system
- Compare and contrast memory management techniques.
- Understand the deadlock prevention and avoidance.
- Perform administrative tasks on Linux based systems.

Text Books:

1. Silberschatz A, Galvin P B, and Gagne G, Operating System Concepts, 9th edition, Wiley, 2016.
2. Tanenbaum A S, Modern Operating Systems, 3rd edition, Pearson Education, 2008.
(Topics: Inter-process Communication and File systems.)

Reference Books:

1. Tanenbaum A S, Woodhull A S, Operating Systems Design and Implementation, 3rd edition, PHI, 2006.
2. Dhamdhere D M, Operating Systems A Concept Based Approach, 3rd edition, Tata McGraw-Hill, 2012.
3. Stallings W, Operating Systems -Internals and Design Principles, 6th edition, Pearson Education, 2009
4. Nutt G, Operating Systems, 3rd edition, Pearson Education, 2004

(19A02403) POWER ELECTRONICS
Professional Elective-I

Course Objectives:

The student will be able to:

1. Understand the differences between signal level and power level devices.
2. Analyze controlled rectifier circuits.
3. Analyze the operation of DC-DC choppers.
4. Analyze the operation of voltage source inverters.

UNIT-I: Power Switching Devices

Diode, Thyristor, MOSFET, IGBT: I-V Characteristics; Firing circuit for thyristor; Voltage and current commutation of a thyristor; Gate drive circuits for MOSFET, IGBT and GTO.

Learning Outcomes:

At the end of the unit, students will be able to

- Understand the basic power semiconductor devices their construction, principle of working and their characteristics.
- Understand in detail about SCR i.e., its characteristics, series and parallel connection of SCR's, specification, its ratings and various commutation methods.
- Apply the above concepts to solve numerical problems.

UNIT-II: Thyristor Rectifiers

Single-phase half-wave and full-wave rectifiers, Single-phase full-bridge thyristor rectifier with R-load and highly inductive load; Three-phase full-bridge thyristor rectifier with R-load and highly inductive load; Input current wave shape and power factor-Numerical problems.

Learning Outcomes:

At the end of the unit, students will be able to

- Understand the concepts of phase control technique, midpoint and bridge connections of half and full controlled converters with various loads for both 1 $\emptyset$ and 3 $\emptyset$ phase converters, effect of source inductance and dual converters.
- Analyze and evaluate voltages and currents, active and reactive power inputs to converter with and without freewheeling diode for 1 $\emptyset$ and 3 $\emptyset$ converters.
- Apply the above concepts to solve numerical problems.

UNIT-III: DC-DC buck converter

Elementary chopper with an active switch and diode, concepts of duty ratio and average voltage, power circuit of a buck converter, analysis and waveforms at steady state, duty ratio control of output voltage.

DC-DC boost converter:

Power circuit of a boost converter, analysis and waveforms at steady state, relation between duty ratio and average output voltage.

Learning Outcomes:

At the end of the unit, students will be able to

- Understand the concepts of various control strategies, types of choppers and analyze their principle operation, waveforms of voltages and currents at different loads.
- Apply the above concepts to solve numerical problems.

UNIT-IV:

Single phase Voltage Source inverters – operating principle - steady state analysis, Simple forced commutation circuits for bridge inverters – Mc Murray and Mc Murray Bedford inverters, Voltage control techniques for inverters and Pulse width modulation techniques, single phase current source inverter with ideal switches, basic series inverter, single phase parallel inverter – basic principle of operation only, Three phase bridge inverters (VSI) – 180 degree mode – 120 degree mode of operation - Numerical problems.

Learning Outcomes:

At the end of the unit, students will be able to

- Understand the construction, working of single phase voltage inverters with their waveforms in various operating modes when different loads are applied and the different modulating techniques available.
- Understand the construction, working of three phase voltage inverters with their waveforms in various operating modes when different loads are applied, harmonic components and the different modulating techniques available.
- Apply the above concepts to solve numerical problems.

UNIT-V: AC VOLTAGE CONTROLLERS & CYCLO CONVERTERS:

AC voltage controllers – Principle of phase control – Principle of integral cycle control - Single phase two SCRs in anti parallel – With R and RL loads – modes of operation of Triac – Triac with R and RL loads – RMS load voltage, current and power factor - wave forms – Numerical problems. Cyclo converters - Midpoint and Bridge connections - Single phase to

single phase step-up and step-down cyclo converters with Resistive and inductive load, Principle of operation, Waveforms, output voltage equation.

Learning Outcomes:

At the end of the unit, students will be able to

- Understand the concept of AC voltage controllers
- Understand the concept of Cyclo Converters

Course Outcomes:

At the end of this course students will be able to:

- Understand the operation, characteristics and usage of basic Power Semiconductor Devices.
- Understand different types of Rectifier circuits with different operating conditions.
- Understand DC-DC converters operation and analysis of their characteristics.
- Understand the construction and operation of voltage source inverters, Voltage Controllers and Cyclo Converters.
- Apply all the above concepts to solve various numerical problem solving

TEXT BOOKS:

1. M. H. Rashid, “Power Electronics: Circuits, Devices and Applications”, 2nd edition, Prentice Hall of India, 1998
2. P.S.Bimbhra, “Power Electronics”, 4th Edition, Khanna Publishers, 2010.
3. M. D. Singh & K. B. Kanchandhani, “Power Electronics”, Tata Mc Graw Hill Publishing Company, 1998.

REFERENCE BOOKS:

1. Ned Moha, “Power Electronics”, Wiley, 2011.
2. Robert W. Erickson and Dragan Maksimovic, “Fundamentals of Power Electronics” 2nd Edition, Kluwer Academic Publishers, 2004.
3. Vedam Subramanyam, “Power Electronics”, New Age International (P) Limited, 1996.
4. V.R.Murthy, “Power Electronics”, 1st Edition, Oxford University Press, 2005.
5. P.C.Sen, “Power Electronics”, Tata Mc Graw-Hill Education, 1987.

(19A05303T) OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Professional Elective-I

Course Objectives:

- To understand object oriented concepts and problem solving techniques
- To obtain knowledge about the principles of inheritance and polymorphism
- To implement the concept of packages, interfaces, exception handling and concurrency mechanism.
- To design the GUIs using applets and swing controls.
- To understand the Java Database Connectivity Architecture

UNIT - I

Introduction: Introduction to Object Oriented Programming, The History and Evolution of Java, Introduction to Classes, Objects, Methods, Constructors, this keyword, Garbage Collection, Data Types, Variables, Type Conversion and Casting, Arrays, Operators, Control Statements, Method Overloading, Constructor Overloading, Parameter Passing, Recursion, String Class and String handling methods.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the syntax, semantics and features of Java Programming Language.
- Learn object oriented features and understanding type conversion and casting.
- Understand different types of string handling functions and its usage.

UNIT - II

Inheritance: Basics, Using Super, Creating Multilevel hierarchy, Method overriding, Dynamic Method Dispatch, Using Abstract classes, Using final with inheritance, Object class,

Packages: Basics, Finding packages and CLASSPATH, Access Protection, Importing packages.

Interfaces: Definition, Implementing Interfaces, Extending Interfaces, Nested Interfaces, Applying Interfaces, Variables in Interfaces.

Learning Outcomes:

At the end of this unit, the student will be able to

- Implement types of Inheritance and developing new classes based on existing classes
- Distinguish between system packages and user defined packages.
- Demonstrate features of interfaces to implement multiple inheritances.

UNIT - III

Exception handling - Fundamentals, Exception types, Uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws and finally, built-in exceptions, creating own exception sub classes.

Stream based I/O (java.io) – The Stream classes-Byte streams and Character streams, Readingconsole Input and Writing Console Output, File class, Reading and writing Files, Random access file operations, The Console class, Serialization, Enumerations, Autoboxing, Generics.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn what exceptions are and how they are handled.
- Learn when to use exception handling and how to create user defined exceptions
- Learn the difference between various files and streams.

UNIT - IV

Multithreading: The Java thread model, Creating threads, Thread priorities, Synchronizing threads, Interthread communication.

The Collections Framework (java.util): Collections overview, Collection Interfaces, The Collectionclasses- Array List, Linked List, Hash Set, Tree Set, Priority Queue, Array Deque, Hashtable, Properties, Stack, Vector, String Tokenizer, Bit Set, Date, Calendar, Random, Formatter, Scanner.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand concurrency, parallelism and multithreading
- Learn the importance of collections and use prebuilt generic data structures from framework.

UNIT – V

Applet: Basics, Architecture, Applet Skeleton, requesting repainting, using the status window, passing parameters to applets

GUI Programming with Swings – The origin and design philosophy of swing, components and containers, layout managers, event handling, using a push button, jtextfield, jlabel and image icon, the swing buttons, jtext field, jscrollpane, jlist, jcombobox, trees, jtable, An overview of jmenubar, jmenu and jmenuitem, creating a main menu, showmessagedialog, showconfirmdialog, showinputdialog, showoptiondialog, jdialog, create a modeless dialog.

Accessing Databases with JDBC:

Types of Drivers, JDBC Architecture, JDBC classes and Interfaces, Basic steps in developing JDBC applications, Creating a new database and table with JDBC.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn how to use the Nimbus look-and-feel
- Understand the GUI programming.
- Understand basic steps in developing JDBC applications,

Course Outcomes:

After the completion of the course the student will be able

- To solve real world problems using OOP techniques.
- To apply code reusability through inheritance, packages and interfaces
- To solve problems using java collection framework and I/O classes.
- To develop applications by using parallel streams for better performance.
- To develop applets for web applications.
- To build GUIs and handle events generated by user interactions.
- To use the JDBC API to access database

Text Books:

1. Herbert Schildt “Java The complete reference”, 9th edition, McGraw Hill Education (India) Pvt. Ltd.
2. Paul Dietel, Harvey Dietel “Java How to Program”, 10th Edition, Pearson Education.

REFERENCE BOOKS:

1. T. Budd “Understanding Object-Oriented Programming with Java”, updated edition, Pearson Education.
2. Cay S. Horstmann, “Core Java Volume – 1 Fundamentals”, Pearson Education.
3. Sagayaraj, Dennis, Karthik and Gajalakshmi, “Java Programming for core and advanced learners” University Press
4. Y. Daniel Liang, “Introduction to Java programming”, Pearson Education.
5. P. Radha Krishna, “Object Oriented Programming through Java”, University Press.
6. S. Malhotra, S. Chudhary, “Programming in Java”, 2nd edition, Oxford Univ. Press.
7. R.A. Johnson, “Java Programming and Object-oriented Application Development”, Cengage Learning.

(19A04504a)DATA COMMUNICATIONS AND NETWORKING

Professional Elective-I

Course Objectives:

- To explain the basic concept of computer communication networks
- To demonstrate the TCP/IP and OSI models with merits and demerits.
- To explore the various layers of OSI Model.
- To introduce IP addressing, UDP and TCP Models.
- To have the concept of different routing techniques for data communications.

UNIT- I

Introduction to Computer Networks: Uses of computer Network, Network Software-design Issues for layers, Service primitives and relationship of services to Protocols, Reference models- OSI & TCP/IP, network architectures introduction, Example of Networks-X.25, Frame Relay & ATM, Protocols and Standards.

Learning Outcomes:

At the end of this unit, the student will be able to

- Enumerate the layers of the OSI model and TCP/IP. (L1)
- Explain the function(s) of each layer. (L2)

UNIT- II

Physical Layer: Physical layer- Data rate limits, Transmission media-guided and Unguided, Switching systems, Circuit switching, Datagram switching & Virtual circuit switching, Structure of circuit and packet switch, cable modem and DSL technologies, SONET basics, selection of IEEE std 802.11, a, b, c, g.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand principles of data communication using transmission (guided and wireless) media. (L1)
- Know to the concepts of various switching techniques. (L1)
- Explain the basics of DSL, SONET, and IEEE standards. (L2)

UNIT- III

Data link layer: Framing, Flow & Error control Protocols, HDLC, PPP, Multiple access techniques, random access, controlled access & Channelization, Ethernet types-bridged,

Switched, Full duplex, Fast & gigabit Ethernet, Introduction to Data link layer in 802.11 LAN, connecting devices like passive hubs, repeaters, Active hubs, Bridges, Two-layer Switches, Routers, three layer switches, Gateway etc., Backbone networks, Virtual LANs, Simple Router architecture, Sliding window protocol.

Learning Outcomes:

At the end of this unit, the student will be able to

- List the different connecting devices for networking. (L1)
- Understand the principles of error control protocols, multiple access protocols, routers and switches in data link layer. (L1)
- Solve the error control and multiple access based problems. (L2)

UNIT- IV

Network Layer: IPv4 address, IPv6 address, Address mapping-ARP, RARP & DHCP, IPv4 datagram detail format, IPv6 datagram detail format, ICMP, IGMP, Network layer issues like Delivery, forwarding, intra-domain and Inter-domain routing, Routing algorithms like Shortest path routing, Flooding, Distance Vector Routing, Link State Routing, Path vector routing etc., Addressing types-Physical, Logical & port address.

Transport Layer: Transport layer-Process to process delivery, Connection oriented & Connectionless Transport, UDP, TCP, congestion control and Quality of Service.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concepts of IPvx and different protocols.(L1)
- Apply the knowledge on different routing algorithms and measure their performance metrics.(L2)
- Distinguish between the connection oriented and connection less transport protocols.(L4)

UNIT- V

Application Layer: Application layer protocols and applications like Ping, FTP, telnet, HTTP, SMTP, SNMP, TFTP, BOOTP, DNS, NFS, RPC, X-server, E-mail, Introduction to streaming Audio/Video,P2P file sharing, Introduction to socket programming.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the importance of application layer and the terminology like FTP, HTTP, SMTP, SNMP,TFTP etc., (L1)
- Know about the P2P file sharing and socket programming.(L2)

Course Outcomes:

- Understand the requirement of theoretical & practical aspects of computer networks, functions of various layers involved in data communications, building the skills of sub netting and routing mechanisms.
- Explain the role of protocols in networking.
- Analyze the services and features of the various layers in the protocol stack.

TEXT BOOKS:

1. Behrouz A. Forouzan, “Data Communications and Networking”, 4th Edition, Tata McGraw Hill, 2007.
2. Andrew Tenenbaum, “Computer Networks”, 4th Edition, Pearson Education.
3. Kurose & Ross, “Computer Networking- A top down approach featuring the Internet”, 3rd Edition, Pearson Education.
4. William Stallings, “Computer Networks and Cryptography”, 3rd Edition, Pearson Education.

REFERENCES:

1. Behrouz A. Forouzan, “TCP/IP protocol Suit”, 3rd Edition, Tata McGraw Hill Publications.
2. Stevens, “TCP/IP illustrated Volume - I & II”, Pearson education.
3. Feibel Werner, “Encyclopedia of networking”, Pearson education.

(19A04504b)NANO ELECTRONICS
Professional Elective-I

Course Objectives

- To introduce the challenges in CMOS VLSI device design and fundamental limits of operation.
- To study novel MOS based silicon devices and various multi gate devices.
- To learn about SOI devices and its performance comparison with Silicon devices
- To understand the underlying concepts by setting up and solving the Schrödinger equation for different types of potentials in one dimension as well as in 2 or 3 dimensions for specific cases.
- To understand nano electronic systems and building blocks such as: low-dimensional semiconductors, hetero structures, carbon nano tubes, quantum dots, nano wires etc.
- To gain knowledge on spin electronic devices.
- To familiarize students with the present research front in Nano electronics and to be able to critically assess future trends.

UNIT- I:

Challenges going to sub-100 nm MOSFETs Oxide layer thickness, tunneling, power density, non-uniform dopant concentration, threshold voltage scaling, lithography, hot electron effects, sub-threshold current, velocity saturation, interconnect issues, fundamental limits for MOS operation.

Learning Outcomes:

At the end of this unit, the student will be able to

- Retrieving the challenges and current trends of CMOS technologies. (L1)
- Explain the fabrication process and limitations in the CMOS design. (L2)

UNIT- II:

Novel MOS-based devices Multiple gate MOSFETs, Silicon-on-insulator, Silicon-on-nothing, Fin FETs, vertical MOSFETs, strained Si devices.

Learning Outcomes:

At the end of this unit, the student will be able to

- Inferring the latest MOS device in several aspects of latest configurations like SOI, SON, Strained Si and FETs. (L2).
- Choosing different models of MOS devices according to the requirement. (L3)

UNIT- III:

Quantum structures quantum wells, quantum wires and quantum dots, Single electron devices charge quantization, energy quantization, Coulomb blockade, Coulomb staircase, Bloch oscillations.

Learning Outcomes:

At the end of this unit, the student will be able to

- Categorize the structure of trendy devices. (L2)
- Integrate and model the device with basic quantum structures. (L4)

UNIT- IV:

Hetero structure based devices Type I, II and III hetero junctions, Si-Ge hetero structure, hetero structures of III-V and II-VI compounds - resonant tunneling devices.

Learning Outcomes:

At the end of this unit, the student will be able to

- Correlating device structures with type of materials, which are commonly used for fabrication (L5)
- Defend the tunneling devices with several parameters of hetero structures. (L5)

UNIT- V:

Carbon nanotubes based devices CNFET, characteristics; Spin-based devices spin FET, characteristics, Applications of MOSFET, CNFET and Spin FET devcies.

Learning Outcomes:

At the end of this unit, the student will be able to

- Criticize based on characteristics study for the MOS/FET devices. (L5)
- Adapt the device in specific applications in real-time. (L2)

Course Outcomes:

- Retrieving the challenges and current trends of CMOS technologies.
- Explain the fabrication process and limitations in the CMOS design, Inferring the latest MOS device in several aspects of latest configurations like SOI, SON, Strained Si and FETs, Categorize the structure of trendy devices, Adapt the device in specific applications in real-time.
- Choosing different models of MOS devices according to the requirement.
- Integrate and model the device with basic quantum structures.
- Correlating device structures with type of materials, which are commonly used for fabrication, defend the tunneling devices with several parameters of hetero structures; compare characteristics study for the MOS/FET devices.

TEXT BOOKS:

1. Mircea Dragoman and Daniela Dragoman, “ Nano electronics Principles & devices”, Artech House Publishers, 2005.
2. Karl Goser, “Nanoelectronics and Nanosystems: From Transistors to Molecular and Quantum Devices”, Springer 2005.

REFERENCE BOOKS:

1. Mark Lundstrom and Jing Guo, “Nanoscale Transistors: Device Physics Modelling and Simulation”, Springer, 2005.
2. Vladimir V Mitin, Viatcheslav A Kochelap and Michael A Stroscio, “Quantum hetero structures”, Cambridge University Press, 1999.
3. S M Sze (Ed), “High speed semiconductor devices”, Wiley, 1990.

(19A01506a) EXPERIMENTAL STRESS ANALYSIS
OPEN ELECTIVE-I

Course Objective:

To bring awareness on experimental method of finding the response of the structure to different types of load.

- Demonstrates principles of experimental approach.
- Teaches regarding the working principles of various strain gauges.
- Throws knowledge on strain rosettes and principles of non destructive testing of concrete.
- Gives an insight into the principles of photo elasticity.

UNIT-I

PRINCIPLES OF EXPERIMENTAL APPROACH: - Merits of Experimental Analysis
Introduction, uses of experimental stress analysis advantages of experimental stress analysis,
Different methods –Simplification of problems.

Learning outcomes:

At the end of the unit, students will be able to:

- Demonstrate the merits and principles of experimental approach
- Give an insight into the uses and advantages of experimental stress analysis

UNIT-II

STRAIN MEASUREMENT USING STRAIN GAUGES: - Definition of strain and its relation
of experimental Determinations Properties of Strain Gauge Systems-Types of Strain Gauges –
Mechanical, Acoustic and Optical Strain Gauges. Introduction to Electrical strain gauges -
Inductance strain gauges – LVDT – Resistance strain gauges – various types –Gauge factor –
Materials of adhesion base.

Learning outcomes:

At the end of the unit, students will be able to:

- Introduce various strain gauge systems and their properties
- Give information regarding the gauge factor and materials of adhesion bases

UNIT-III

STRAIN ROSSETTES AND NON – DESTRUCTIVE TESTING OF CONCRETE:-
Introduction – the three elements Rectangular Rosette – The Delta Rosette Corrections for
Transverse Strain Gauge. Ultrasonic Pulse Velocity method –Application to Concrete.
Hammer Test – Application to Concrete.

Learning outcomes:

At the end of the unit, students will be able to:

- Introduces various strain rosettes and corrections for strain gauges
- Gives an insight into the destructive and non destructive testing of concrete

UNIT-IV

THEORY OF PHOTOELASTICITY: - Introduction –Temporary Double refraction – The stress Optic Law –Effects of stressed model in a polariscope for various arrangements – Fringe Sharpening. Brewster’s Stress Optic law.

Learning outcomes:

At the end of the unit, students will be able to:

- Introduces stress optic laws.
- Gives the arrangements and working principles of polariscope.

UNIT-V

TWO DIMENSIONAL PHOTOELASTICITY: - Introduction – Iso-chromatic Fringe patterns- Isoclinic Fringe patterns passage of light through plane Polariscope and Circular polariscope Isoclinic Fringe patterns – Compensation techniques – Calibration methods – Separation methods – Scaling Model to prototype Stresses – Materials for photo – Elasticity Properties of Photoelastic Materials.

Learning outcomes:

At the end of the unit, students will be able to:

- Introduces the understanding of different fringe patterns.
- Introduces model analysis and properties of photo elastic materials.

Course Outcomes:

After completion of the course

- The student will be able to understand different methods of experimental stress analysis
- The student will be able to understand the use of strain gauges for measurement of strain
- The student will be exposed to different Non destructive methods of concrete
- The student will be able to understand the theory of photo elasticity and its applications in analysis of structures

TEXT BOOKS:-

1. J.W.Dally and W.F.Riley, “Experimental stress analysis College House Enterprises”
2. Dr.Sadhu Singh, “Experimental stress analysis”, khanna Publishers

REFERENCE BOOKS:

1. U.C.Jindal, “Experimental Stress analysis”, Pearson Publications.
2. L.S.Srinath, “Experimental Stress Analysis”, MC.Graw Hill Company Publishers.

(19A01506b) BUILDING TECHNOLOGY
OPEN ELECTIVE-I

Course Objectives:

- To impart to know different types of buildings, principles and planning of the buildings.
- To identify the termite control measure in buildings, and importance of grouping circulation, lighting and ventilation aspects in buildings.
- To know the different modes of vertical transportation in buildings.
- To know the utilization of prefabricated structural elements in buildings.
- To know the importance of acoustics in planning and designing of buildings.

UNIT-I

Overview of the course, basic definitions, buildings-types-components- economy and design-principles of planning of buildings and their importance. Definitions and importance of grouping and circulation-lighting and ventilation-consideration of the above aspects during planning of building.

Learning outcomes:

At the end of the unit, students will be able to:

- To be able to plan the building with economy and according to functional requirement.

UNIT-II

Termite proofing: Inspection-control measures and precautions- lighting protection of buildings-general principles of design of openings-various types of fire protection measures to be considered while planning a building.

Learning outcomes:

At the end of the unit, students will be able to:

- Able to know the termite proofing technique to the building and protection from lightening effects.
- To be able to know the fire protection measure that are to be adopted while planning a building.

UNIT-III

Vertical transportation in a building: Types of vertical transportation-stairs-different forms of stairs- planning of stairs- other modes of vertical transportation – lifts-ramps-escalators.

Learning outcomes:

At the end of the unit, students will be able to:

- To be able to know the different modes of vertical transportation and their suitability

UNIT-IV

Prefabrication systems in residential buildings- walls-openings-cupboards-shelves etc., planning and modules and sizes of components in prefabrication. Planning and designing of residential buildings against the earthquake forces, principles, seismic forces and their effect on buildings.

Learning outcomes:

At the end of the unit, students will be able to:

- Identify the adoption of prefabricated elements in the building.
- Know the effect of seismic forces on buildings

UNIT-V

Acoustics – effect of noise – properties of noise and its measurements, principles of acoustics of building. Sound insulation- importance and measures.

Learning outcomes:

At the end of the unit, students will be able to:

- To know the effect of noise, its measurement and its insulation in planning the buildings

Course Outcomes:

After completion of the course the student will be able to

- Understand the principles in planning and design the buildings.
- Know the different methods of termite proofing in buildings.
- Know the different methods of vertical transportation in buildings.
- Know the implementation of prefabricated units in buildings and effect of earthquake on buildings.
- Know the importance of acoustics in planning and designing of buildings.

TEXT BOOKS :

1. Varghese, “Building construction”, PHI Learning Private Limited.
2. Punmia.B.C, “Building construction”, Jain.A.K and Jain.A.K Laxmi Publications.
3. S.P.Arora and S.P.Brndra “Building construction”, Dhanpat Rai and Sons Publications, New Delhi
4. “Building construction-Technical teachers training institute”, Madras, Tata McGraw Hill.

REFERENCE BOOKS:

1. National Building Code of India, Bureau of Indian Standards

(19A02506a) ELECTRICAL ENGINEERING MATERIALS
(OPEN ELECTIVE-I)

Course Objectives:

To make the students learn about

- Classification of materials.
- Properties of materials and its applications.
- Domestic wiring and earthing

UNIT-I Conducting Materials

Introduction – classification of materials – Metals and Non metals, physical, thermal, mechanical and electrical properties of materials – classification of electrical materials – concept of atom – electron configuration of atom, conductors, general properties of conductors, factors effecting resistivity of electrical materials –electrical/mechanical/thermal properties of copper, aluminum, iron, steel, lead, tin and their alloys – applications.

Learning outcomes:

At the end of the unit, students will be able to:

- Understand the classification of conducting materials.
- Analyze the properties of different conducting materials
- Apply the materials where it is applicable
- Know about electron configuration of atom

UNIT-II Dielectric and High Resistivity Materials

Introduction – solid, liquid and gaseous dielectrics, leakage current, permittivity, dielectric constant, dielectric loss – loss angle – loss constant, Breakdown voltage and dielectric strength of – solid, liquid and gaseous dielectrics, effect of break down– electrical and thermal effects, Polarization – electric, ionic and dipolar polarization. Effect of temperature and Frequency on dielectric constant of polar dielectrics. High Resistivity materials – electrical / thermal / mechanical properties of Manganin, Constantan, Nichrome, Tungsten, Carbon and Graphite and their applications in electrical equipment.

Learning outcomes:

At the end of the unit, students will be able to:

- Understand the classification of dielectric and high resistivity materials.
- Analyze the properties of dielectric and high resistivity materials
- Understand about concept of polarization and dipolar polarization
- Apply the materials where it is applicable

UNIT-III Solid Insulating Materials

Introduction – characteristics of a good electrical insulating materials – classification of insulating materials – electrical, thermal, chemical and mechanical properties of solid insulating materials - Asbestos, Bakelite, rubber, plastics, thermo plastics. Resins, polystyrene, PVC, porcelain, glass, cotton and paper.

Learning outcomes:

At the end of the unit, students will be able to:

- Understand about various characteristics of solid insulating materials
- Understand the classification of solid insulating materials.
- Analyze the properties of solid insulating materials
- Apply the materials where it is applicable

UNIT-IV Liquid & Gas Insulating Materials

Liquid insulating materials – Mineral oils, synthetic liquids, fluorinated liquids – Electrical, thermal and chemical properties – transformer oil – properties – effect of moisture on insulation properties Gaseous insulators – classification based on dielectric strength – dielectric loss, chemical stability properties and their applications.

Unit Outcomes:

At the end of the unit, the student will be able to

- Understand the classification of liquid insulating materials.
- Analyze the properties of liquid insulating materials
- Apply the materials where it is applicable
- Understand about properties and classification of gaseous insulators

UNIT-V Domestic Wiring

Wiring materials and accessories – Types of wiring – Types of Switches - Specification of Wiring – Stair case wiring - Fluorescent lamp wiring- Godown wiring – Basics of Earthing – single phase wiring layout for a residential building.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand about wiring materials and accessories
- Understand about earthing and wiring layout of domestic buildings
- Design and develop Residential wiring
- Know about godown wiring

Course Outcomes:

After completing the course, the student should be able to:

- Understand the classification of materials, domestic wiring materials and earthing.

- Analyze the properties of different electrical materials
- Apply where the materials are applicable based on properties of materials
- Design and develop Residential wiring, godown wiring and earthing.

Text Books:

1. G.K. Mithal, “Electrical Engineering Materials”, Khanna publishers, 2nd edition, 1991.
2. R.K. Rajput, A course in “Electrical Engineering Materials”, Laxmi publications, 2009.

Reference Books:

1. C.S. Indulkar and S. Thiruvengadam, “An Introduction to Electrical Engineering Materials” S Chand & Company, 2008.
2. Technical Teachers Training Institute, “Electrical engineering Materials”, 1st Edition, Madras, McGraw Hill Education, 2004.
3. by S.P. Seth, “A course in Electrical Engineering Materials Physics Properties & Applications”, Dhanapat Rai & Sons Publications, 2018.

(19A03506a) INTRODUCTION TO HYBRID AND ELECTRIC VEHICLES
OPEN ELECTIVE-I

Course Objectives:

- Provide good foundation on hybrid and electrical vehicles.
- To address the underlying concepts and methods behind power transmission in hybrid and electrical vehicles.
- Familiarize energy storage systems for electrical and hybrid transportation.
- To design and develop basic schemes of electric vehicles and hybrid electric vehicles.

UNIT I: Electric Vehicle Propulsion and Energy Sources

Introduction to electric vehicles, vehicle mechanics - kinetics and dynamics, roadway fundamentals propulsion system design - force velocity characteristics, calculation of tractive power and energy required, electric vehicle power source - battery capacity, state of charge and discharge, specific energy, specific power, Ragone plot. battery modeling - run time battery model, first principle model, battery management system- soc measurement, battery cell balancing. Traction batteries - nickel metal hydride battery, Li-Ion, Lipolymer battery.

Learning Outcomes:

After successful completion of this unit, the students will be able to

- Summaries the concepts of electrical vehicle propulsion and energy sources. (l2)
- Identify the types of power sources for electrical vehicles.(l3)
- Demonstrate the design considerations for propulsion system. (l2)
- Solve the problems on tractive power and energy required. (l3)

UNIT II: Electric Vehicle Power Plant And Drives

Introduction electric vehicle power plants. Induction machines, permanent magnet machines, switch reluctance machines. Power electronic converters-DC/DC converters - buck boost converter, isolated DC/DC converter. Two quadrant chopper and switching modes. AC drives- PWM, current control method. Switch reluctance machine drives - voltage control, current control.

Learning Outcomes:

After successful completion of this unit, the students will be able to

- Choose a suitable drive scheme for developing an electric vehicles depending on resources.(l1)
- List the various power electronic converters. (l1)

- Describe the working principle dc/dc converters and buck boost convertor. (12)
- Explain about ac drives. (12)

UNIT III: Hybrid And Electric Drive Trains

Introduction hybrid electric vehicles, history and social importance, impact of modern drive trains in energy supplies. Hybrid traction and electric traction. Hybrid and electric drive train topologies. Power flow control and energy efficiency analysis, configuration and control of DC motor drives and induction motor drives, permanent magnet motor drives, switch reluctance motor drives, drive system efficiency.

Learning Outcomes:

After successful completion of this unit, the students will be able to

- Identify the social importance of hybrid vehicles. (13)
- Discuss impact of modern drive trains in energy supplies. (16)
- Compare hybrid and electric drive trains.(12)
- Analyze the power flow control and energy efficiency. (16)

UNIT IV: Electric and Hybrid Vehicles - Case Studies

Parallel hybrid, series hybrid -charge sustaining, charge depleting. Hybrid vehicle case study – Toyota Prius, Honda Insight, Chevrolet Volt. 42 V system for traction applications. Lightly hybridized vehicles and low voltage systems. Electric vehicle case study - GM EV1, Nissan Leaf, Mitsubishi Miev. Hybrid electric heavy duty vehicles, fuel cell heavy duty vehicles.

Learning Outcomes:

After successful completion of this unit, the students will be able to

- List the various electric and hybrid vehicles in the present market. (11)
- Discuss lightly hybridized vehicle and low voltage systems.(16)
- Explain about hybrid electric heavy duty vehicles and fuel cell heavy duty vehicles. (12)

UNIT V: Electric And Hybrid Vehicle Design :

Introduction to hybrid vehicle design. Matching the electric machine and the internal combustion engine. Sizing of propulsion motor, power electronics, drive system. Selection of energy storage technology, communications, supporting subsystem. Energy management strategies in hybrid and electric vehicles - energy management strategies- classification, comparison, implementation.

Learning Outcomes:

After successful completion of this unit, the students will be able to

- Illustrate matching the electric machine and the internal combustion engine. (12)
- Select the energy storage technology. (13)
- Select the size of propulsion motor. (13)
- Design and develop basic schemes of electric and hybrid electric vehicles. (13)

Course outcomes:

After learning the course the students will be able to:

- Explain the working of hybrid and electric vehicles. (12)
- Choose a suitable drive scheme for developing an hybrid and electric vehicles depending on resources. (13)
- Develop the electric propulsion unit and its control for application of electric vehicles.(13)
- Choose proper energy storage systems for vehicle applications. (13)
- Design and develop basic schemes of electric vehicles and hybrid electric vehicles.(13)

Text Books :

1. Iqbal Hussein, “Electric and Hybrid Vehicles: Design Fundamentals”, 2nd edition, CRC Press, 2003.
2. [Amir Khajepour](#), [M. Saber Fallah](#), [Avesta Goodarzi](#), “Electric and Hybrid Vehicles: Technologies, Modeling and Control - A Mechatronic Approach”, illustrated edition, John Wiley & Sons, 2014.
3. Mehrdad Ehsani, YimiGao, Sebastian E. Gay, Ali Emadi, “Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design”, CRC Press, 2004.

References:

1. James Larminie, John Lowry, “Electric Vehicle Technology”, Explained, Wiley, 2003.
2. John G. Hayes, [G. Abas Goodarzi](#), “Electric Powertrain: Energy Systems, Power Electronics and Drives for Hybrid, Electric and Fuel Cell Vehicles”, 1st edition, Wiley-Blackwell, 2018.

(19A03506b) **RAPID PROTOTYPING**
OPEN ELECTIVE-I

Course Objectives:

- Familiarize techniques for processing of CAD models for rapid prototyping.
- Explain fundamentals of rapid prototyping techniques.
- Demonstrate appropriate tooling for rapid prototyping process.
- Focus Rapid prototyping techniques for reverse engineering.
- Train Various Pre – Processing, Processing and Post Processing errors in RP Processes.

UNIT – I

10 Hours

Introduction: Introduction to Prototyping, Traditional Prototyping Vs. Rapid Prototyping (RP), Need for time compression in product development, Usage of RP parts, Generic RP process, Distinction between RP and CNC, other related technologies, Classification of RP.

RP Software: Need for RP software, MIMICS, Magics, SurgiGuide, 3-matic, 3D-Doctor, Simplant, Velocity2, VoXim, SolidView, 3DView, etc., software, Preparation of CAD models, Problems with STL files, STL file manipulation, RP data formats: SLC, CLI, RPI, LEAF, IGES, HP/GL, CT, STEP.

Learning Outcomes:

At the end of the unit, the student will be able to

- Explain prototyping process. (l2)
- Classify different rapid prototyping processes. (l2)
- Summarize rp software's and represent a 3d model in stl format, other rp data formats. (l2)

UNIT – II

8 Hours

Solid and Liquid Based RP Systems: Stereolithography (SLA): Principle, Process, Materials, Advantages, Limitations and Applications. Solid Ground Curing (SGC): Principle, Process, Materials, Advantages, Limitations, Applications.

Fusion Deposition Modeling (FDM): Principle, Process, Materials, Advantages, Limitations, Applications. **Laminated Object Manufacturing (LOM):** Principle, Process, Materials, Advantages, Limitations, Applications.

Learning Outcomes:

At the end of the unit, the student will be able to

- Explain the principles, advantages, limitations and applications of Solid and Liquid based AM systems. (L2)
- Identify the materials for Solid and Liquid based AM systems. (L2)

UNIT – III

8 Hours

Powder Based RP Systems: Principle and Process of Selective Laser Sintering (SLS), Advantages, Limitations and Applications of SLS, Principle and Process of Laser Engineered Net Shaping (LENS), Advantages, Limitations and Applications of LENS, Principle and Process of Electron Beam Melting (EBM), Advantages, Limitations and Applications of EBM.

Other RP Systems: Three Dimensional Printing (3DP): Principle, Process, Advantages, Limitations and Applications. Ballistic Particle Manufacturing (BPM): Principle, Process, Advantages, Limitations, Applications. Shape Deposition Manufacturing (SDM): Principle, Process, Advantages, Limitations, Applications.

Learning Outcomes:

At the end of the unit, the student will be able to

- Explain the principles, advantages, limitations and applications of powder based AM systems. (L2)
- Understand the principles, advantages, limitations and applications of other Additive Manufacturing Systems such as 3D Printing, Ballistic Particle Manufacturing and Shape Deposition Modeling. (L2)

UNIT – IV

8 Hours

Rapid Tooling: Conventional Tooling Vs. Rapid Tooling, Classification of Rapid Tooling, Direct and Indirect Tooling Methods, Soft and Hard Tooling methods.

Reverse Engineering (RE): Meaning, Use, RE – The Generic Process, Phases of RE Scanning, Contact Scanners and Noncontact Scanners, Point Processing, Application Geometric Model, Development.

Learning Outcomes:

At the end of the unit, the student will be able to

- Classify Rapid Tooling methods. (L2)
- Explain the concepts of reverse engineering and scanning tools. (L2)

UNIT – V

8 Hours

Errors in RP Processes: Pre-processing, processing, post-processing errors, Part building errors in SLA, SLS, etc.

RP Applications: Design, Engineering Analysis and planning applications, Rapid Tooling, Reverse Engineering, Medical Applications of RP.

Learning Outcomes:

At the end of the unit, the student will be able to

- Identify various Pre – Processing, Processing and Post – Processing errors in RP processes. (L2)
- Apply of RP in engineering design analysis and medical applications. (L3)

Course Outcomes:

At the end of the course, the student will be able to

- Use techniques for processing of CAD models for rapid prototyping. (L3)
- Understand and apply fundamentals of rapid prototyping techniques. ((L3)
- Use appropriate tooling for rapid prototyping process. (L3)
- Use rapid prototyping techniques for reverse engineering. (L3)
- Identify Various Pre – Processing, Processing and Post Processing errors in RP processes. (L3)

Text Books:

1. Chua C.K., Leong K.F. and Lim C.S., “Rapid Prototyping: Principles and Applications”, 2nd edition, World Scientific Publishers, 2003.
2. Ian Gibson, David W. Rosen, Brent Stucker, “Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing”, 1st Edition, Springer, 2010.
3. Rafiq Noorani, “Rapid Prototyping: Principles and Applications in Manufacturing”, John Wiley & Sons, 2006.

Reference Books:

1. Liou W. Liou, Frank W., Liou, “Rapid Prototyping and Engineering Applications: A Tool Box for Prototype Development”, CRC Press, 2007.
2. Pham D.T. and Dimov S.S., “Rapid Manufacturing; The Technologies and Application of RPT and Rapid tooling”, Springer, London 2001.
3. Gebhardt A., “Rapid prototyping”, Hanser Gardener Publications, 2003.
4. Hilton P.D. and Jacobs P.F., “Rapid Tooling: Technologies and Industrial Applications”, CRC Press, 2005.

(19A05506a) FREE AND OPEN SOURCES SYSTEMS
(Open Elective –I)
(Common to CSE & IT)

Course Objectives:

This course is designed to:

- Understand the context and operation of free and open source software (FOSS) communities and associated software projects.
- Motivate the students to contribute in FOSS projects
- Familiarize with programming languages like Python, Perl, Ruby
- Elucidate the important FOSS tools and techniques

UNIT I PHILOSOPHY

Notion of Community--Guidelines for effectively working with FOSS community--, Benefits of Community based Software Development --Requirements for being open, free software, open source software –Four degrees of freedom - FOSS Licensing Models - FOSS Licenses – GPL- AGPL-LGPL - FDL - Implications – FOSS examples.

Learning outcomes:

At the end of the unit, students will be able to:

- Analyze the benefits of Community based Software Development. (L4)
- Explain the degrees of Freedom. (L2)

UNIT II LINUX

Linux Installation and Hardware Configuration – Boot Process-The Linux Loader (LILO) - The Grand Unified Bootloader (GRUB) - Dual-Booting Linux and other Operating System - Boot-Time Kernel Options- X Windows System Configuration-System Administration – Backup and Restore Procedures- Strategies for keeping a Secure Server.

Learning outcomes:

At the end of the unit, students will be able to:

- Demonstrate Linux Installation and hardware configuration. (L2)
- Compare Linux and Windows System Configurations. (L4)

UNIT III PROGRAMMING LANGUAGES

Programming using languages like Python, Perl, Ruby

Learning outcomes:

At the end of the unit, students will be able to:

- Explain the syntax of programming Languages Python, Perl and Ruby. (L2)
- Develop applications in the Open source programming Languages. (L6)

UNIT IV PROGRAMMING TOOLS AND TECHNIQUES

Usage of design Tools like Argo UML or equivalent, Version Control Systems like Git or equivalent, – Bug Tracking Systems- Package Management Systems

Learning outcomes:

At the end of the unit, students will be able to:

- List various programming tools and explain their uses (L1)
- Make use of the various tools while building applications (L3)

UNIT V FOSS CASE STUDIES

Open Source Software Development - Case Study – Libre office -Samba

Learning outcomes:

At the end of the unit, students will be able to:

- Elaborate the open Source Software Development(L6)
- Compare Libre office with its proprietary equivalent (L5)

Course Outcomes:

Upon completion of the course, the students should be able to:

- Demonstrate Installation and running of open-source operating systems.(L2)
- Justify the importance of Free and Open Source Software projects. (L5)
- Build and adapt one or more Free and Open Source Software packages. (L6)
- Utilize a version control system. (L3)
- Develop software to and interact with Free and Open Source Software development projects.(L3)

TEXT BOOK:

Ellen Siever, Stephen Figgins, Robert Love, Arnold Robbins, “Linux in a Nutshell”, Sixth Edition, O'Reilly Media, 2009.

REFERENCES:

1. Philosophy of GNU URL: <http://www.gnu.org/philosophy/>.
2. Linux Administration URL: <http://www.tldp.org/LDP/lame/LAME/linux-admin-made-easy/>.
3. The Python Tutorial available at <http://docs.python.org/2/tutorial/>.

4. Perl Programming book at <http://www.perl.org/books/beginning-perl/>.
5. Ruby programming book at <http://ruby-doc.com/docs/ProgrammingRuby/>.
6. Version control system URL: <http://git-scm.com/>.
7. Samba: URL : <http://www.samba.org/>.
8. Libre office: <http://www.libreoffice.org/>.

(19A05506b) COMPUTER GRAPHICS and MULTIMEDIA ANIMATION
(Open Elective –I)
(Common to CSE & IT)

Course Objectives:

This course is designed to:

- Introduce the use of the components of a graphics system and become familiar with the building approach of graphics system components and related algorithms.
- Understand the basic principles of 3- 3-dimensional computer graphics.
- Provide insites on how to scan, convert the basic geometrical primitives, how to transform the shapes to fit them as per the picture definition.
- Provide an understanding of mapping from world coordinates to device coordinates, clipping, and projections.
- Discuss the application of computer graphics concepts in the development of computer games, information visualization, and business applications.

UNIT I OVERVIEW OF COMPUTER GRAPHICS SYSTEM

OverView of Computer Graphics System – Video display devices – Raster Scan and random scan system – Input devices – Hard copy devices.

Learning outcomes:

At the end of the unit, students will be able to:

- Explain the overview of computer graphics with visualization. (L2)
- Classify the Input devices. (L2)
- Distinguish raster scan and random scan systems. (L4)

UNIT II OUTPUT PRIMITIVES AND ATTRIBUTES

Drawing line, circle and ellipse generating algorithms – Scan line algorithm – Character Generation – attributes of lines, curves and characters – Antialiasing.

Learning outcomes:

At the end of the unit, students will be able to:

- Analyse output primitives and attributes. (L4)
- Design algorithms based on output. (L6)

UNIT III TWO DIMENSIONAL GRAPHICS TRANSFORMATIONS AND VIEWING:

Two-dimensional Geometric Transformations – Windowing and Clipping – Clipping of lines and clipping of polygons.

Learning outcomes:

At the end of the unit, students will be able to:

- Create two-dimensional graphics. (L6)
- Examine the clipping of polygon. (L4)
- Compare different forms of variations. (L2)

UNIT IV THREE DIMENSIONAL GRAPHICS AND VIEWING

Three-dimensional concepts – Object representations- Polygon table, Quadric surfaces, Splines, Bezier curves and surfaces – Geometric and Modelling transformations – Viewing - Parallel and perspective projections.

Learning outcomes:

At the end of the unit, students will be able to:

- Create three-dimensional graphics. (L6)
- Explain the Quadric surfaces and polygon table. (L2)
- Define modelling transformations. (L1)

UNIT V REMOVAL OF HIDDEN SURFACES

Visible Surface Detection Methods – Computer Animation.

Learning outcomes:

At the end of the unit, students will be able to:

- List the different types of detection methods. (L1)
- Compare various computer animations. (L2)

Course outcomes:

Upon completion of the course, the students should be able to:

- Explain the basic concepts used in computer graphics. (L2)
- Inspect various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping. (L4)
- Assess the importance of viewing and projections. (L5)
- Define the fundamentals of animation, virtual reality and its related technologies. (L3)
- Analyze the typical graphics pipeline (L4)

TEXTBOOK

1. Hearn, D. and Pauline Baker,M., Computer Graphics (C-Version), 2nd Edition, Pearson Education, 2002.

REFERENCES

1. Neuman, W.M., and Sproull, R.F., Principles of Interactive Computer Graphics, Mc Graw Hill Book Co., 1979.
2. Roger, D.F., Procedural elements for Computer Graphics, Mc Graw Hill Book Co., 1985.
3. Asthana, R.G.S and Sinha, N.K., Computer Graphics, New Age Int. Pub. (P) Ltd., 1996.
4. Floey, J.D., Van Dam, A, Feiner, S.K. and Hughes, J.F, Computer Graphics, Pearson Education, 2001.

(19A27506a) BREWING TECHNOLOGY
OPEN ELECTIVE - I

PREAMBLE

This course covers the origin of brewing and ingredients used, methods and equipment used and innovations in this field.

Course Objectives

- To understand the Beer manufacturing, ingredients and their roles.
- To understand overall view of a brewing industry

UNIT – I

Introduction of brewing, history of brewing; Raw materials: barley, hops, water, yeast; Adjuncts for beer production: Maize, rice, millet, wheat, sugar etc. Malt production, role of enzymes for malting; Barley storage, steeping, germination, kilning, cooling, storage;

Learning Outcomes:

At the end of the unit, the student should be able to:

- Introduction of brewing, history of brewing
- Raw materials like barley, hops, water, yeast
- Adjuncts for beer production: Maize, rice, millet, wheat, sugar etc
- Malt production, role of enzymes for malting
- Barley storage, steeping, germination, kilning, cooling, storage

UNIT – II

Malt from other cereals, caramel malt, roasted malt, smoked malt, malt extract; Malt quality evaluation, Wort production, malt milling, Mashing, Mashing vessels; Wort boiling, clarification, cooling and aeration Enzyme properties, starch degradation, b-glucan degradation; Conversion of fatty matter, Biological acidification

Learning Outcomes:

At the end of the unit, the student should be able to:

- Malt from other cereals, caramel malt, roasted malt, smoked malt, malt extract

- Malt quality evaluation, Wort production, malt milling, Mashing, Mashing vessels
- Wort boiling, clarification, cooling and aeration Enzyme properties, starch degradation, b-glucan degradation
- Conversion of fatty matter, Biological acidification

UNIT – III

Beer production methods, fermentation technology, changes during fermentation; Filtration procedure and equipment, beer stabilization conditions and durations, beer carbonation process; Packaging equipment and packaging materials, storage conditions and distribution process

Learning Outcomes:

At the end of the unit, the student should be able to:

- Beer production methods, fermentation technology, changes during fermentation
- Filtration procedure and equipment, beer stabilization conditions and durations, beer carbonation process
- Packaging equipment and packaging materials, storage conditions and distribution process

UNIT – IV

Brewing Equipment. Grain mill, kettles, siphons, carboys, fermentation equipment, wort chillers, pumps beer bottles, cans, labels, bottle caps, sanitation equipments Preventive Production of beer against technology, ling phenomenon of beer, possible measures against staling reactions, oxidation

Learning Outcomes:

At the end of the unit, the student should be able to:

- Brewing Equipments like Grain mill, kettles, siphons, carboys, fermentation equipment, wort chillers
- pumps beer bottles, cans, labels, bottle caps, sanitation equipments
- Preventive Production of beer against technology, ling phenomenon of beer, possible measures against staling reactions, oxidation

UNIT – V

Recent advances: Immobilized Cell Technology in Beer Production, immobilized yeast cell technology Energy management in the brewery and maltings; waste water treatment Automation and plant planning

Learning Outcomes:

At the end of the unit, the student should be able to:

- Immobilized Cell Technology in Beer Production, immobilized yeast cell technology
- Energy management in the brewery and maltings
- waste water treatment Automation and plant planning

Course Outcomes:

By the end of this course, students will attain the:

- Knowledge of beer making, chemistry of ingredients used for brewing,
- Knowledge on brewing industry, Unit operations and equipments involved.

TEXT BOOKS

1. Brewing: “Science and Practice, Brookes and Roger Stevens”, Dennis E. Briggs, Chris A. Boulton, Peter A. 2004, Woodhead publishing limited.
2. Die Deutsche “Bibliothek Technology: “Brewing and Malting”, Wolfgang Kunze. 2010, Bibliographic information published

REFERENCES

1. “Handbook of Brewing”: Process, Technology, Markets, Hans Michael Eblinger. 2009, Wiley-VCH Verlag GmbH & Co.
2. Brewing: “New Technologies”, Charles W. Bamforth. 2006, Woodhead Pub.

(19A27506b) COMPUTER APPLICATIONS IN FOOD INDUSTRY
(OPEN ELECTIVE – I)

PREAMBLE

This course covers all facets of computerization and various software's used and their usage.

Course Objectives

- Able to know about “The necessity of Software & their applications in Food Industries”
- Able to Implement the Programs in ‘C’ to perform various operations that are related to Food Industries.

UNIT – I

Computerization, Importance of Computerization in food industry and IT applications in food industries. Computer operating environments and information system for various types of food industries. Introduction to Bar charts and Pie charts & the procedure to develop bar charts and pie charts on given Data.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Computerization, Importance of Computerization in food industry and IT applications in food industries.
- Computer operating environments and information system for various types of food industries.
- Introduction to Barcharts and Piecharts & the procedure to develop barcharts and piecharts on given Data.

UNIT – II

Introduction to Software & Programming Languages, Properties, Differences of an Algorithm and Flowcharts, Advantages and disadvantages of Flowcharts & Algorithms. Introduction, Fundamentals & advantages of ‘C’. Steps in learning ‘C’ (Character set, Identifiers, Keywords) Steps in learning ‘C’ (Data types, Constants, Variables, Escape sequences).

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Introduction to Software & Programming Languages, Properties, Differences of an Algorithm and Flowcharts
- Advantages and disadvantages of Flowcharts & Algorithms. Introduction, Fundamentals & advantages of 'C'.
- Steps in learning 'C' (Character set, Identifiers, Keywords)
- Steps in learning 'C' (Data types, Constants, Variables, Escape sequences).

UNIT – III

Steps in learning 'C' (Operators, Statements) Steps in learning 'C' (Header Files, Input & Output functions: Formatted I/O functions, Unformatted I/O functions). Basic Structure of a simple 'C' program. Decision Making/Control Statements. Branching, Concept of Looping & Looping statements.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Steps in learning 'C' (Operators, Statements)
- Steps in learning 'C' (Header Files, Input & Output functions: Formatted I/O functions, Unformatted I/O functions).
- Basic Structure of a simple 'C' program. Decision Making/Control Statements.
- Branching, Concept of Looping & Looping statements.

UNIT – IV

Concept of Functions (Defining a function & Function Prototypes, Types of functions: Library functions & User defined functions. Concept of various types of User Defined Functions (i.e., About 4 types). Concept of Arrays & Types of Arrays (Single, Double and Multi-Dimensional Arrays). Concept of a String Library Functions.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Concept of Functions (Defining a function & Function Prototypes, Types of functions: Library functions & User defined functions.
- Concept of various types of User Defined Functions (i.e., About 4 types).
- Concept of Arrays & Types of Arrays (Single, Double and Multi-Dimensional Arrays).
- Concept of a String Library Functions.

UNIT – V

Concept of Pointers, Structures & Unions. Introduction to Data Structures, Types of Data Structures (Primary & Secondary Data Structures) Concept of Linked Lists, Types of Linked Lists & Basic operations on linked Lists. Concept of Stacks & Operations on Stacks (PUSH &

POP Operations) Concept of Queues and types of Queues Operations on a Queue (ENQUEUE & DEQUEUE Operations)

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Concept of Pointers, Structures & Unions. Introduction to Data Structures, Types of Data Structures (Primary & Secondary Data Structures)
- Concept of Linked Lists, Types of Linked Lists & Basic operations on linked Lists.
- Concept of Stacks & Operations on Stacks (PUSH & POP Operations)
- Concept of Queues and types of Queues Operations on a Queue (ENQUEUE & Dequeue Operations)

Course Outcomes

By the end of the course, the students will be able to

- know about the various steps which are related to computer and Software and their application in Food Industries
- know about the various steps which are necessary to implement the programs in 'C'

TEXT BOOKS

1. Yeswanth Kanethkar, Let us 'C'
2. Balaguruswamy E., "Computer Programming in 'C'"
3. Mark Allen Waise , "Data Structures"

REFERENCES

1. M. S Excel 2000, Microsoft Corporation
2. M. S. Office – Microsoft Corporation
3. Verton M.V. "Computer concepts for Agri Business", AVI Pub. Corp., West Port, USA.

**(19A54506a) OPTIMIZATION TECHNIQUES
(OPEN ELECTIVE-I)**

Course Objectives:

The student will be able to learn:

- The basic concepts of Optimization
- The emphasis of this course is on different classical Optimization techniques linear programming and simplex algorithms.
- About optimality of balanced transportation Problems
- About Constrained and unconstrained nonlinear programming.
- About principle of optimality and dynamic programming

UNIT – I Introduction and Classical Optimization Techniques:

Statement of an Optimization problem – design vector – design constraints – constraint surface – objective function – objective function surfaces – classification of Optimization problems. Classical Optimization Techniques: Single variable Optimization – multi variable Optimization without constraints – necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraints. Solution by method of Lagrange multipliers – multivariable Optimization with inequality constraints – Kuhn – Tucker conditions – Numerical examples.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- To know how to formulate statement of optimization problem with or without constraints
- To know about classification of single and multivariable optimization problems
- To know about necessary and sufficient conditions in defining the optimization problems
- To understand how to formulate Kuhn-Tucker conditions and to solve numerical problems

UNIT – II Linear Programming

Standard form of a linear programming problem – geometry of linear programming problems – definitions and theorems – solution of a system of linear simultaneous equations – pivotal reduction of a general system of equations – motivation to the simplex method – simplex algorithm – Numerical examples.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- To know about formulation of LPP
- To know about formulations of GPP
- To understand various theorems in solving simultaneous equations
- To understand about necessity of Simplex method and to solve numerical problems

UNIT – III Nonlinear Programming – One Dimensional Minimization methods

Introduction, Unimodal function, Elimination methods- Unrestricted Search, Exhaustive Search, Dichotomous Search, Fibonacci Method, Golden Section Method and their comparison; Interpolation methods - Quadratic Interpolation Method, Cubic Interpolation Method and Direct Root Methods – Numerical examples.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- To know about NLP in one dimensional optimization problems
- To understand about various search methods
- To learn about various interpolation methods
- To distinguish and compare the various elimination methods with numerical examples

UNIT – IV Unconstrained & Constrained Nonlinear Programming

Unconstrained Optimization Techniques: Introduction- Classification of Unconstrained Minimization Methods, General Approach, Rate of Convergence, Scaling of Design Variables; Direct Search methods- Random Search Methods, Grid Search Method, Pattern Directions, Powell's Method and Simplex Method

Constrained Optimization Techniques: Introduction, Characteristics of a Constrained Problem, Direct Search Methods - Random Search Methods, Basic Approach in the Methods of Feasible Directions, Rosen's Gradient Projection Method, Generalized Reduced Gradient Method and Sequential Quadratic Programming.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- To distinguish between unconstrained and constrained optimization problems
- To learn about direct search methods in unconstrained NLP problems and comparison
- To understand about direct search methods in constrained NLP problems and comparison
- To do exercises for solving numerical examples of various methods

UNIT – V Dynamic Programming

Dynamic programming multistage decision processes – types – concept of sub optimization and the principle of optimality – computational procedure in dynamic programming – examples illustrating the calculus method of solution - examples illustrating the tabular method of solution – Numerical examples.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- To know what is DP problem?
- To know about computational procedure in solving DPP
- To know Calculus and Tabular methods of solving with numerical examples of various methods

Course Outcomes:

The student gets thorough knowledge on:

- Basic methods, principles in optimization
- Formulation of optimization models, solution methods in optimization
- Finding initial basic feasible solutions.
- Methods of linear and non-linear (constrained and unconstrained) programming.
- Applications to engineering problems.

TEXT BOOKS:

1. S. S. Rao, "Engineering optimization": Theory and practice 3rd edition, New Age International (P) Limited, 1998.
2. H.S. Kasana & K.D. Kumar, "Introductory Operations Research Springer (India)", 2004.

REFERENCES:

1. R Fletcher, "Practical Methods of Optimization" , 2nd Edition, Wiley Publishers, 2000.
2. Jorge Nocedal and Wright S, "Numerical Optimization Springer", 1st Edition, 1999.
3. by K.V. Mital and C. Mohan, "Optimization Methods in Operations Research and systems Analysis" 3rd Edition, New Age International (P) Limited, 1996.
4. by S.D. Sharma, "Operations Research", Kedar Nath, 2012.
5. by H.A. Taha, "Operations Research", 9th Edition, An Introduction Pearson, 2010.
6. G. Hadley, "Linear Programming", Narosa, 2002.

**(19A52506a) TECHNICAL COMMUNICATION AND PRESENTATION SKILLS
(OPEN ELECTIVE)**

Course Objectives:

- To develop awareness in students of the relevance and importance of technical communication and presentation skills.
- To prepare the students for placements
- To sensitize the students to the appropriate use of non-verbal communication
- To train students to use language appropriately for presentations and interviews
- To enhance the documentation skills of the students with emphasis on formal and informal writing

SYLLABUS

UNIT -1:

Basics of Technical Communication – Introduction – Objectives & Characteristics of Technical Communication – Importance and need for Technical communication - LSRW Skills – Barriers to effective communication

Learning Outcomes:

At the end of the module, the learners will be able to

- Understand the importance of LSRW skills
- Identify and overcome the barriers to effective communication
- Realize the need and importance of technical communication

UNIT -II

Informal and Formal Conversation - Verbal and Non-verbal communication –Kinesics, Proxemics, Chronemics, Haptics, Paralanguage

Learning Outcomes:

At the end of the module, the learners will be able to

- State the difference between formal and informal conversation.
- Apply the knowledge of the difference between the verbal and non-verbal communication
- Evaluate the different aspects of non-verbal communication.

UNIT -III

Written communication – Differences between spoken and written communication – Features of effective writing –Advantages and disadvantages of spoken and written communication- Art of condensation- summarizing and paraphrasing

Learning Outcomes:

At the end of the module, the learners will be able to

- Know the difference between written and spoken communication
- Apply the awareness of features of effective writing.
- Implement the understanding of summarizing and paraphrasing.

UNIT -IV

Presentation Skills – Nature and importance of oral presentation – Defining the purpose – Analyzing the audience - Planning and preparing the presentation, organizing and rehearsing the presentation –Individual and group presentations - Handling stage fright

Learning Outcomes:

At the end of the module, the learners will be able to

- State the importance of presentation skills in corporate climate.
- Analyze the demography of the audience.
- Plan, prepare and present individual and group presentations.

UNIT -V

Interview Skills – The Interview process –Characteristics of the job interview – Pre-interview preparation techniques – Projecting the positive image – Answering Strategies

Learning Outcomes:

At the end of the module, the learners will be able to

- Identify the characteristics of the job interview.
- Understand the process of Interviews.
- Develop a positive image using strategies in answering FAQs in interviews

Course Outcomes

- Understand the importance of effective technical communication
- Apply the knowledge of basic skills to become good orators
- Analyze non-verbal language suitable to different situations in professional life
- Evaluate different kinds of methods used for effective presentations
- Create trust among people and develop employability skills

TEXT BOOKS:

1. Ashrif Rizvi, "Effective Technical Communication", TataMcGrahill, 2011
2. Meenakshi Raman &Sangeeta Sharma, "Technical Communication", 3rd Edition, O U Press 2015

REFERENCES:

1. Pushpalatha & Sanjay Kumar, "Communication Skills", Oxford Univsesity Press
- 2.Barron's/Books on TOEFL/GRE/GMAT/CAT/IELTS DELTA/Cambridge University Press.2012.
3. Butterfield Jeff, "Soft Skills for Everyone", Cengage Publications, 2011.
4. Universities Press (India) Pvt Ltd., "Management Shapers Series",Himayatnagar, Hyderabad 2008.
5. John Hughes & Andrew Mallett, "Successful Presentations"Oxford.
- 6.Edgar Thorpe and Showick Thorpe, "Winning at Interviews"Pearson
7. Munish Bhargava, "Winning Resumes and Successful Interviews", McGraw Hill

(19A51506a) CHEMISTRY OF ENERGY MATERIALS

Course Objectives:

- To make the student understand basic electrochemical principles such as standard electrode potentials, emf and applications of electrochemical principles in the design of batteries.
- To understand the basic concepts of processing and limitations of fossil fuels and Fuel cells & their applications.
- To impart knowledge to the students about fundamental concepts of hydrogen storage in different materials and liquification method
- Necessasity of harnessing alternate energy resources such as solar energy and its basic concepts.
- To understand and apply the basics of calculations related to material and energy flow in the processes.

UNIT-1: Electrochemical Systems: Galvanic cell, standard electrode potential, application of EMF, electrical double layer, dipole moments, polarization, Batteries-Lead-acid and Lithium ion batteries.

Learning Outcomes:

At the end of this unit, the students will be able to

- Solve the problems based on electrode potential (L3)
- Describe the Galvanic Cell (L2)
- Differentiate between Lead acid and Lithium ion batteries (L2)
- Illustrate the electrical double layer (L2)

UNIT-2: Fuel Cells: Fuel cell working principle, Classification of fuel cells, Polymer electrolyte membrane (PEM) fuel cells, Solid-oxide fuel cells (SOFC), Fuel cell efficiency, Basic design of fuel cell,.

Learning Outcomes:

At the end of this unit, the students will be able to

- Describe the working Principle of Fuel cell (L2)
- Explain the efficiency of the fuel cell (L2)
- Discuss about the Basic design of fuel cells (L3)

- Classify the fuel cell (L2)

UNIT-3: Hydrogen Storage: Hydrogen Storage, Chemical and Physical methods of hydrogen storage, Hydrogen Storage in metal hydrides, metal organic frame works (MOF), Carbon structures, metal oxide porous structures, hydrogel storage by high pressure methods. Liquifaction method.

Learning Outcomes:

At the end of this unit, the students will be able to

- Differentiate Chemical and Physical methods of hydrogen storage (L2)
- Discuss the metal organic frame work (L3)
- Illustrate the carbon and metal oxide porous structures (L2)
- Describe the liquification methods (L2)

UNIT-4:Solar Energy: Solar energy introduction and prospects, photo voltaic (PV) technology, concentrated solar power (CSP), Solar Fuels, Solar cells.

Learning Outcomes:

At the end of this unit, the students will be able to

- Apply the photo voltaic technology (L3)
- Demonstrate about solar energy and prospects (L2)
- Illustrate the Solar cells (L2)
- Discuss about concentrated solar power (L3)

UNIT-5: Photo and Photo electrochemical Conversions: Photochemical cells and applications of photochemical reactions, specificity of photo electrochemical cell, advantage of photoelectron catalytic conversions.

Learning Outcomes:

At the end of this unit, the students will be able to

- Differentiate between Photo and Photo electrochemical Conversions (L2)
- Illustrate the photochemical cells (L2)
- Identify the applications of photochemical reactions (L3)
- Interpret advantages of photoelectron catalytic conversion (L2)

Course Outcome:

- Ability to perform simultaneous material and energy balances.
- Student learn about various electrochemical and energy systems
- Knowledge of solid, liquid and gaseous fuels
- To know the energy demand of world, nation and available resources to fulfill the demand
- To know about the conventional energy resources and their effective utilization
- To acquire the knowledge of modern energy conversion technologies
- To be able to understand and perform the various characterization techniques of fuels
- To be able to identify available nonconventional (renewable) energy resources and techniques to utilize them effectively

References :

1. Physical chemistry **by** Ira N. Levine
2. Essentials of Physical Chemistry, Bahl and Bahl and Tuli.
3. Inorganic Chemistry, Silver and Atkins
4. Fuel Cell Hand Book 7th Edition, by US Department of Energy (EG&G technical services and corporation)
5. Hand book of solar energy and applications by Arvind Tiwari and Shyam.
6. Solar energy fundamental, technology and systems by Klaus Jagar et.al.
7. Hydrogen storage by Levine Klebonoff

(19A04501P)INTEGRATED CIRCUITS AND APPLICATIONS LAB

LIST OF EXPERIMENTS

Course Objectives:

- To familiarize different Analog ICs.
- To implement linear and nonlinear application circuits by Op amp.
- To realize active filters using Op amp.
- To design of various multi-vibrator circuits using 555 timer application
- To design and Understand the working of mixed signal circuits like Analog to Digital Convertors, Digital to analog Convertors and Phase Locked Loop.
- To understand the working of a few application specific analog ICs and to design circuits based on these ICs.

Conduct any 12 experiments from the following list. Out of them any 4 experiments may be conducted using software tools.

Note: All the Hardware experiments may be performed using ICs 741, TL082, 555,565

Interpretation of data sheets (741, TL082, 555, 565)

1. Applications of Op-amp
Design and test the performance of the following circuits using Op-amp IC741/TL082
 - a. Inverting amplifier
 - b. Non-inverting amplifier
 - c. Voltage follower
 - d. Summer
2. Design and test the performance of practical differentiator and integrator circuits for various time constants. Plot the graphs.
3. Comparator circuits
To study zero crossing detectors, window detector and Schmitt trigger using Op-Amp.
4. Signal converters
Construct suitable circuits for Voltage to Current and Current to Voltage converters using Op-Amp.
5. Active filters using Op-amp
Design and test the performance of 2nd and 3rd order Butterworth LPF, HPF.
6. Active filters using Op-amp
Design and test the performance of 2nd and 3rd order Butterworth BPF and BSF.
7. Construct and verify the performance of
 - a. Logarithmic and antilog amplifiers
 - b. Instrumentation amplifier
8. Precision rectifiers
Conduct experiments on half wave and full wave precision rectifiers and draw the

- output waveforms.
9. Design the monostable multivibrator circuit and verify their performance practically using Op-Amp and IC 555.
 10. Design the astable multivibrator circuit and verify their performance practically using Op-Amp and IC 555.
 11. Data converters
Construct and study performance of
 - a. DAC circuits – R-2R and ladder type.
 - b. Successive approximation type ADC.
 12. To study performance of PLL IC565
 13. Design a DC power supply using 78XX/79XX and LM723, verify the same practically.

Equipment required for

Laboratory Software:

- i. Multisim/ Pspice/Equivalent Licensed simulation software tool
- ii. Computer Systems with required specifications

Hardware:

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators
4. Digital Multimeters
5. Decade Résistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)
9. Active & Passive Electronic Components
10. Bread Boards
11. Connecting Wires
12. CRO Probes

Course Outcomes:

- Understand the working of Op amp ICs & Application specific analog ICs.
- Analyze operational amplifier based circuits for linear and non-linear applications.
- Design Operational amplifiers for linear and nonlinear application, Multivibrator circuits using 555 & application specific ICs.
- Simulate all linear and nonlinear application based Op amp Circuits and circuits based on application specific ICs.
- Compare theoretical, practical & simulated results in integrated circuits.

(19A52601P)ENGLISH LANGUAGE SKILLS LAB

Course Objectives

- students will be exposed to a variety of self instructional, learner friendly modes of language learning
- Students will cultivate the habit of reading passages from the computer monitor. Thus providing them with the required facility to face computer based competitive exams like GRE, TOEFL, and GMAT etc.
- students will learn better pronunciation through stress, intonation and rhythm
- students will be trained to use language effectively to face interviews, group discussions, public speaking
- students will be initiated into greater use of the computer in resume preparation, report writing, format making etc

UNIT -I

1. Phonetics for listening comprehension of various accents - 2
2. Formal Presentations using PPT slides without Graphic Elements
3. Paraphrasing

Learning Outcomes

At the end of the module, the learners will be able to

- Understand different accents spoken by native speakers of English
- Make formal structured presentations on general topics using PPT slides without graphical elements
- Paraphrase short academic texts using suitable strategies and conventions

UNIT- II

1. Debate – 2 (Following Argument)
2. Listening to short speeches/ short stories for note-making and summarizing
3. E-mail Writing

Learning Outcomes

At the end of the module, the learners will be able to

- Participate in formal discussions and speak clearly on a specific topic using suitable discourse markers
- Make formal structured presentations on academic topics using ppt slides with relevant graphical elements
- Write formal emails in the standard format

UNIT-III

1. Listening for Discussions
2. Group Discussions
3. Writing Persuasive/argumentative essays on general topics

Learning Outcomes

At the end of the module, the learners will be able to

- Follow a discussion to identify the salient points
- Participate in group discussions using appropriate conventions and language strategies
- Produce logically coherent persuasive/argumentative essays

UNIT-IV

1. Reviewing film/ book
2. Group Discussions – reaching consensus in Group Work
3. Resume Writing – Cover Letter – Applying for Internship

Learning Outcomes

At the end of the module, the learners will be able to

- Judge a film or book
- Express thoughts and ideas with acceptable accuracy and fluency with a view to reach consensus in group discussions
- Prepare a CV and write a cover letter to seek internship/ job

UNIT-V

1. Writing Project Reports
2. Editing Short Texts
3. Answering FAQs in Interviews

Learning Outcomes

At the end of the module, the learners will be able to

- Collaborate with a partner to make effective presentations
- Understand the structure and produce an effective project report.
- Edit short texts according to different needs of the work place.

Course Outcomes

- Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills

- Apply communication skills through various language learning activities
- Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
- Evaluate and exhibit acceptable etiquette essential in social and professional settings
- Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

SUGGESTED SOFTWARE:

- Walden Infotech English Language Communication Skills.
- iTell- Orell Digital Language Lab
- Digital Teacher
- LES(Learn English Select) by British council
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
- DELTA's key to the Next Generation TOEFL Test: Advanced Skills Practice.
- Lingua TOEFL CBT Insider, by Dreamtech
- English Pronunciation in Use (Elementary, Intermediate, Advanced) CUP
- Cambridge Advanced Learners' English Dictionary with CD.

REFERENCE BOOKS:

The software consisting of the prescribed topics elaborated above should be procured and used.

1. Meenakshi Raman & Sangeeta Sharma, "Technical Communication" O U Press 2009.
2. Barron's Books on TOEFL/GRE/GMAT/CAT/IELTS /DELTA/Cambridge University Press.2012.
3. Butterfield Jeff, "Soft Skills for Everyone", Cengage Publications, 2011.
4. "Practice Psychometric Tests": How to familiarize yourself with genuine recruitment tests, 2012.
5. David A McMurrey & Joanne Buckely "Handbook for Technical Writing" CENGAGE Learning 2008.
6. "A Textbook of English Phonetics for Indian Students", 2nd Edition, T.Balasubramanyam. (Macmillan), 2012.
7. "A Handbook for English Laboratories", E. Suresh Kumar, P. Sreehari, Foundation Books, 2011

Note: Links provided by APSHE on LSRW, grammar and vocabulary

(19A04503P)DIGITAL COMMUNICATIONS LAB

Course Objectives

- To Develops skills for performance analysis of practical digital communication systems.
- To understand the fundamental concepts on TDM, Pulse modulations& digital modulation techniques.
- To evaluate the performance of PCM, DPCM and DM in a digital communication system.
- To learns how to use MATLAB software and hardware effectively and creatively to synthesis digital communication systems.

LIST OF EXPERIMENTS

Minimum of Twelve experiments to be conducted (any six from Part-A)

HARDWARE EXPERIMENTS (PART – A)

1. Generation of random data using linear feedback shift registers at a given data rate. Plot the random data.
2. Construct Time division multiplexing circuit to multiplex three users' data.
3. Verify the functionality of each block in Pulse code modulation system practically.
4. Find the processing gain in a Differential pulse code modulation circuit experimentally.
5. Verify the operation of Delta modulation and demodulation.
6. Design and verify modulated and demodulated circuit for Frequency shift keying.
7. Construct a modulated and demodulated circuit for Differential phase shift keying.
8. Design and verify working principle of QPSK modulation and demodulation with suitable setup.

SOFTWARE EXPERIMENTS (PART-B)

Modeling of Digital Communications using MATLAB

1. Study Sampling Theorem and verify the effect of under sampling and oversampling while retrieving the original signal.
2. Understand functioning of each block in Pulse code modulation circuit and verify through simulation.
3. Write a program on Differential pulse code modulation and demodulation.
4. Write a program on Frequency shift keying modulation schemes for given two carrier frequencies, determine the bit error probability.
5. Write a program and verify QPSK modulation and demodulation, determine the bit error probability.
6. Write a program and verify Differential phase shift keying modulation scheme is a non-coherent modulation scheme, determine the bit error probability is inferior to that

of QPSK.

EQUIPMENT REQUIRED FOR LABORATORIES:

1. RPS - 0 – 30V
2. CROs - 0 – 20 MHz.
3. Function Generators - 0 – 1 MHz
4. RF Generators - 0 – 1000 MHz.
5. Multimeters
6. Required Electronic Components (Active and Passive) which include ICs as well.
7. Arbitrary Wave form generators/ PNS generators – 2 Nos. (To generate digital data at required data rates)
8. Licensed MATLAB software with required toolboxes.

Course Outcomes

- Understand real time behavior of different digital modulation schemes and technically visualize spectra of different digital modulation schemes.
- Design and implement different modulation and demodulation techniques.
- Analyze digital modulation & demodulation techniques.
- Simulate all digital modulation and demodulation techniques in MATLAB.

(19A99601) MANDATORY COURSE: RESEARCH METHODOLOGY

Course Objectives :

The objective of this course is

- To understand the basic concepts of research and research problem
- To make the students learn about various types of data collection and sampling design
- To enable them to know the method of statistical evaluation
- To make the students understand various testing tools in research
- To make the student learn how to write a research report
- To create awareness on ethical issues in research

Syllabus

UNIT- I

Meaning of Research – Objectives of Research – Types of Research – Research Approaches – Guidelines for Selecting and Defining a Research Problem – Research Design – Concepts related to Research Design – Basic Principles of Experimental Design.

Learning Outcomes:-

After completion of this unit student will

- Understand the concept of research and its process
- Explain various types of research
- Know the steps involved in research design
- Understand the different research approaches

UNIT- II

Sampling Design – steps in Sampling Design – Characteristics of a Good Sample Design – Random Sampling Design. Measurement and Scaling Techniques-Errors in Measurement – Tests of Sound Measurement – Scaling and Scale Construction Techniques – Time Series Analysis – Interpolation and Extrapolation. Data Collection Methods – Primary Data – Secondary data – Questionnaire Survey and Interviews.

Learning Outcomes:-

After completion of this unit student will

- Understand the concept of sampling and sampling design
- Explain various techniques in measurement and scaling

- Learn various methods of data collection
- Design survey questionnaires for different kinds of research
- Analyze the questionnaires

UNIT- III

Correlation and Regression Analysis – Method of Least Squares – Regression vs Correlation – Correlation vs Determination – Types of Correlations and Their Applications

Learning Outcomes:-

After completion of this unit student will

- Know the association of two variables
- Understand the importance of correlation and regression
- Compare and contrast correlation and regression
- Learn various types of correlation
- Apply the knowledge of C&R Analysis to get the results

UNIT- IV

Statistical Inference: Tests of Hypothesis – Parametric vs Non-parametric Tests – Hypothesis Testing Procedure – Sampling Theory – Sampling Distribution – Chi-square Test – Analysis of variance and Co-variance – Multivariate Analysis

Learning Outcomes:-

After completion of this unit student will

- Know the statistical inference
- Understand the hypothesis testing procedure
- Compare and contrast Parametric and Non-parametric Tests
- Understand the use of chi-square test in investigating the distribution of categorical variables
- Analyze the significance of variance and covariance

UNIT- V

Report Writing and Professional Ethics: Interpretation of Data – Report Writing – Layout of a Research Paper – Techniques of Interpretation- Making Scientific Presentations in Conferences and Seminars – Professional Ethics in Research.

Learning Outcomes:-

After completion of this unit student will

- Learn about report writing
- Understand how to write research paper

- Explain various techniques of interpretation
- Understand the importance of professional ethics in research
- Design a scientific paper to present in the conferences/seminars

Course Outcomes:

At the end of the course, students will be able to

- Understand basic concepts and its methodologies
- Demonstrate the knowledge of research processes
- Read, comprehend and explain research articles in their academic discipline
- Analyze various types of testing tools used in research
- Design a research paper without any ethical issues

TEXT BOOKS:

1. C.R.Kothari, “Research Methodology:Methods and Techniques”,2nd edition, New Age International Publishers.
2. A Step by Step Guide for Beginners, “Research Methodology”: Ranjit Kumar, Sage Publications

REFERENCES:

1. P.Narayana Reddy and G.V.R.K.Acharyulu, “Research Methodology and Statistical Tools”, 1st Edition, Excel Books,New Delhi.
2. Donald R. “Business Research Methods”, Cooper & Pamela S Schindler, 9th edition.
3. S C Gupta, “Fundamentals of Statistics”, 7th edition Himalaya Publications

(19A04601T)MICROPROCESSORS AND MICROCONTROLLERS

Course Objectives:

- To introduce fundamental architectural concepts of microprocessors and microcontrollers.
- To impart knowledge on addressing modes and instruction set of 8086 and 8051.
- To introduce assembly language programming concepts.
- To explain memory and I/O interfacing with 8086 and 8051.
- To introduce 16 bit and 32 bit microcontrollers.

UNIT- I

Introduction to 8085 and 8086 Microprocessors: 8085 Microprocessor Architecture, Pin Diagram, Flag Register, Interrupts of 8085. Register Organisation of 8086, Architecture, Pin Diagram, Flag Register, Physical Memory concept, Memory addressing in 8086, Stack organization of 8086, Addressing Modes in 8086, Interrupt structure of 8086.

Learning Outcomes:-

After completion of this unit student will

- Summarize features of a microprocessor (L2)
- Explain about ISR and interrupt structure of 8086 (L2)
- Distinguish between Intel 8085 & 8086 microprocessors (L5)

UNIT- II

8086 Microprocessor Instruction Set and Addressing Modes, Instruction Set of 8086, Assembly Language Programming, Simple programs, Assembler Directives, Procedures and Macros, String Instructions.

Learning Outcomes:-

After completion of this unit student will

- Understand instruction set of 8086 microprocessor (L1)
- Explain addressing modes of 8086 (L2)
- Develop assembly language programs for various problems (L2)

UNIT- III

Memory interacting with 8086 and Peripheral Devices, Interfacing SRAMs, DRAMs and EPROMs to 8086, Programmable Peripheral Interface 8255, Programmable Interval Timer

8253, Programmable Interrupt Controller 8259, Programmable Communication Interface 8251 USART, DMA Controller 8257.

Learning Outcomes:-

After completion of this unit student will

- Demonstrate memory &I/O interfacing with 8086 (L2)
- Describe interfacing of 8086 with peripheral devices (L2)

UNIT- IV

Intel 8051 Microcontroller, Microprocessor vs Microcontroller, 8051 Microcontroller Architecture, Microcontroller 8051 pin diagram, 8051 Ports, Internal and External Memory, Counters and Timers, Serial Communication in 8051, Interrupts in 8051, Addressing Modes, Data Transfer Instructions, Data and Bit-Manipulation Instructions, Arithmetic Instructions, simple programs.

Learning Outcomes:-

After completion of this unit student will

- Describe architecture and features of Intel 8051 microcontroller (L2)
- Develop assembly language programs to perform various operations using 8051 (L2)
- Distinguish between microprocessor and a microcontroller (L5)

UNIT- V

ARM Architectures and Processors: What is ARM Architecture, ARM Processor Families, ARM Cortex-M Series, Cortex-M0+ Processor Overview, Cortex-M0+ Block Diagram, Registers, Memory Map, Bit-band Operations, Endianness, ARM Cortex-M0+ Processor Instruction Set – ARM and Thumb Instruction Set.

Learning Outcomes:-

After completion of this unit student will

- Explain architecture and addressing modes of ARM Cortex M0+. (L2)
- Explain the Assembly instruction set of ARM Cortex M0+. (L2)

Course Outcomes:

- Understand instruction set of 8086 microprocessor and ARM architecture.

- Explain addressing modes of 8086, develop assembly language programs for various problems, describe interfacing of 8086 with peripheral devices, architecture and addressing modes of ARM Cortex M0+, assembly instruction set of ARM Cortex M0+.
- Distinguish between microprocessor and microcontroller, 8085& 8086 microprocessors, design applications using microcontrollers.

Text Books:

1. K M Bhurchandi, A K Ray, “Advanced Microprocessors and Peripherals”, 3rd edition, McGraw Hill Education, 2017.
2. Raj Kamal, “Microcontrollers: Architecture, Programming, Interfacing and System Design”, 2nd edition, Pearson, 2012.
3. Alexander G. Dean “Embedded Systems Fundamentals on Arm Cortex-M based Microcontrollers”: A Practical Approach

References:

1. Ramesh S Gaonkar, “Microprocessor Architecture Programming and Applications with the 8085”, 6th edition, Penram International Publishing, 2013.
2. Kenneth J. Ayala, “ the 8051 Microcontroller”, 3rd edition, Cengage Learning, 2004.
3. Andrew N. Sloss, Dominic Symes, Chris Wright, ARM System Developer’s Guide: “Designing and Optimizing System Software”, Elsevier, 2004.
4. John H. Davies, Newness, “MSP 430 Microcontroller Basics”, Elsevier Publications, 2008.

(19A04602T) DIGITAL SIGNAL PROCESSING

Course Objectives:

- To provide background and fundamental material for the analysis and processing of digital signals.
- To familiarize the relationships between continuous-time and discrete time signals and systems.
- To study fundamentals of time, frequency and Z-plane analysis and to discuss the inter-relationships of these analytic method.
- To study the designs and structures of digital (IIR and FIR) filters from analysis to synthesis for a given specifications.
- To introduce a few real-world signal processing applications.
- To acquaint with DSP processor.

UNIT- I:

Discrete Fourier Transform: Discrete Fourier series, Properties of Discrete Fourier series, Discrete Fourier Transform (DFT), The DFT as a linear transformation, Relationship of the DFT to other transforms, Properties of DFT.

Fast Fourier Transforms: Efficient computation of DFT algorithms - Radix 2-Decimation-in-Time & Decimation-in-Frequency algorithms, Inverse FFT, Illustrative problems.

Learning Outcomes:-

After completion of this unit student will

- Understand the concept of DFT and its properties.(L1)
- Find N-Point DFT/FFT for a given signal/sequence.(L2)

UNIT- II:

IIR Digital Filters: Review of analog filter design, Frequency transformation in the analog and digital domains, Design of IIR filters from Analog filters – Approximation of derivatives, Impulse invariance, Bilinear transformation, Design of Butterworth, Chebyshev filters, Illustrative problems.

Realization of IIR Systems: Structures for IIR systems–Direct form I& Direct form II, Transposed, Cascade form, Parallel form and Lattice structures, Signal flow graphs.

Learning Outcomes:-

After completion of this unit student will

- Understands signal flow graph and block diagram representations of difference equations that realize digital filters(L1)
- Realization of different structures for IIR filters(L2)
- Design of IIR filters using different techniques. (L4)

UNIT- III:

FIR Digital Filters: Linear phase FIR filter, characteristic response, location of zeros, Design of FIR filter using Windowing Techniques - Rectangular, Hanning, Hamming, Kaiser, Bartlett, Blackman, Design of FIR filter by Frequency sampling technique, Illustrative problems.

Realization of FIR Systems: Structures for FIR systems - Direct form, Cascade form and Lattice structures. Comparison of FIR and IIR filters.

Learning Outcomes:-

After completion of this unit student will

- Understand the concept of FIR filter(L1)
- Realization of different structures for FIR filters(L2)
- FIR filter design based on windowing methods.(L4)
- Compare FIR and IIR filters (L5)

UNIT -IV:

Architectures for Programmable DSP Devices: Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation Unit, Programmability and Program Execution, Speed Issues.

Learning Outcomes:-

After completion of this unit student will

- Recognize the fundamentals of fixed and floating point architectures of various DSPs.(L1)
- Learn the architecture details and instruction sets of fixed and floating point DSPs.(L1)
- Illustrate the control instructions, interrupts, and pipeline operations.(L2)

UNIT- V:

Programmable Digital Signal Processors: Introduction, Commercial Digital signal-processing Devices, Architecture of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control,

TMS320C54XX instructions and Programming, On-Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline Operation of TMS320C54XX Processors.

Learning Outcomes:-

After completion of this unit student will

- Illustrate the features of on-chip peripheral devices and its interfacing along with its programming details.(L2)
- Analyze and implement the signal processing algorithms in DSPs. (L3)

Course Outcomes

- Understand the basic concepts of IIR and FIR filters, DSP building blocks to achieve high speed in DSP processor, DSP TMS320C54XX architecture and instructions.
- Compute the fast Fourier transforms and find the relationship with other transforms. Realization of digital filter structures.
- Design of FIR and IIR digital filters.
- Compare FIR and IIR filters.

TEXT BOOKS:

1. John G. Proakis, Dimitris G. Manolakis, “Digital signal processing, principles, Algorithms and applications,” Pearson Education/PHI, 4th ed., 2007.
2. Avtar Singh and S. Srinivasan, “Digital Signal Processing,” Thomson Publications, 2004.

REFERENCES:

1. Sanjit K Mitra, “Digital signal processing, A computer base approach,” Tata McGraw Hill, 3rd edition, 2009.
2. A.V.Oppenheim and R.W. Schaffer, & J R Buck, “Discrete Time Signal Processing,” 2nd, Pearson Education, 2012.
3. B. P. Lathi, “Principles of Signal Processing and Linear Systems,” Oxford Univ. Press, 2011.
4. B. Venkata Ramani and M.Bhaskar, “Digital Signal Processors, Architecture, Programming and Applications,” TMH, 2004.

Course Objectives:

- Learn and understand the architectures of Field-programmable Gate Arrays.
- Translate a software application into hardware logic for FPGA architectures.
- Design synthesizable systems based on industry-standard coding methods.
- Build testbenches and create data models to verify bit-true accurate designs.
- Acquire the knowledge about Design and modelling of Parwan CPU, vending machine, washing machine, etc.

UNIT-I

Introduction and Field-Programmable Gate Arrays: Hardware Description Languages, FPGA Boards and Software Tools, Transistor as a Switch, Logic Gates from Switches, FPGA Building Blocks, Layout of the Xilinx Artix-7 XC7A35T FPGA, Resources of FPGA, Clock Management, The XADC Block, High-Speed Serial I/O Transceivers, Peripheral Component Interconnect Express Interface, FPGA-Based Digital System Design Philosophy, Advantages and Disadvantages of FPGAs, Usage Areas of FPGAs, Introduction to VHDL, VHDL Fundamentals, Entity and Architecture Representations, Dataflow Modeling, Behavioral Modeling, Timing and Delays in Modeling, Hierarchical Structural Representation, Testbench Formation in VHDL, Structure of a VHDL Testbench File, Displaying Test Results.

Learning Outcomes:-

After completion of this unit student will

- Understand the architecture of FPGA devices (L2)
- Know the software tools used in digital design (L1)
- Understand the VHDL design styles to design digital systems (L2)

UNIT-II:

VHDL Data Types and Operators: Data Types in VHDL, Signal and Variable Data Types, Data Values, Naming a Signal or Variable, Defining Constants, Defining Arrays, Operators in VHDL, Application on Data Types and Operators, FPGA Building Blocks Used in Data Types and Operators, Implementation Details of Vector and Arithmetic Operations.

Learning Outcomes:-

After completion of this unit student will

- Know various data types used in VHDL language (L2)
- Understand the VHDL operators and apply them in digital design (L3)

- Implement various arithmetic and logical operations in digital design (L3)

UNIT-III:

Combinational Circuits: Logic Gates, Combinational Circuit Analysis, Logic Function Formation between Input and Output, Boolean Algebra, Gate-Level Minimization, Combinational Circuit Implementation, Truth Table-Based Implementation, Implementing Combinational Circuits, Combinational Circuit Design,

Combinational Circuit Blocks: Adders in VHDL, Comparators in VHDL, Decoders in VHDL, Encoders in VHDL, Multiplexers in VHDL, Parity Generators and Checkers in VHDL, Applications on Combinational Circuit Blocks, Sample Designs, Home Alarm System, Digital Safe System, Car Park Occupied Slot Counting System, Applications on Combinational Circuits, Implementing the Home Alarm System, Implementing the Digital Safe System, Implementing the Car Park Occupied Slot Counting System, FPGA Building Blocks Used in Combinational Circuits,

Data Storage Elements: Latches in VHDL, Flip-Flops in VHDL, Register, Memory, Read-Only Memory, ROM in VHDL, ROM Formation Using IP Blocks, Random Access Memory, Application on Data Storage Elements, FPGA Building Blocks Used in Data Storage Elements.

Learning Outcomes:-

After completion of this unit student will

- Design and analyze various combinational logic circuits (L4)
- Use VHDL in design of combinational logic circuits to analyze the behaviour (L4)
- Implement various memory and data storage elements using VHDL (L4)

UNIT-IV:

Sequential Circuits: Sequential Circuit Analysis, State Table, State Diagram, State Representation in VHDL, Timing in Sequential Circuits, Synchronous Operation, Asynchronous Operation, Shift Register as a Sequential Circuit, Shift Registers in VHDL, Multiplication and Division Using Shift Registers, Counter as a Sequential Circuit, Synchronous Counter, Asynchronous Counter, Counters in VHDL, Frequency Division Using Counters, Sequential Circuit Design, Applications on Sequential Circuits

Learning Outcomes:-

After completion of this unit student will

- Design sequential logic circuits (L4)
- Use VHDL in design of sequential logic circuits to analyze the behavior (L4)
- Create VHDL structural models to design sequential logic circuits (L5)

UNIT-V:

CPU Modeling and Design: Defining a Comprehensive Example, Parwan CPU Memory Organization of Parwan, Instruction Set, Instruction Format, Programming in Parwan Assembly, Behavioral Description of Parwan, Timing and Clocking, Packages, Interface Description of Parwan, Parwan Behavioral Architecture, Parwan Bussing Structure, Interconnection of Components, Global View of Parwan Components, Instruction Execution

Advanced Applications: Vending Machine, Digital Clock, Moving Wave via LEDs, Translator, Air Freshener Dispenser, Obstacle-Avoiding Tank, Intelligent Washing Machine, Non-Touch Paper Towel Dispenser, Car Parking Sensor System, Digital Table Tennis Game

Learning Outcomes:-

After completion of this unit student will

- Understand the design of Parwan CPU (L5)
- Develop VHDL models for various advanced digital applications (L5)
- Use VHDL in design of digital design systems like washing machines, car parking systems (L5)

Course Outcomes:

- Understand the architecture of FPGAs, tools used in modelling of digital design and modelling styles in VHDL.
- Learn the IEEE Standard 1076 Hardware Description Language (VHDL).
- Analyze and design basic digital circuits with combinatorial and sequential logic circuits using VHDL.
- Model complex digital systems at several levels of abstractions, behavioural, structural.
- Design complex digital CPU, vending machine and washing machines etc and analyze the case studies.

Text Books:

1. CemUnsalan, Bora Tar “Digital System Design with FPGA Implementation Using Verilog and VHDL” McGraw-Hill Education, 2017
2. ZainalabedinNavabi “VHDL: Analysis and Modeling of Digital Systems" VHDL: Analysis and Modeling of Digital Systems, Z. Navabi, McGraw Hill International Ed. 1998.

References:

1. J. Bhaskar “A VHDL Primer”, Pearson Education India, 3rd edition, 2015
2. Stephen Brown and Zvonko Vranesic “Fundamentals of digital logic design with VHDL” Tata McGraw Hill, 2nd edition, 2009.

**(19A04605a)INTRODUCTION TO WIRELESS AND CELLULAR
COMMUNICATIONS
PROFESSIONAL ELECTIVE-II**

Course Objectives:

- To be familiar with evolution of Wireless communication standards
- To understand cellular concepts and various terminology used in wireless & cellular communications
- To analyze the propagation effects in free space and different types of fading channels.
- To be able to apply different concepts of equalization and diversity schemes for better performance of receivers.
- To understand and apply the knowledge of 3G and 4G communication technologies for designing suitable receivers to counter balance the effects of fading channels

Unit 1: Overview of Cellular Systems and evolution: Introduction, Mobile Radio Systems around the world and US, examples of wireless communication systems, Comparison and trends in wireless communication systems, Evolution of 2G/3G/4G/5G Communication Standards.

Cellular Concepts – Frequency reuse, Cochannel and Adjacent channel Interference, C/I, Handoff, Blocking, Erlang Capacity, Improving coverage and capacity in cellular systems.

Unit 2: Wireless propagation Part 1: Link budget, Free-space path loss, Noise figure of receiver, Large Scale Propagation effects.

Wireless propagation Part II: Small scale multipath propagation, Multipath fading, Shadowing, Fading margin, shadowing margin, Channel Models.

Unit 3: Equalization & Diversity: Introduction, Types of equalization techniques, Diversity Schemes -Antenna Diversity, Time Diversity.

Unit 4: Multiple Access Techniques: Introduction, Types of access techniques, Wireless Channel Capacity, Introduction to MIMO.

Unit 5: CDMA Part I – PN codes, generation, properties, CDMA Part II, OFDM and LTE Part I OFDM and LTE Part II.

Course Outcomes:

- CO1: Understand different technologies used in the evaluation of wireless communication standards.
- CO2: Apply the concepts of frequency reuse, fading channel characteristics, equalization and diversity techniques to find the solutions for a given problem.

- CO3: Analyze the performances of different technologies used in 2G, 3G standards of wireless communication.
- CO4: Solve some complex problems to design receivers due to small scale fading, effects of the channel.
- CO5: Compare various technologies used in different generations of wireless communication to know the merits and demerits of each technology.

Text Books:

1. T. S. Rappaport, "Wireless Communications – Principles and Practice" (2nd edition) Pearson, 2010, ISBN 9788131731864
2. A. Molisch, "Wireless Communications," Wiley, 2005 Haykin & Moher, "Modern Wireless Communications" Pearson 2011 (Indian Edition)
3. J. G. Proakis, "Digital Communications," McGraw Hill
4. A. Goldsmith, "Wireless Communications," Cambridge Univ Press, 2005
5. D. Tse and P. Viswanath, "Fundamentals of Wireless Communications," Cambridge Univ Press, 2005

**(19A04605b) FABRICATION TECHNIQUES FOR MEMS-BASED SENSORS:
CLINICAL PERSPECTIVE
PROFESSIONAL ELECTIVE-II**

Course Objectives:

- To be familiar with microengineering devices, clean room, metallic impurities and wafer cleaning process.
- To understand the principles of MEMs based sensors and different technologies used in the fabrication process.
- To know the design process flow for fabricating microengineering devices, Process flow for microheater
- To understand process flow for Fabricating Flexible Force Sensors, Force Sensors on Silicon, and Fabricating VOC sensors,

Unit 1: Introduction to microengineering devices and its applications, Clean room, contaminants, wafer cleaning processes (DI water, RCA, metallic impurities, etc.).

Unit 2: Introduction to the microheater, force sensors, microfluidic devices, its specifications, and applications, Masks - Types of masks, Types of Photoresists, Spin Coaters Lithography process: optical lithography, x-ray, and e-beam lithography, lift-off techniques, soft lithography, Use of resists (spin coating, positive and negative photoresists), photoresist pre-baking, exposure, and development.

Unit 3: Etching: Isotropic/anisotropic, selectivity, wet and plasma assisted etching, Types of wafers and orientations, Techniques of metallization: PVD [(Sputtering – DC, RF, and Magnetron), thermal evaporation, e-beam evaporation], Chemical Vapor Deposition: Dielectric films (Plasma Enhance Chemical Vapor Deposition (PECVD)), Atomic Layer Deposition.

Unit 4: Understanding and designing the process flow for fabricating microengineering devices, Process flow for microheater, force sensors, and microfluidic devices, Wafer dicing and bonding techniques, Microfluidic Chips.

Unit 5: Process Flow for Fabricating Flexible Force Sensors and Force Sensors on Silicon, Process Flow for Fabricating VOC sensors, Biochips, Clinical Research: Problems and Solutions using Microengineering Device, Visit to non-conventional Class 10000 Clean Room and discussing few equipment within.

Course Outcomes:

- **CO1:** Understand the principles of MEMs based sensors, clean room, types of wafers, and different technologies used in the fabrication process.

- **CO2:** Analyze the process flow for Fabricating Flexible Force Sensors, Force Sensors on Silicon, and Fabricating VOC sensors.
- **CO3:** design process flow for fabricating microengineering devices, Process flow for microheater.

Books and references

1. J.D. Plummer, M.D. Deal, P.G. Griffin, Silicon VLSI Technology, Pearson Education, 2001.
2. S.A.Campbell, The Science and Engineering of Microelectronic Fabrication, Oxford University Press, 2001. S.M. Sze (Ed), VLSI Technology, 2nd Edition, McGraw Hill, 1988
3. Senturia S. D., Microsystem Design, Kluwer Academic Publisher, 2001 Madou, M Fundamentals of Microfabrication, CRC Press, 1997.
4. Gad-el-Hak, M., Ed., The MEMS Handbook; CRC Press: New York, NY, 2002.

(19A04605c) INTEGRATED PHOTONICS DEVICES AND CIRCUITS
PROFESSIONAL ELECTIVE-II

Course Objectives:

- To be familiar with Photonic Integrated Circuits, multimode waveguides, various types of directional couplers, and CMOS Compatible Silicon Photonics Technology.
- To understand the concepts of coupled mode theory, fiber to waveguide converters, and directional couplers.
- To analyze the functionality of multimode waveguides, various types of directional couplers Reconfigurable Filters and Tunable Delay Lines, and FPPGAs.
- To design single mode, multimode waveguides, bends, and photonic crystal waveguides and Integrated Optical High-Speed Modulators.

Unit 1: Introduction to Photonic Integrated Circuits – Functional Building Blocks; Theory of Optical Waveguide – The Basic Building Block; Orthogonality Condition of Guided Modes, Introduction to Photonic Integrated Circuits – Functional Building Blocks; Theory of Optical Waveguide – The Basic Building Block; Orthogonality Condition of Guided Modes.

Unit 2: Design Principle of Single-Mode and Multimode Waveguides: Channel and Ridge/Rib waveguides, Waveguide Bends; Slot and Photonic Crystal Waveguides, Design Principle of Single-Mode and Multimode Waveguides: Channel and Ridge/Rib waveguides, Waveguide Bends; Slot and Photonic Crystal Waveguides.

Unit 3: Coupled Mode Theory; Waveguide Distributed Bragg Reflector (DBR) and Sub-Wavelength Grating (SWG) waveguide; Adiabatic Mode-Size Converter (MSC), Fiber-to-Waveguide, Vertical Grating Coupler (VGC), Coupled Mode Theory; Waveguide Distributed Bragg Reflector (DBR) and Sub-Wavelength Grating (SWG) waveguide; Adiabatic Mode-Size Converter (MSC), Fiber-to-Waveguide Vertical Grating Coupler (VGC).

Unit 4: Directional Coupler (DC), Multi-Mode Interferometric Coupler (MMIC). Mach-Zehnder Interferometer (MZI) and Microring Resonator (MRR): Filters and Delay Lines, Directional Coupler (DC), Multi-Mode Interferometric Coupler (MMIC). Mach-Zehnder Interferometer (MZI) and Microring Resonator (MRR): Filters and Delay Lines. Practical Planar Lightwave Circuits and CMOS Compatible Silicon Photonics Technology Platforms; Thermo-Optic and Electro-Optic Switches; Reconfigurable Filters and Tunable Delay Lines, Concept of Field Programmable Photonic Gate Array (FPPGA).

Unit 5: Practical Planar Lightwave Circuits and CMOS Compatible Silicon Photonics Technology Platforms; Thermo-Optic and Electro-Optic Switches; Reconfigurable Filters and Tunable Delay Lines, Concept of Field Programmable Photonic Gate Array (FPPGA),

Course Outcomes:

- CO1: Get familiarity with Photonic Integrated Circuits, multimode waveguides, various types of directional couplers, and CMOS Compatible Silicon Photonics Technology.
- CO2: Understand the concepts of coupled mode theory, fiber to waveguide converters, and directional couplers.
- CO3: Analyze the functionality of multimode waveguides, various types of directional couplers Reconfigurable Filters and Tunable Delay Lines, and FPPGAs.
- CO4: Design single mode, multimode waveguides, bends, and photonic crystal waveguides and Integrated Optical High-Speed Modulators.

Books and references

- 1) Silicon Photonics – An Introduction, G.T. Reed (Wiley)
- 2) Photonics: Optical Electronics for Modern Communication, Yariv and Yeh (Oxford)
- 3) Optoelectronic Integrated Circuit Design and Device Modeling, Jianjun Gao (Wiley)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
B.Tech (ECE)– III-II Sem **L T P C**
3 0 0 3
(19A04605d) ELECTRICAL MEASUREMENT AND ELECTRONIC INSTRUMENTS
PROFESSIONAL ELECTIVE-II

Course Objectives:

- To remember the basic definitions of some important measurement parameters of electrical and electronic instruments.
- To understand the basic principles of different measuring meters (voltage, current, and other passive parameters), CROs, and transducers.
- To apply the knowledge of DC and AC meters while solving problems related to measurement errors.
- To analyze the performance of various electric and electronic instruments like energy meters, analog & digital meters, CROs, function generators and signal generators.
- To design the AC& DC multi-meters function generators and function generators for the given specifications.

Unit 1: Measurement Error, Accuracy and Instrument grades, Electro-mechanical instruments, electromechanical ammeters, voltmeters and ohmmeters.

Unit 2: Electromechanical wattmeter and energy meter, Resistance Measurement, Impedance Measurement: AC Bridges, Potentiometers: DC and AC, Instrument transformers: CT & PT.

Unit 3: Magnetic Measurement, Analog Instrumentation Basics, Analog Instrumentation, Digital Instrumentation Basics, Digital Instrumentation, Signal and Function Generators, Spectrum Analyzer.

Unit 4: Oscilloscope and Electronic probes: Introduction, Block diagram of CRO, Electron beam generation, Deflection Assembly – Horizontal and Vertical amplifiers and associated blocks, Digital CRO, basic principle, types of digital CROs, Probes – types of probes and associated principles.

Unit 5: Transducers: Introduction, types of transducers – Strain gauge, LVDT, Inductive and capacitive transducers, electromechanical transducers.

Course Outcomes:

- CO1: Remember the basic definitions of some important measurement parameters of electrical and electronic instruments.
- CO2: Understand the basic principles of different measuring meters (voltage, current, and other passive parameters), CROs, and transducers.

- CO3: Apply the knowledge of DC and AC meters while solving problems related to measurement errors.
- CO4: Analyze the performance of various electric and electronic instruments like energy meters, analog & digital meters, CROs, function generators and signal generators.
- CO5: Design the AC & DC multi-meters function generators and function generators for the given specifications.

Books and references

1. Electronic Instrumentation and Measurements: David A. Bell
2. A course in Electrical and Electronic Measurements and Instrumentation: A. K. Sawhney
3. Basic Electrical Measurements: M B Stout
4. Electrical Measurements and Measuring Instruments, E.W Golding, F.C Widdis
5. Electronic Measurements and Instrumentation: William David Cooper.

**(19A04605e)PRINCIPLES AND TECHNIQUES OF MODERN RADAR SYSTEMS
PROFESSIONAL ELECTIVE-II**

Course Objectives:

- To understand the basic principles of RADAR and its variants, RADAR based Microwave imaging.
- To apply the fundamental knowledge of various RADARs, Matched Filter and to find the range between the target and RADAR, frequency and phase of the received signal.
- To analyze the received data from the target using CW RADAR & MTI RADAR and to find the distance, tracking range for clutter analysis.

Unit 1: Basic Principles: Fundamental elements of Radar and its block diagram, Radar equation – Signal to Noise Power Ratio (SNR), Radar Cross section – Cross sections of small targets, Examples of target cross sections, cross section fluctuations and models.

Unit 2: CW Radar – Principle, block diagram, FMCW Radar, Pulsed Radar Principles, Clutter Analysis, MTI Improvement Factor, Pulsed Doppler Radar, range measurement.

Unit 3: Tracking in Radar, Frequency measurement and tracking, Angular resolution, Monopulse Technique, Detection Theory: Match Filtering, Radar Ambiguity Function.

Unit 4: Imaging Radar: Resolution Concept, Pulse Compression, Synthetic Aperture Processing, ISAR Imaging, Probability of false alarm and Detection, Modified Radar Range Equation with Swerling Models.

Unit 5: Ground Penetrating Radar for close sensing, Radar Tomography and Radar based Microwave Imaging, Emerging and Modern Applications of Radar Principles.

Course Outcomes:

- CO1: Understand the basic principles of RADAR and its variants, RADAR based Microwave imaging.
- CO2: Apply the fundamental knowledge of various RADARs, Matched Filter and to find the range between the target and RADAR, frequency and phase of the received signal.
- CO3: Analyze the received data from the target using CW RADAR & MTI RADAR and to find the distance, tracking range for clutter analysis.

Books and references

1. Introduction to Radar Systems, M.I. Skolnik, 3rdEdition, Tata Mcgraw hill edition, 2001
2. Radar Systems Analysis and Design using MATLAB, B.R.Mahafza, 3rd Edition, CRC Press, 2013.
3. Radar Principles, Peyton Z. Peebles, Jr., Wiley India, 2008.
4. Monopulse Principles and Techniques, S.M.sherman and D.K.Barton, 2ndEdition,Artech house, 2011
5. Fundamentals of Radar Signal Processing, M.A.Richards, TMH, 2005
6. Ground Penetrating Radar: Theory and Applications, Ed: H.M. Jolt, Elsevier, 2009
7. Microwave Imaging, M.Pastorino, John Wiley, 2010

**(19A01604a) INDUSTRIAL WASTE AND WASTE WATER MANAGEMENT
OPEN ELECTIVE-II**

Course Objectives:

- To teach Health and Environment Concerns in waste water management
- To teach material balance and design aspects of the reactors used in waste water treatment.
- To impart knowledge on selection of treatment methods for industrial waste water
- To teach common methods of treatment in different industries
- To provide knowledge on operational problems of common effluent treatment plant

UNIT –I

Industrial water Quantity and Quality requirements:

Boiler and cooling waters–Process water for Textiles, Food processing, Brewery Industries, power plants, fertilizers, sugar mills Selection of source based on quality, quantity and economics. Use of Municipal wastewater in Industries – Adsorption, Reverse Osmosis, Ion Exchange, Ultra filtration, Freezing, Elutriation, Removal of Colour, Odour and Taste.

Learning Outcomes:

At the end of the unit, students will be able to:

- Learn the procedures for assessment of quality of Industrial water
- Suggest different processes of handling waste water

UNIT –II

Basic theories of Industrial Wastewater Management: Industrial waste survey - Measurement of industrial wastewater Flow-generation rates – Industrial wastewater sampling and preservation of samples for analysis -Wastewater characterization-Toxicity of industrial effluents-Treatment of wastewater-unit operations and processes-Volume and Strength reduction – Neutralization and Equalization, Segregation and proportioning- recycling, reuse and resources recovery

Learning Outcomes:

At the end of the unit, students will be able to:

- Measure industrial waste water flow
- Characterize waste water
- Suggest techniques for treatment of waste water.

UNIT –III

Industrial wastewater disposal management: Discharges into Streams, Lakes and oceans and associated problems, Land treatment - Common Effluent Treatment Plants: advantages and suitability, Limitations and challenges- Recirculation of Industrial Wastes- Effluent Disposal Method

Learning Outcomes:

At the end of the unit, students will be able to:

- Understand options for waste water disposal.
- Explain functioning of common effluent treatment plants

UNIT – IV

Process and Treatment of specific Industries-1: Manufacturing Process and origin, characteristics, effects and treatment methods of liquid waste from Steel plants, Fertilizers, Textiles, Paper and Pulp industries, Oil Refineries, Coal and Gas based Power Plants

Learning Outcomes:

At the end of the unit, students will be able to:

- Understand the character of waste water from Steel plants and refineries
- Suggest suitable waste water treatment techniques

UNIT – V

Process and Treatment of specific Industries-2: Manufacturing Process and origin, characteristics, effects and treatment methods of liquid waste from Tanneries, Sugar Mills, Distillers, Dairy and Food Processing industries, Pharmaceutical Plants

Learning Outcomes:

At the end of the unit, students will be able to:

- Understand the character of waste water from tanneries and distilleries
- Suggest suitable waste water treatment techniques

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- Design treatment methods for any industrial wastewater.
- Examine the manufacturing process of various industries.
- Assess need for common effluent treatment plant for an industry
- Test and analyze BOD, COD, TSS and MPN in waste water.

TEXT BOOK

1. M. N. Rao and A. K. Dutta, “Wastewater Treatment”, Oxford & IBH, New Delhi.
2. K.V. S. G. Murali Krishna, “Industrial Water and Wastewater Management”.

REFERENCES

1. A. D. Patwardhan, “Industrial Wastewater treatment”, PHI Learning, Delhi
2. Metcalf and Eddy Inc., “Wastewater Engineering”, Tata McGraw Hill co., New Delhi.
3. G. L. Karia & R.A. “Christian Wastewater Treatment- Concepts and Design Approach”, Prentice Hall of India.

(19A01604b) BUILDING SERVICES AND MAINTAINANCE
OPEN ELECTIVE-II

Course Objectives:

- To impart knowledge in concepts of building maintenance
- To insist the student to observe various practices of good building maintenance
- To teach the importance safety in buildings
- To demonstrate the use of ventilation in buildings.
- To give the list of different types of machineries in buildings

UNIT – I

PLUMBING SERVICES: Water supply system- fixing of pipes in buildings – maintenance of buildings- water meters-sanitary fittings-design of building drainage- gas supply systems

Learning Outcomes:

At the end of the unit, students will be able to:

- Understand water supply system
- Understand the building drainage system.

UNIT – II

VENTILATION: Necessity of ventilation – functional requirements – systems of ventilation-natural ventilation-artificial ventilation-air conditioning-systems of air conditioning-essentials of air conditioning-protection against fire caused by air conditioning systems.

Learning Outcomes:

At the end of the unit, students will be able to:

- Understand concepts of ventilation
- Understand concepts of air conditioning

UNIT – III

THERMAL INSULATION: Heat transfer system-thermal insulating materials-methods of thermal insulation-economics of thermal insulation-thermal insulation of exposed walls, doors, windows and roofs.

Learning Outcomes:

At the end of the unit, students will be able to:

- Understand methods of insulation
- Understand materials of insulation

UNIT – IV

FIRE SAFETY: Causes of fire in buildings-fire safety regulations-characteristics of fire resisting materials- fire resistant construction-heat and smoke detectors-fire alarms-fire fighting pump and water storage.

Learning Outcomes:

At the end of the unit, students will be able to:

- Understand safety regulations of fire system
- Know about the implementation and usage of various fire resistant materials in building construction

UNIT – V

MACHINERIES IN BUILDINGS: Lifts-essential requirements-design considerations-escalators-essential requirements-electrical installations in buildings-lighting in buildings-methods of electrical wiring-earthing

Learning Outcomes:

At the end of the unit, students will be able to:

- Understanding of different machineries of buildings
- Understanding of electrical installation of buildings

Course Outcomes:

Student will be able to understand

- Concepts of plumbing, drainage system and gas supply system
- Concepts of ventilation and air conditioning
- Concepts of thermal insulation and economics of thermal insulation
- Concepts of fire safety in buildings and fire resistant construction
- Concepts of different machineries of buildings

TEXT BOOKS:

1. B.C.Punmia, Er. Ashok K jain, Arun K Jain “Building construction”, Laxmi publications pvt.ltd. New Delhi.
2. Janardhan Jah, S.K Sinha, “Building construction”, Khanna publishers
3. Rangwala, “Building construction”, Charothar publishing house.

REFERENCE BOOKS:

1. David V Chadderton, "Building services engineering", Outledge
2. P.C Varghees "Building construction", Printice hall india

**(19A02604a) INDUSTRIAL AUTOMATION
OPEN ELECTIVE-II**

Course Objectives:

- To understand the basic concepts of Automation
- To understand the concepts of automation cycle and hardware components
- To gain knowledge about pneumatic and hydraulic devices
- To understand the concepts of sensors and actuators
- To know the use of Robotics used in industries automation

UNIT -I:

Introduction to Automation

Definition and fundamentals of automation, reasons for Automating, basic elements of an automated system: Power, Program and control system, safety, maintenance & repair diagnosis, error detection and recovery, Automation principles and strategies: USA principle, strategies of automation and production system, automation migration strategy

Learning Outcomes:

At the end of the unit, students will be able to:

- To understand the fundamental concepts of automation and its basic elements
- To understand system safety requirements
- To understand about maintenance and repair strategies
- To know about production system automation

UNIT- II:

Mechanization and Automation

Basic principles of Mechanization and automation, product cycle, hard Vs flexible automation, Capital- intensive Vs low cost automation. Types of systems-mechanical, electrical, hydraulic, pneumatic and hybrid systems, Automation using CAMS, Geneva mechanisms, gears etc. Assembly line Automation: automated assembly systems, transfer systems, vibratory bowl feeders, non-vibratory feeders, part orienting, feed track, part placing & part escapement systems. Introduction to Material storage/ handling and transport systems, and its automation using AS/RS, AGVS and conveyors etc.

Learning Outcomes:

At the end of the unit, students will be able to:

- To know about how to analyse the various automation methods
- To know about assembling and placing of various parts
- To distinguish between mechanization and automation of systems
- To know about material storage, handling and automation using various approaches

UNIT -III:

Pneumatics and hydraulics

Hydraulic and pneumatic devices-Different types of valves, Actuators and auxiliary elements in Pneumatics & hydraulics , their applications and use of their ISO symbols. Synthesis and design of circuits (up to 3 cylinders)–pneumatic, electro pneumatics and hydraulics. Design of Electro-Pneumatic Circuits using single solenoid and double solenoid valves; with and without grouping.

Learning Outcomes:

At the end of the unit, students will be able to:

- To know design of various pneumatic and hydraulic components
- To understand about synthesis and design of Pneumatic circuits
- To understand about electro pneumatic circuits
- To design using various solenoid valves with and without grouping

UNIT -IV:

Sensors & Actuators Sensors

Selection of sensors (Displacement, temperature, acceleration, force /pressure) based on static and dynamic characteristics. Interfacing: Concept of interfacing, bit accuracy and sampling speed, amplifying electronics, and microcontroller. Actuators: Principle and selection of electro mechanical actuators (1) DC motors (2) Stepper Motors (3) Solenoid Actuators (4) Servo Motors (5) BLDC

Learning Outcomes:

At the end of the unit, students will be able to:

- To know about selection of sensors and actuators based on dynamic characteristics
- To understand about necessity of interfacing sensors with Microcontroller
- To understand principle and selection of actuators
- To apply various electro mechanical actuators to certain machines

UNIT- V:

Robots and their applications

Introduction to robots, Types, Classifications, Selection of robots, Robot Degrees of freedom, Robot configuration, Accuracy and repeatability, Specification of a robot, Robot feedback

controls: Point to point control and Continuous path control, Control system for robot joint, Adaptive control, Drives and transmission systems, End effectors, Industrial robot applications of robots

Learning Outcomes:

At the end of the unit, students will be able to:

- To know about Robots, classification, selection and specifications
- To understand the use of robotics in industrial applications
- To know about various feedback controls of Robot
- To understand how adaptive control strategies can be used in Robots

Course Outcomes:

1. Understand the basic concepts of Industrial automation
2. Design and analysis of automation methods, placing and assembling of various parts
3. Design of various processing and control circuits using pneumatic and hydraulic elements
4. Selection of sensors based on the industrial application
5. Role of robotics in industrial applications

TEXT BOOKS:

1. Stamatis Manesis and George Nikolakopoulos, "Introduction to Industrial Automation", CRC Press, 2018.
2. Frank Lamb, "Industrial Automation", Hands on, Mc Graw Hill Education, 2013.

REFERENCES:

1. Richerd L. Shell and Ernest L. Hall, "Hand Book of Industrial Automation", CRC Press, 2000.

**(19A02604b) SYSTEM RELIABILITY CONCEPTS
(OPEN ELECTIVE-II)**

Course Objectives:

To make the students learn about:

- The Basic concepts, rules for combining probabilities of events, failure density and distribution functions.
- Evaluation of network Reliability / Unreliability and types of redundancies.
- Evaluation of network Reliability / Unreliability using conditional probability method.
- Expected value and standard deviation of Exponential distribution and Measures of reliability.
- Evaluation of Limiting State Probabilities of one, two component repairable models.

UNIT-I:

Basic Probability Theory

Basic concepts – Rules for combining Probabilities of events – Failure Density and Distribution functions – Bernoulli's trials – Binomial distribution – Expected value and standard deviation for binomial distribution – Examples

Learning Outcomes:

At the end of the unit, students will be able to:

- To know about basic rules for probabilities of events
- To distinguish between pdf and cdf
- Get detailed information about Probability of failure density and distribution functions
- Obtain the expected value and standard deviation for binomial distribution.

UNIT-II:

Network Modeling and Reliability Evaluation

Basic concepts – Evaluation of network Reliability / Unreliability – Series systems, Parallel systems, Series - Parallel systems, partially redundant systems – Types of redundancies - Evaluation of network Reliability / Unreliability using conditional probability method – Paths based and Cutset based approach – complete event tree and reduced event tree methods - Examples.

Learning Outcomes:

At the end of the unit, students will be able to:

- How to find the Probability of success and failures of network using different approaches for series-parallel configurations.
- Classification of redundancies.
- To find reliability / unreliability of complex systems using different methods
- Comparison of approaches to solve probability index of SISO system

UNIT-III:

Time Dependent Probability

Basic concepts – Reliability functions $f(t)$, $Q(t)$, $R(t)$, $h(t)$ – Relationship between these functions – Bath tub curve – Exponential failure density and distribution functions - Expected value and standard deviation of Exponential distribution – Measures of reliability – MTTF, MTTR, MTBF – Evaluation of network reliability / Unreliability of simple Series, Parallel, Series-Parallel systems - Partially redundant systems - Evaluation of reliability measure – MTTF for series and parallel systems – Examples.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the concepts of time domain functions and relationship between them.
- Obtain the expected value and standard deviation for exponential distribution.
- Obtain the values of probabilistic measures for series and parallel configurations.
- To obtain probabilistic measures for fully redundant and partially redundant configurations

UNIT-IV:

Discrete Markov Chains & Continuous Markov Processes

Markov Chains: Basic concepts – Stochastic transitional Probability matrix – time dependent probability evaluation – Limiting State Probability evaluation – Absorbing states.

Markov Processes: Modeling concepts – State space diagrams – time dependent reliability evaluation of single component repairable model – Evaluation of Limiting State Probabilities of one, two component repairable models – Frequency and duration concepts – Frequency balance approach - Examples.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the concepts of Stochastic Transitional Probability Matrix, Limiting State Probability
- To know about evaluation for one and two component repairable models.
- Understand the concept of Frequency balance approach.

- To distinguish between Markov chains and Markov processes

UNIT-V:

Multi Component & Approximate System Reliability Evaluation

Recursive relation for evaluation of equivalent transitional rates– cumulative probability and cumulative frequency and ‘n’ component repairable model – Series systems, Parallel systems, Basic probability indices – Series, Parallel systems – Complex Systems– Cutset approach – Examples.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the concepts of recursive relation for evaluation of equivalent transitional rates.
- Obtain the cumulative probability and cumulative frequency for different systems
- To know about computation of basic probability indices for series, parallel configurations
- To know how to evaluate basic probability indices using cut set approach

Course Outcomes:

After completing the course, the student should be able to do the following:

- Understand the concepts for combining Probabilities of events, Bernoulli’s trial, and Binomial distribution.
- Network Reliability/Unreliability using conditional probability, path and cutset based approach, complete event tree and reduced event tree methods.
- Understanding Reliability functions and to develop relationship between these functions, expected value and standard deviation of Exponential distribution and measures of reliabilities.
- Analyze the time dependent reliability evaluation of single component repairable model, frequency and duration concepts, Frequency balance approach.
- Recursive relation for evaluation of equivalent transitional rates, cumulative probability and cumulative frequency and ‘n’ component repairable model.

Text Books:

1. Roy Billinton and Ronald N. Allan, “Reliability Evaluation of Engineering Systems”, Reprinted in India B. S. Publications, 2007.
2. E. Balagurusamy, “Reliability Engineering”, Tata McGraw Hill, 2003.

Reference Books:

1. E. E. Lewis , “Introduction to Reliability Engineering” Wiley Publications.
2. Charles E. Ebeling, “Reliability and Maintainability Engineering”, Tata McGraw Hill, 2000.
3. by Ajit Kumar Verma, Srividya Ajit and Durga Rao Karanki, Springer, “Reliability and Safety Engineering” 2nd edition, 2016.
4. Rausand and Arnljot Hoyland, “System Reliability Theory Marvin”, Wiley Publications.

(19A03604a) INTRODUCTION TO MECHATRONICS
OPEN ELECTIVE

Course Objectives:

- Familiarize the technologies behind modern mechatronic systems.
- Explain fundamentals for the development of fully automated system.
- Develop a robotic or automated systems focusing on the hardware and software integration.
- Demonstrate the development and design of mechatronic system and MEMS.

UNIT – I

Introduction: Definition of Mechatronics, Need for Mechatronics in Industry, Objectives of mechatronics, mechatronics design process, Mechatronics key elements, mechatronics applications – Computer numerical control (CNC) machines, Tool monitoring systems, Flexible manufacturing system (FMS), Industrial Robots, Automatic packaging systems, Automatic inspection systems.

Learning Outcomes:

At the end of the unit, the student will be able to

- Explain the role of mechatronics in industry.(l2)
- Identify the application of mechatronics in automation industry.(l3)

UNIT – II

Sensors: Static characteristics of sensors, Displacement, Position and Proximity sensors, Force and torque sensors, Pressure sensors, Flow sensors, Temperature sensors, Acceleration sensors, Level sensors, Light sensors, Smart material sensors, Micro and Nano sensors, Selection criteria for sensors.

Learning Outcomes:

At the end of the unit, the student will be able to

- Classify various types of sensors. (l2)
- Choose sensors for particular application. (l3)
- Measure different quantity's using sensors. (l4)

UNIT – III

Actuators: Mechanical, Electrical, Hydraulic and Pneumatic Actuation systems, Characteristics and their limitations, Design of Hydraulic and Pneumatic circuits, Piezoelectric actuators, Shape memory alloys, Selection criteria for actuators.

Learning Outcomes:

At the end of the unit, the student will be able to

- Classify various actuation systems. (I2)
- Choose the criterion for different actuators. (I1)

UNIT – IV

Microprocessors, Microcontrollers and Programmable Logic Controllers: Architecture of of Microprocessor, Microcontroller and Programmable Logic Controller, PLC Programming using ladder diagrams, logics, latching, sequencing, timers relays and counters, data handling, Analog input/output, selection of controllers.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the architecture of microprocessors, microcontrollers and PLC. (L2)
- Formulate various programs using PLC. (L6)

UNIT – V

Design of mechatronics systems, Mechatronics design elements, Traditional mechatronics systems, Embedded systems, Procedure for designing a mechatronic systems.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understanding design of mechatronics . (L2)
- Various Mechatronics systems. (L4)
- Design Aspects of Mechatronic systems. (L2)

Course Outcomes

Upon successful completion of this unit, the student will be able to:

- Explain mechatronics systems in industry. (I2)
- Identify mechatronic systems encountered in practice. (I3)
- Examine the components of a typical mechatronic system. (I4)
- Compare the various techniques used for development of mems. (I4)
- Develop programs using plc. (I6)

Text books:

1. Er R. Rajput, “ A Text book of Mechatronics”, S.Chand,2nd edition-2016.
2. James J Allen, “Micro Electro Mechanical Systems Design”, CRC Press Taylor & Francis group, 2005.

Reference Text books:

1. WBolton, “Mechatronics Electronics Control Systems in Mechanical and Electrical Engineering”, 3rd edition, Pearson Education Press, 2005.
2. Devadas Shetty and Richard A Kolk, “Mechatronic System Design”, 2nd edition, Cengage learning, 2010.
3. Clarence W. de Silva, “Mechatronics an Integrated Approach”, CRC Press, 2004.
4. Ganesh S Hedge, “Mechatronics”, Jones & Bartlett Learning, 2010.

(19A03604b) OPTIMIZATION TECHNIQUES THROUGH MATLAB
OPEN ELECTIVE-II

Course Objectives

- Introduce basics of MATLAB
- Familiarize the fundamentals of optimization
- Explain single variable optimization using various methods
- Implement multi variable optimization using various methods
- Train various evolutionary algorithms.

UNIT -I

Introduction to MAT LAB: Overview, MATLAB Preliminaries, Basics of MATLAB, Beyond the Basics of MATLAB, Popular Functions and Commands, Plotting using MATLAB, Optimization with MATLAB.

Learning Outcomes:

After completion of this unit, students will be able to

- Write simple codes in MATLAB. (L3)
- Plot the data using MATLAB. (L3)
- Implement optimization models in MATLAB. (L3)

UNIT -II

Introduction to Optimization: Statement of an optimization problem, Classifications of optimization Problems: Single variable optimization, Multi variable optimization with no constraints, Multi variable optimization with equality constraints, Multi variable optimization with inequality constraints, Convex and Concave programming.

Learning Outcomes:

After completion of this unit, students will be able to

- Build optimization problem. (l1)
- Solve various optimization problems(l3)
- Compare convex and concave programming (l4)

UNIT -III

Single Variable Optimization: Finite difference method, Central difference method, Runge-Kutta method, interval halving method, golden section method with MATLAB code.

Learning Outcomes:

After completion of this unit, students will be able to

- Understand various methods involving single variable optimization. (12)
- Develop codes in matlab for different methods. (13)
- Identify methods for solving a single variable optimization problem. (13)

UNIT- IV

Multi Variable Optimization: Conjugate gradient method, Newton's method, Powell's method, Fletcher- Reeves method, Hook and Jeeves method, interior penalty function with MATLAB code.

Learning Outcomes:

After completion of this unit, students will be able to

- Apply various methods involving multi variable optimization. (12)
- Develop codes in matlab for solving various multi variable optimization problems. (13)
- Choose methods for solving a multi variable optimization problem. (13)

UNIT -V

Evolutionary Algorithms: Overview, Genetic Algorithms: Basics of Genetic Algorithms, Options in MATLAB, Multi Objective Optimization using Genetic Algorithms, Ant Colony Optimization, Simulated Annealing, Particle Swarm Optimization.

Learning Outcomes:

After completion of this unit, students will be able to

- Apply different types of genetic algorithms. (13)
- Model optimization problems using genetic algorithms in matlab. (13)
- Compare different genetic algorithms for performance. (15)

Course Outcomes:

After completion of this course the student can be able to

- Use optimization terminology and concepts, and understand how to classify an optimization problem.(14)
- Apply optimization methods to engineering problems.(13)
- Implement optimization algorithms.(13)
- Compare different genetic algorithms. (15)
- Solve multivariable optimization problems. (14)

TEXT BOOKS:

1. Rao V.Dukkipati, MATLAB: “An Introduction with Applications”, Anshan, 2010.
2. Achille Messac, “Optimization in practice with MATLAB”, Cambridge University Press, 2015.

3. Jasbir S Arora, “Introduction to optimum design”, 2nd edition. Elsevier, 2004.

REFERENCES:

1. Cesar Perez Lopez, “MATLAB Optimization Techniques”, Academic press, Springer publications, 2014.
2. Steven C.Chapra, “Applied Numerical Methods with MATLAB for Engineers and scientists”: 4th edition, McGraw-Hill Education, 2018.

(19A04604a) **BASICS OF VLSI**
OPEN ELECTIVE-II

Course Objectives:

The objectives of the course are to

- Learn and Understand IC Fabrication process steps required for various MOS circuits
- Understand and Experience VLSI Design Flow
- Learn Transistor-Level CMOS Logic Design
- Understand VLSI Fabrication and Experience CMOS Physical Design
- Learn to Analyze Gate Function and Timing Characteristics

UNIT – I

Introduction: Introduction to MOS Technology – MOS, PMOS, NMOS, CMOS and BiCMOS technologies, fabrication fundamentals: Oxidation, Lithography, Diffusion, Ion implantation, Metallization and Encapsulation.

Basic Electrical Properties: Basic Electrical Properties of MOS, CMOS and BiCMOS Circuits, I_{DS} - V_{DS} relationships, MOS transistor threshold Voltage, g_m , g_{ds} , figure of merit ω_0 , Pass transistor, NMOS inverter, Various pull - ups, Determination of pull-up to pulldown ratio (Z_{pu} / Z_{pd}), CMOS Inverter analysis and design, BiCMOS inverters, Latch-up in CMOS circuits.

Learning Outcomes:

After completion of this unit, students will be able to

- Demonstrate a clear understanding of CMOS fabrication flow and technology scaling (L2)
- Analyze the electrical properties of MOS and BiCMOS circuits (L3)
- Design MOSFET based logic circuit (L4)

UNIT – II

VLSI Circuit Design Processes: VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layouts, Lambda based design rules, Contact cuts, CMOS Lambda based design rules, Layout Diagrams for logic gates, Transistor structures, wires and vias, Scaling of MOS circuits- Scaling models, scaling factors, scaling factors for device parameters, Limitations of Scaling.

Learning Outcomes:

After completion of this unit, students will be able to

- Understand the design rules and layout diagram for logic gates, limitations of scaling (L1)
- Draw the Layout of simple MOS circuit using Lambda based design rules (L2)

UNIT – III

Gate Level Design and Layout: Architectural issues, Switch logic networks: Gate logic, Alternate gate circuit: Pseudo-NMOS Dynamic CMOS logic. Basic circuit concepts, Sheet Resistance R_s and its concept to MOS, Area Capacitance Units, Calculations, The delay unit T , Inverter Delays, Driving large Capacitive Loads, Wiring Capacitances, Fan-in and fan-out, Choice of layers

Learning Outcomes:

After completion of this unit, students will be able to

- Apply basic circuit concepts to MOS circuits. (L2)
- Estimate the propagation delays in CMOS circuits (L3).

UNIT – IV

Subsystem Design: Subsystem Design, Shifters, Adders, ALUs, Multipliers: Array multiplier, Serial/Parallel multiplier, Parity generator, Comparators, Zero/One Detectors, Up/Down Counter, Memory elements: SRAM, DRAM, ROM, Serial Access Memories.

Learning Outcomes:

After completion of this unit, students will be able to

- Apply the Lambda based design rules for subsystem design (L2)
- Design of Adders, Multipliers and memories etc (L4)
- Design digital systems using MOS circuits (L4)

UNIT – V

Semiconductor Integrated Circuit Design: PLDs, FPGAs, CPLDs, Standard Cells, Programmable Array Logic, Programmable Logic Array Design Approach.

Learning Outcomes:

After completion of this unit, students will be able to

- Analyze various architectures and device technologies of PLDs (L3)
- Design simple logic circuit using PLA, PAL, FPGA and CPLD. (L4)

Course Outcomes:

- Learn the basic fabrication process of MOS transistors, study CMOS inverter circuits, basic circuit concepts such as Sheet Resistance, Area Capacitance and Delay calculation, Field programmable gate arrays and realization techniques, CPLDs and FPGAs for implementing the various logic functions.
- Apply CMOS technology-specific layout rules in the placement and routing of transistors and interconnect, and to verify the functionality.
- Analyze the performance of CMOS Inverter circuits
- Compare various Scaling models and understand the effect of scaling on device parameters

TEXT BOOKS:

1. Kamran Eshraghian, “Essentials of VLSI circuits and systems”, EshraghianDouglasand A. Pucknell, PHI, 2005 Edition
2. Wayne Wolf, “Modern VLSI Design”, 3rd Edition, Pearson Education, 1997.

REFERENCE BOOKS:

1. John .P. Uyemura, “CMOS logic circuit Design”, Springer, 2007.
2. Neil H. E Weste, “CMOS VLSI Design – A Circuits and Systems Perspective”, 3rd edition, DavidHarris, Ayan Banerjee, Pearson, 2009.

(19A04604b) PRINCIPLES OF COMMUNICATION SYSTEMS
OPEN ELECTIVE-II

Course Objectives:

- To understand the concept of various modulation schemes and multiplexing.
- To apply the concept of various modulation schemes to solve engineering problems.
- To analyse various modulation schemes.
- To evaluate various modulation scheme in real time applications.

UNIT-I:

Amplitude Modulation

Introduction to Noise and Fourier Transform. An overview of Electronic Communication Systems. Need for Frequency Translation, Amplitude Modulation: DSB-FC, DSB-SC, SSB-SC and VSB. Frequency Division Multiplexing. Radio Transmitter and Receiver.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand the concept of noise, Fourier transform, carrier modulation and frequency division multiplexing (L1).
- Apply the concept of amplitude modulation to solve engineering problems (L2).
- Analyse various amplitude modulation schemes (L3).
- Evaluate various amplitude modulation schemes in real time applications (L3).

UNIT-II:

Angle Modulation

Angle Modulation, Tone modulated FM Signal, Arbitrary Modulated FM Signal, FM Modulation and Demodulation. Stereophonic FM Broadcasting.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand the concept of angle modulation and its components (L1).
- Apply the concept of frequency modulation to solve engineering problems (L2).
- Analyse angle modulation schemes (L3).
- Evaluate frequency modulation scheme in real time applications (L3).

UNIT-III:

Pulse Modulation

Sampling Theorem: Low pass and Band pass Signals. Pulse Amplitude Modulation and Concept of Time Division Multiplexing. Pulse Width Modulation. Digital Representation of Analog Signals.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand the concept of various pulse modulation schemes and time division multiplexing (L1).
- Analyse various pulse modulation schemes (L3).

UNIT-IV:

Digital Modulation

Binary Amplitude Shift Keying, Binary Phase Shift Keying and QuadraturePhase Shift Keying, Binary Frequency Shift Keying. Regenerative Repeater.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand the concept of various digital modulation schemes (L1).
- Analyze various digital modulation schemes (L3).

UNIT-V:

Communication Systems

Satellite, RADAR, Optical, Mobile and Computer Communication (Block diagram approach only).

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand the concept of various communication systems (L1).

Note: The main emphasis is on qualitative treatment. Complex mathematical treatment may be avoided.

Course Outcomes:

- Understand the concept of various modulation schemes and multiplexing (L1).
- Apply the concept of various modulation schemes to solve engineering problems (L2).
- Analyse various modulation schemes, and evaluate various modulation scheme in real time applications (L3).

TEXT BOOKS:

1. Herbert Taub, Donald L Schilling and Goutam Saha, “Principles of Communication Systems”, 3rd Edition, Tata McGraw-Hill Publishing Company Ltd., 2008.

REFERENCES:

1. B. P. Lathi, Zhi Ding and Hari M. Gupta, “Modern Digital and Analog Communication Systems”, 4th Edition, Oxford University Press, 2017.
2. K. Sam Shanmugam “Digital and Analog Communication Systems”, Wiley India Edition, 2008.

Blooms’ Learning levels:

L1: Remembering and Understanding

L2: Applying

L3: Analyzing, Evaluating

(19A05604a) FUNDAMENTALS OF VR/AR/MR

Open Elective-II
(Common to CSE & IT)

Course Objectives:

This course is designed to:

- Explore the history of spatial computing and design interactions
- Understand the foundational principles describing how hardware, computer vision algorithms function
- Learn Virtual reality animation and 3D Art optimization
- Demonstrate Virtual reality
- Introduce to the design of visualization tools

UNIT-I

How Humans interact with Computers: Common term definition, introduction, modalities through the ages (pre- 20th century, through world war-II, post world war-II, the rise of personal computing, computer miniaturization), why did we just go over all of this?, types of common HCI modalities, new modalities, the current state of modalities for spatial computing devices, current controllers for immersive computing systems, a note on hand tracking and hand pose recognition.

Designing for our Senses, Not our Devices: Envisioning a future, sensory technology explained, who are we building this future for?, sensory design, five sensory principles, Adobe's AR story.

Learning Outcomes:

At the end of the unit, students will be able to:

- Explain common modalities and their pros and cons.(L2)
- Demonstrate Mapping modalities to current industry inputs(L2)
- Explore the importance of design with spatial computing(L5)

UNIT-II

Virtual Reality for Art: A more natural way of making 3D art, VR for animation.

3D art optimization: Introduction, draw calls, using VR tools for creating 3D art, acquiring 3D models vs making them from scratch.

How the computer vision that makes augmented reality possible works: Who are we?, a brief history of AR, how and why to select an AR platform, mapping, platforms, other development considerations, the AR cloud.

Learning Outcomes:

At the end of the unit, students will be able to:

- Utilize VR tools for creating 3D Animations(L3)
- Analyze how and why to Select an AR Platform(L4)

UNIT-III

Virtual reality and augmented reality: cross platform theory: Why cross platform? The role of game engines, understanding 3D graphics, portability lessons from video game design, simplifying the controller input.

Virtual reality toolkit: open source framework for the community: What is VRTK and why people use it?, the history of VRTK, welcome to the steam VR unity toolkit, VRTK v4, the future of VRTK, success of VRTK.

Three virtual reality and augmented reality development practices: Developing for virtual reality and augmented reality, handling locomotion, effective use of audio, common interaction paradigms.

Learning Outcomes:

At the end of the unit, students will be able to:

- Explain why the design approach should be considered at a holistic high level based on the goal of the experience(L2)
- Build VR solutions using Virtual reality toolkit(L6)
- Interpret the development practices in three Virtual reality and Augmented reality development(L2)

UNIT-IV

Data and machine learning visualization design and development in spatial computing:

Introduction, understanding data visualization, principles for data and machine learning visualization design and development in spatial computing, why data and machine learning visualization works in spatial computing, 2D data visualization vs 3D data visualization in spatial computing, interactivity in data visualizations and in spatial computing, animation, failures in data visualization, good data visualization design optimize 3D spaces, data representations, info graphics, and interactions, defining distinctions in data visualization and big data for machine, how to create data visualization: data visualization creation pipeline, webXR, data visualization challenges in XR, data visualization industry use case examples of data visualization, 3D reconstruction and direct manipulation of real world data, data visualization is for everyone, hands on tutorials, how to create data visualization, resources.

Learning Outcomes:

At the end of the unit, students will be able to:

- Understand, define, and set data and machine visualization design and development principles in embodied reality(L1)
- Demonstrate best practices, and practical tools to create beautiful and functional data visualizations.(L2)

UNIT-V

Character AI and Behaviors: Introduction, behaviors, current practice: Reactive AI, more intelligence in the system, Deliberative AI, machine learning.

The virtual and augmented reality health technology ecosystem: VR/AR health technology application design, standard UX isn't intuitive, tutorial: insight Parkinson's experiment, companies, case studies from leading Academic institutions.

Learning Outcomes:

At the end of the unit, students will be able to:

- Design a behavioral AI system for a video game(L6)
- Identify issues related to design of virtual reality (VR) and augmented reality (AR) experiences deployed in a health-care context(L3)
- Explain the use of motion data from controllers to reduce the visible tremor of a Parkinson's patient in a virtual environment(L2)

Course outcomes

Upon completion of the course, the students should be able to:

- Explain how the humans interact with computers (L2)
- Apply technical and creative approaches to make successful applications and experiences. (L3)
- Design audio and video interaction paradigms (L6)
- Design Data visualization tools (L6)
- Apply VR/MR/AR in various fields in industry (L3)

Text book

1. Erin Pangilinan, Steve lukas, and Vasanth Mohan, "Creating Augmented & Virtual Realities", 1st edition, O'REILLY, 2019.

References

1. Steve Aukstakalnis, "Practical Augmented Reality", Pearson Education, 2017.

(19A05604b) DATA SCIENCE
Open Elective-II
(Common to CSE & IT)

Course Objectives

This course is designed to:

- Understand the approaches for handling data related problems
- Explore the mathematical concepts required for Data science
- Explain the basic concepts of data science.
- Elucidate various Machine Learning algorithms.
- Introduce Natural Language Processing and Recommender Systems

UNIT- I

Introduction to Data Science, A Crash Course in Python, Visualising Data.

Learning Outcomes:

At the end of the unit, students will be able to:

- Describe the importance of data analysis (L1).
- Identify the key connectors of Data Science (L4).
- Interpret and Visualize the data using bar charts, line charts and scatter plots (L3).

UNIT-II

Linear Algebra, Statistics, Probability, Hypothesis and Inference, Gradient Descent.

Learning Outcomes:

At the end of the unit, students will be able to:

- Identify the Correlation between two vectors (L4).
- Test a given hypothesis (L3).
- Compute mean, median and mode for the given data (L3).

UNIT-III

Getting Data, Working with Data, Machine Learning, k-Nearest Neighbors, Naïve Bayes.

Learning Outcomes:

At the end of the unit, students will be able to:

- Compute dimensionality reduction using PCA (L3).

- Differentiate supervised and unsupervised learning methods (L4).
- Describe overfitting, under fitting, bias, variance and goodness of learning (L1).
- Solve classification problem using k-nearest neighbour classifier (L3).
- Apply Naïve Bayes classifier to solve decision making problem (L3).

UNIT-IV

Simple Linear Regression, Multiple Regression, Logistic Regression, Decision Trees, Neural Networks.

Learning Outcomes:

At the end of the unit, students will be able to:

- Describe gradient descent approach, maximum likelihood estimation and method of least squares (L1).
- Apply SVM to determine a hyperplane with maximum margin (L3).
- Determine decision tree for given data (L5).
- Describe Perceptron and Back Propagation (L3).

UNIT-V

Clustering, Natural Language Processing, Network Analysis, Recommender Systems.

Database and SQL, MapReduce

Learning Outcomes:

At the end of the unit, students will be able to:

- Determine Clusters in data using k-means and Hierarchical Clustering methods (L5).
- Apply basic SQL Operations using NotQuiteABase (L3).
- Compare User-Based and Item-Based Collaborative Filtering (L2).
- Describe Grammer and MapReduce (L1).

Course Outcomes:

After completion of this course the student would be able to

- Visualize the data using bar charts, line charts and scatter plots (L4).
- Analyse Correlation between two data objects (L4).
- Demonstrate feature selection and dimensionality reduction.(L2)
- Solve decision making problems using k-NN, Naïve Bayes, SVM and Decision. Trees (L3).
- Determine Clusters in data using k-means and Hierarchical Clustering methods (L3).
- Design basic SQL Operations using NotQuiteABase (L6)
- Demonstrate the way to use machine learning algorithms using python. (L2)

Text Books:

1. Data Science from Scratch, First Principles with Python - Joel Grus, O'Reilly, First Edition.

Reference Books:

1. The Data Science Handbook, Field Cady, WILEY.
2. An Introduction to Data Science, Jeffrey M. Stanton, Jeffrey Stanton, 2012

(19A27604a) FOOD TOXICOLOGY
OPEN ELECTIVE II

PREAMBLE

This text covers about toxins and their relation in food. Examination, identification and prevention of toxins.

Course Objectives

- To know the various toxins and their evaluation.
- To understand their tolerance and control measures.

UNIT – I

Principles of Toxicology: classification of toxic agents; characteristics of exposure; spectrum of undesirable effects; interaction and tolerance; biotransformation and mechanisms of toxicity. Evaluation of toxicity: risk vs. benefit: experimental design and evaluation: prospective and retrospective studies: Controls :Statistics (descriptive, inferential): animal models as predictors of human toxicity: Legal requirements and specific screening methods: LD50 and TD50: in vitro and in vitvo studies; clinical trials.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Classification of toxic agents; characteristics of exposure;
- Spectrum of undesirable effects; interaction and tolerance; biotransformation and mechanisms of toxicity.
- Evaluation of toxicity: risk vs. benefit: experimental design and evaluation:
- Prospective and retrospective studies: Controls: Statistics (descriptive, inferential): animal models as predictors of human toxicity:
- Legal requirements and specific screening methods: LD50 and TD50: in vitro and in vitvo studies; clinical trials.

UNIT – II

Natural toxins in food: natural toxins of importance in food- toxins of plant and animal origin; microbial toxins (e.g., bacterial toxins, fungal toxins and Algal toxins), natural occurrence, toxicity and significance, determination of toxicants in foods and their management.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Natural toxins in food: natural toxins of importance in food- toxins of plant and animal origin
- Microbial toxins (e.g., bacterial toxins, fungal toxins and algal toxins), natural occurrence, toxicity and significance
- Determination of toxicants in foods and their management

UNIT – III

Food allergies and sensitivities: natural sources and chemistry of food allergens; true/untrue food allergies; handling of food allergies; food sensitivities (anaphylactoid reactions, metabolic food disorders and idiosyncratic reactions); Safety of genetically modified food: potential toxicity and allergenicity of GM foods. Safety of children consumables.

Learning outcomes:

At the end of unit, students will be able to understand the following

- Natural sources and chemistry of food allergens; true/untrue food allergies; handling of food allergies
- Food sensitivities (anaphylactoid reactions, metabolic food disorders and idiosyncratic reactions)
- Potential toxicity and allergenicity of gm foods. Safety of children consumables.

UNIT – IV

Environmental contaminants and drug residues in food: fungicide and pesticide residues in foods; heavy metal and their health impacts; use of veterinary drugs (e.g. Malachite green in fish and β - agonists in pork); other contaminants in food, radioactive contamination of food, Food adulteration and potential toxicity of food adulterants.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Fungicide and pesticide residues in foods; heavy metal and their health impacts
- Use of veterinary drugs (e.g. Malachite green in fish and β - agonists in pork); other contaminants in food, radioactive contamination of food
- Food adulteration and potential toxicity of food adulterants.

UNIT – V

Food additives and toxicants added or formed during food processing; safety of food additives; toxicological evaluation of food additives; food processing generated toxicants: nitroso-compounds, heterocyclic amines, dietary Supplements and toxicity related to dose: common dietary supplements; relevance of the dose; possible toxic effects.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Safety of food additives; toxicological evaluation of food additives;
- Nitroso-compounds, heterocyclic amines, dietary supplements and toxicity related to dose
- Common dietary supplements; relevance of the dose; possible toxic effects.

Course Outcomes

By the end of course

- Student will gain knowledge on principles of toxicity and characteristics of toxins and their classification. Examination and prevention of toxins in foods and etc.

TEXT BOOKS

1. Helferich, W., and Winter, C.K “Food Toxicology”,. CRC Press, LLC. Boca Raton, FL. 2007.
2. Shibamoto, T., and Bjeldanes, L. “Introduction to Food Toxicology”, 2009, 2nd Edition. Elsevier Inc., Burlington, MA.
3. Watson, D.H. “Natural Toxicants in Food”, CRC Press, LLC. Boca Raton, FL1998.

REFERENCES

1. Duffus, J.H., and Worth, H.G. J. “Fundamental Toxicology”, The Royal Society of Chemistry. 2006.
2. Stine, K.E., and Brown, T.M. “Principles of Toxicology”, 2nd Edition. CRC Press. 2006.
3. Tönu, P. “Principles of Food Toxicology”. CRC Press, LLC. Boca Raton, FL. 2007.

(19A27604b) FOOD PLANT EQUIPMENT DESIGN
OPEN ELECTIVE - II

PREAMBLE

This text focuses on materials used for food plant equipment and factors considered for design of various equipment.

Course Objectives:

- To understand the material properties and codes used.
- To know the design considerations.
- To study the design of evaporators, dryers, crystallizers and etc.

UNIT – I

Materials and properties: Materials for fabrication, mechanical properties, ductility, hardness, corrosion, protective coatings, corrosion prevention linings equipment, choice of materials, material codes. Design considerations: Stresses created due to static and dynamic loads, combined stresses, design stresses and theories of failure, safety factor, temperature effects, radiation effects, effects of fabrication method, economic considerations

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Materials for fabrication, mechanical properties, ductility, hardness, corrosion, protective coatings
- Corrosion prevention linings equipment, choice of materials, material codes
- Stresses created due to static and dynamic loads, combined stresses, design stresses and theories of failure, safety factor
- Temperature effects, radiation effects, effects of fabrication method, economic considerations

UNIT – II

Design of pressure and storage vessels: Operating conditions, design conditions and stress; Design of shell and its component, stresses from local load and thermal gradient, mountings and accessories. Design of heat exchangers: Design of shell and tube heat exchanger, plate heat exchanger, scraped surface heat exchanger, sterilizer and retort

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Design of pressure and storage vessels includes operating conditions, design conditions and stress
- Design of shell and its component, stresses from local load and thermal gradient, mountings and accessories
- Design of heat exchangers like shell and tube heat exchanger, plate heat exchanger, scraped surface heat exchanger, sterilizer and retort

UNIT – III

Design of evaporators and crystallizers: Design of single effect and multiple effect evaporators and its components; Design of rising film and falling film evaporators and feeding arrangements for evaporators; Design of crystallizer and entrainment separator

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Design of evaporators like single effect and multiple effect evaporators and its components; rising film and falling film evaporators and feeding arrangements for evaporators;
- Design of crystallizer and entrainment separator

UNIT – IV

Design of agitators and separators: Design of agitators and baffles; Design of agitation system components and drive for agitation. Design of centrifuge separator; Design of equipment components, design of shafts, pulleys, bearings, belts, springs, drives, speed reduction systems. Design of freezing equipment: Design of ice-cream freezers and refrigerated display system

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Design of agitators and baffles like Design of agitation system components and drive for agitation.
- Design of centrifuge separator like equipment components, design of shafts, pulleys, bearings, belts, springs, drives, speed reduction systems.
- Design of freezing equipment like ice-cream freezers and refrigerated display system

UNIT – V

Design of dryers: Design of tray dryer, tunnel dryer, fluidized dryer, spray dryer, vacuum dryer, freeze dryer and microwave dryer. Design of extruders: Cold and hot extruder design, design of screw and barrel, design of twin screw extruder. Design of fermenters: Design of fermenter vessel, design problems

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Design of dryers like tray dryer, tunnel dryer, fluidized dryer, spray dryer, vacuum dryer, freeze dryer and microwave dryer
- Design of extruders like Cold and hot extruder design, design of screw and barrel, design of twin screw extruder.
- Design of fermenter vessel, design problems

Course Outcomes

By the end of the course, the students will

- acquires knowledge on theoretical aspects to be design considerations for a food plant equipment and designing of evaporators, separators, storage vessels and etc.

TEXT BOOKS

1. Antonio Lopez-Gomez, Gustavo V. Barbosa-Canovas, “Food plant design”, CRC press 2005.
2. George D. Saravacos and Zacharias B. Maroulis, “Food Plant Economics”, CRC Press 2007.

REFERENCES

1. Peters M., Timmerhaus K. & Ronald W., “Plant Design & Economics for Chemical Engineers”, McGraw Hill.
2. James R Couper, “Process Engg. Economics (Chemical Industries) CRC Press 3. Aries & Newton, Chemical Engg. Cost Estimation”, McGraw Hill.

(19A54604a) WAVELET TRANSFORMS AND ITS APPLICATIONS

OPEN ELECTIVE-II

Course Objective:

This course provides the students to understand Wavelet transforms and its applications.

UNIT-I-

Wavelets

Wavelets and Wavelet Expansion Systems - Wavelet Expansion- Wavelet Transform- Wavelet System- More Specific Characteristics of Wavelet Systems -Haar Scaling Functions and Wavelets -effectiveness of Wavelet Analysis -The Discrete Wavelet Transform The Discrete-Time and Continuous Wavelet Transforms.

Learning Outcomes:

Students will be able to

- Understand wavelets and wavelet expansion systems.
- Find wavelet transforms in continuous as well as discrete domains.

UNIT-II-

A Multiresolution Formulation of Wavelet Systems

Signal Spaces -The Scaling Function -Multiresolution Analysis - The Wavelet Functions - The Discrete Wavelet Transform- A Parseval's Theorem - Display of the Discrete Wavelet Transform and the Wavelet Expansion.

Learning Outcomes:

Students will be able to

- Illustrate the multi resolution analysis, scaling function.
- Implement parseval theorem.

UNIT-III-

Filter Banks and the Discrete Wavelet Transform : Analysis - From Fine Scale to Coarse Scale- Filtering and Down-Sampling or Decimating -Synthesis - From Coarse Scale to Fine Scale -Filtering and Up-Sampling or Stretching - Input Coefficients - Lattices and Lifting - - Different Points of View.

Learning Outcomes:

Students will be able to

- Form fine scale to coarse scale analysis.
- Perform decimating synthesis.
- Find the lattices and lifting.

UNIT-IV

Multiresolution versus Time-Frequency Analysis- Periodic versus Nonperiodic Discrete Wavelet Transforms -The Discrete Wavelet Transform versus the Discrete-Time Wavelet Transform- Numerical Complexity of the Discrete Wavelet Transform.

Learning Outcomes:

Students will be able to

- Perform multi resolution versus time frequency analysis.
- Perform numerical complexity of discrete wavelet transforms.

UNIT-V

Bases, Orthogonal Bases, and Biorthogonal Bases -Matrix Examples - Fourier Series Example - Sine Expansion Example - Frames and Tight Frames - Matrix Examples -Sine Expansion as a Tight Frame Example.

Learning Outcomes:

Students will be able to

- Understand the orthogonal bases and Biorthogonal Bases.
- Find the Frames and Tight Frames using Fourier series.

Course Outcomes:

After the completion of course, students will be able to

- Understand wavelets and wavelet expansion systems.
- Illustrate the multi resolution analysis and scaling functions.
- Form fine scale to coarse scale analysis.
- Find the lattices and lifting.
- Perform numerical complexity of discrete wavelet transforms.
- Find the frames and tight frames using fourier series.

TEXT BOOKS:

1. C. Sidney Burrus, Ramesh A. Gopinath, "Introduction to Wavelets and Wavelets Transforms", Prentice Hall, (1997).
2. James S. Walker, "A Primer on Wavelets and their Scientific Applications", CRC Press, (1999).

REFERENCE BOOKS:

1. Raghuveer Rao, "Wavelet Transforms", Pearson Education, Asia.

(19A52604a) SOFT SKILLS
(OPEN ELECTIVE-II)

Course Objectives

- To develop awareness in students of the relevance and importance of soft skills
- To provide students with interactive practice sessions to make them internalize soft skills
- To develop Time management, Positive thinking & Decision making skills
- To enable to manage stress effectively
- To enable them to develop employability skills

SYLLABUS

UNIT – I

INTRODUCTION

Definition – Scope – Importance- – Methods of improving soft skills – Limits- Analysis – Interpersonal and intrapersonal skills - Verbal and Non-verbal skills.

Learning Outcomes:

At the end of the module, the learners will be able to

- Understand the importance of soft skills
- Identify the methods of improving soft skills
- Analyze various soft skills in different situations
- Distinguish various soft skills
- Apply various soft skills in day to day life and in workplace

UNIT – II INTRAPERSONAL SKILLS

Knowing self/temperaments/traits - Johari windows – quotient skills(IQ, EQ, SQ), creativity, decision-making-Attitude – Confidence Building - Positive Thinking –Time Management – Goal setting.

Learning Outcomes:

At the end of the module, the learners will be able to

- Understand self and its temperament.
- Apply various techniques to know the self.

- Develop positive thinking
- Develop creative thinking and decision-making skills
- Apply self-knowing tools in day to day and professional life.

UNIT – III

INTERPERSONAL SKILLS

Leadership Skills – Negotiation skills – Team-building – Crisis Management – Event Management – Ethics and Etiquettes.

Learning Outcomes:

At the end of the module, the learners will be able to

- Understand the importance of interpersonal skills
- Analyze various tactics in negotiation skills.
- Develop team building spirit.
- Develop crisis management
- Apply interpersonal skills through etiquettes.

UNIT – IV

VERBAL SKILLS

Importance of verbal skills in corporate climate, Listening skills –Mother Tongue Influence (MTI) - Speaking skills – Public speaking - Oral presentations - Writing skills –E-mail etiquettes – Memos - Indianism

Learning Outcomes:

At the end of the module, the learners will be able to

- Understand the importance of verbal skills in corporate climate.
- Explain the need of listening skills.
- Explore MTI and suggest remedies to avoid it.
- Interpret various contexts of speaking.
- Apply verbal skills in personal and professional life.

UNIT – V NON-VERBAL SKILLS

Importance of body language in corporate culture – body language-Facial expressions – eye contact – posture – gestures – Proxemics – Haptics – Dress Code – Paralanguage –Tone, pitch, pause& selection of words

Learning Outcomes:

At the end of the module, the learners will be able to

- Comprehend the importance of non-verbal communication.
- Expound the need of facial expressions, postures and gestures.
- Analyze proxemics, haptics etc.
- Understand the importance of dress code.
- Apply various techniques to use para language

Course Outcomes

- Recognize the importance of verbal and non verbal skills
- Develop the interpersonal and intrapersonal skills
- Apply the knowledge in setting the SMART goals and achieve the set goals
- Analyze difficult situations and solve the problems in stress-free environment
- Create trust among people and develop employability skills

Text Books

1. Meenakshi Raman & Shalini Upadhyay “ Soft Skills”, Cengage Learning, 2018.
2. S. Balasubramaniam, “Soft Skills for Interpersonal Communication”, Orient Black Swan, 2017.

References

1. Barun K. Mitra, “Personality Development and Soft Skills”, –OXFORD Higher Education 2018.
2. Alka Wadkar, “Life Skills for Success“, Sage Publications 2016.
3. Robert M Sheffield, “Developing Soft Skills”, Pearson, 2010.
4. Diana Booher, “Communicate With Confidence”, Tata McGrawhill, 2012.

(19A51604a) CHEMISTRY OF POLYMERS AND ITS APPLICATIONS

Course Objectives:

- To understand the basic principles of polymers
- To synthesize the different polymeric materials and their characterization by various instrumental methods.
- To impart knowledge to the students about fundamental concepts of Hydro gels of polymer networks, surface phenomenon by micelles
- To enumerate the applications of polymers in engineering

Unit – I : Polymers-Basics and Characterization

Basic concepts: monomers, repeat units, degree of polymerization, linear, branched and network polymers, classification of polymers, Polymerization: condensation, addition, radical chain, ionic and coordination and copolymerization. Average molecular weight concepts: number, weight and viscosity average molecular weights, polydispersity and molecular weight distribution Measurement of molecular weight: end group, viscosity, light scattering, osmotic and ultracentrifugation methods, analysis and testing of polymers.

Learning Outcomes:

At the end of this unit, the students will be able to

- Classify the polymers (L3)
- Explain polymerization mechanism (L2)
- Differentiate addition, condensation polymerizations (L2)
- Describe measurement of molecular weight of polymer (L2)

Unit – II : Synthetic Polymers

Addition and condensation polymerization processes – Bulk, Solution, Suspension and Emulsion polymerization.

Preparation and significance, classification of polymers based on physical properties, Thermoplastics, Thermosetting plastics, Fibers and elastomers, General Applications.

Preparation of Polymers based on different types of monomers, Olefin polymers, Diene polymers, nylons, Urea - formaldehyde, phenol - formaldehyde and melamine Epoxy and Ion exchange resins. Characterization of polymers by IR, NMR, XRD.

Learning Outcomes:

At the end of this unit, the students will be able to

- Differentiate Bulk, solution, Suspension and emulsion polymerization (L2)
- Describe fibers and elastomers (L2)
- Identify the thermosetting and thermo polymers (L3)
- Characterize the properties of polymers by IR, NMR, XRD etc.,

Unit – III : Natural Polymers & Modified cellulotics

Natural Polymers: Chemical & Physical structure, properties, source, important chemical modifications, applications of polymers such as cellulose, lignin, starch, rosin, shellac, latexes, vegetable oils and gums, proteins.

Modified cellulotics: Cellulose esters and ethers such as Ethyl cellulose, CMC, HPMC, cellulose acetals, Liquid crystalline polymers; specialty plastics- PES, PAES, PEEK, PEAK.

Learning Outcomes:

At the end of this unit, the students will be able to

- Describe the properties and applications of polymers (L2)
- Interpret the properties of cellulose, lignin, starch, rosin, latex etc., (L2)
- Discuss the special plastics of PES, PAES, PEEK etc., (L3)
- Explain modified cellulotics (L2)

Unit-IV: Hydrogels of Polymer networks and Drug delivery

Definitions of Hydrogel, polymer networks, Types of polymer networks, Methods involved in hydrogel preparation, Classification, Properties of hydrogels, **Applications** of hydrogels in drug delivery.

Introduction to drug systems including, drug development, regulation, absorption and disposition, routes of administration and dosage forms. Advanced drug delivery systems and controlled release.

Learning Outcomes:

At the end of this unit, the students will be able to

- Identify types of polymer networks (L3)
- Describe methods involve in hydrogel preparation (L2)
- Explain applications of hydrogels in drug delivery (L2)
- Demonstrate the advanced drug delivery systems and controlled release (L2)

Unit – V : Surface phenomena

Surface tension, adsorption on solids, electrical phenomena at interfaces including electrokinetics, micelles, reverse micelles, solubilization. Application of photoelectron spectroscopy, ESCA and Auger spectroscopy to the study of surfaces.

Learning Outcomes:

At the end of this unit, the students will be able to

- Demonstrate electrical phenomena at interfaces including electrokinetics, micelles, reverse micelles etc., (L2)
- Explain photoelectron spectroscopy (L2)
- Discuss ESCA and Auger spectroscopy to the study of surfaces (L3)
- Differentiate micelles and reverse micelles (L2)

Course Outcomes

At the end of the course, the student will be able to:

- Understand the state of art synthesis of Polymeric materials
- Understand the hydro gels preparation, properties and applications in drug delivery system.
- Characterize polymers materials using IR, NMR, XRD.
- Analyze surface phenomenon fo micelles and characterise using photoelectron spectroscopy, ESCA and Auger spectroscopy.

References :

1. A Text book of Polymer science, Billmayer
2. Organic polymer Chemistry, K.J.Saunders, Chapman and Hall
3. Advanced Organic Chemistry, B.Miller, Prentice Hall
4. Polymer Chemistry – G.S.Mishra
5. Polymer Chemistry – Gowarikar
6. Physical Chemistry –Galston
7. Drug Delivery- Ashim K. Misra

HUMANITIES ELECTIVE-I

(19A52602a) ENTREPRENEURSHIP & INCUBATION

COURSE OBJECTIVES :

The objective of this course is

- To make the student understand about Entrepreneurship
- To enable the student in knowing various sources of generating new ideas in setting up of New enterprise
- To facilitate the student in knowing various sources of finance in starting up of a business
- To impart knowledge about various government sources which provide financial assistance to entrepreneurs/ women entrepreneurs
- To encourage the student in creating and designing business plans

Syllabus

UNIT-I

Entrepreneurship - Concept, knowledge and skills requirement - Characteristics of successful entrepreneurs - Entrepreneurship process - Factors impacting emergence of entrepreneurship - Differences between Entrepreneur and Intrapreneur - Understanding individual entrepreneurial mindset and personality - Recent trends in Entrepreneurship.

Learning Outcomes:

At the end of the Unit, the learners will be able to

- Understand the concept of Entrepreneur and Entrepreneurship in India
- Know Entrepreneurship process and emergence of Entrepreneurship
- Analyze the differences between Entrepreneur and Intrapreneur
- Develop a creative mind set and personality
- Understand recent trends in Entrepreneurship across the globe

UNIT-II

Starting the New Venture - Generating business idea – Sources of new ideas & methods of generating ideas - Opportunity recognition - Feasibility study - Market feasibility, technical/operational feasibility - Financial feasibility - Drawing business plan - Preparing project report - Presenting business plan to investors.

Learning Outcomes:

At the end of the Unit, the learners will be able to

- Know the process of starting a new venture
- Analyze the sources of new methods in generating business idea
- Evaluate market feasibility, financial feasibility and technical feasibility
- Design and draw business plans in project preparation and prepare project reports

UNIT-III

Sources of finance - Various sources of Finance available - Long term sources - Short term sources - Institutional Finance – Commercial Banks, SFC's in India - NBFC's in India - their way of financing in India for small and medium business - Entrepreneurship development programs in India - The entrepreneurial journey- Institutions in aid of entrepreneurship development

Learning Outcomes:

At the end of the Unit, the learners will be able to

- Know the various sources of finance to start a new venture
- Contrast & compare between Long term & Short term finance sources
- Analyze the role of banks and other financial institutions in promoting entrepreneurship in India
- Evaluate the need and importance of MSMEs in the growth of country

UNIT-IV

Women Entrepreneurship - Entrepreneurship Development and Government - Role of Central Government and State Government in promoting women Entrepreneurship - Introduction to various incentives, subsidies and grants – Export- oriented Units - Fiscal and Tax concessions available - Women entrepreneurship - Role and importance - Growth of women entrepreneurship in India - Issues & Challenges - Entrepreneurial motivations.

Learning Outcomes:

At the end of the Unit, the learners will be able to

- Understand the role of government in promoting women entrepreneurship
- Know various incentives, subsidies and grants available to women entrepreneurs
- Analyze the role of export-oriented units
- Know about the tax concessions available for Women entrepreneurs
- Prepare to face the issues and challenges.

UNIT-V

Fundamentals of Business Incubation - Principles and good practices of business incubation- Process of business incubation and the business incubator and how they operate and influence the Type/benefits of incubators - Corporate/educational / institutional incubators - Broader business incubation environment - Pre-Incubation and Post - Incubation process - Idea lab, Business plan structure - Value proposition

Learning Outcomes:

At the end of the Unit, the learners will be able to:

- Understand the importance of business incubation
- Apply brilliant ideas in the process of business incubation
- Analyze the process of business incubation/incubators.
- Contrast & Compare between business incubation and business incubators.
- Design their own business incubation/incubators as viable-business unit.

Course Outcomes:

At the end of the course, students will be able to

- Understand the concept of Entrepreneurship and challenges in the world of competition.
- Apply the Knowledge in generating ideas for New Ventures.
- Analyze various sources of finance and subsidies to entrepreneur/women Entrepreneurs.
- Evaluate the role of central government and state government in promoting Entrepreneurship.
- Create and design business plan structure through incubations.

TEXT BOOKS

1. D F Kuratko and T V Rao, “Entrepreneurship” - A South-Asian Perspective – Cengage Learning, 2012. (For PPT, Case Solutions Faculty may visit : login.cengage.com)
- 2 . Nandan H, “ Fundamentals of Entrepreneurship”, PHI, 2013

REFERENCES

1. Vasant Desai, “Small Scale Industries and Entrepreneurship”, Himalaya Publishing 2012.
2. Rajeev Roy “Entrepreneurship”, 2nd Edition, Oxford, 2012.
3. B.Janakiramand M.Rizwanal “Entrepreneurship Development: Text & Cases”, Excel Books, 2011.
4. Stuart Read, Effectual “Entrepreneurship”, Routledge, 2013.

E-RESOURCES

1. Entrepreneurship-Through-the-Lens-of-enture Capital
2. <http://www.onlinevideolecture.com/?course=mba-programs&subject=entrepreneurship>
3. http://nptel.ac.in/courses/122106032/Pdf/7_4.pdf
4. <http://freevideolectures.com/Course/3514/Economics/-/Management/-/Entrepreneurhip/50>

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
B.Tech (ECE)– III-II
(19A52602b) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

L T P C
3 0 0 3

Course Objectives :

The objective of this course is

- To inculcate the basic knowledge of micro economics and financial accounting
- To make the students learn how demand is estimated for different products, input-output relationship for optimizing production and cost
- To know the various types of Market Structures & pricing methods and its strategies
- To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
- To provide fundamental skills on Accounting and to explain the process of preparing Financial statements

Syllabus

UNIT I -

INTRODUCTION TO MANAGERIAL ECONOMICS DEMAND

Managerial Economics – Definition – Nature & Scope - Contemporary importance of Managerial Economics - Demand Analysis - Concept of Demand - Demand Function - Law of Demand - Elasticity of Demand - Significance - Types of Elasticity - Measurement of Elasticity of Demand - Demand Forecasting - Factors governing Demand Forecasting - Methods of Demand Forecasting - Relationship of Managerial Economics with Financial Accounting and Management.

Learning Outcomes:

At the end of the Unit, the learners will be able to

- Know the nature and scope of Managerial Economics and its importance
- Understand the concept of demand and its determinants
- Analyze the Elasticity and degree of elasticity
- Evaluate Demand forecasting methods
- Design the process of demand estimation for different types of demand

UNIT -II

THEORY OF PRODUCTION AND COST ANALYSIS

Production Function – Least-cost combination - Short-run and Long-run Production Function - Isoquants and Isocosts, MRTS - Cobb-Douglas Production Function - Laws of Returns - Internal and External Economies of scale – **Cost & Break Even Analysis** - Cost concepts and

Cost behavior - Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems) - Managerial significance and limitations of Break-Even Analysis.

Learning Outcomes:

At the end of the Unit, the learners will be able to

- Know the production function, Input-Output relationship and different cost concepts
- Apply the least-cost combination of inputs
- Analyze the behavior of various cost concepts
- Evaluate BEA for real time business decisions
- Develop profit appropriation for different levels of business activity

UNIT –III

INTRODUCTION TO FORMS OF BUSINESS ORGANIZATIONS AND MARKETS

Market structures - Forms of Business Organizations - Sole Proprietorship - Partnership - Joint Stock Companies - Public Sector Enterprises-Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition – Monopoly - Monopolistic Competition – Oligopoly - Price-Output Determination - Pricing Methods and Strategies.

Learning Outcomes:

At the end of the Unit, the learners will be able to

- Know the structure of markets, features of different markets and forms of business organizations
- Apply the price output relationship in different markets
- Analyze the optimum output levels to maximize profit in different markets
- Evaluate price-output relationship to optimize cost, revenue and profit
- Interpret Pricing Methods and Strategies

UNIT -IV

CAPITAL AND CAPITAL BUDGETING Concept of Capital - Significance - Types of Capital - Components of Working Capital - Sources of Short-term and Long-term Capital - Estimating Working capital requirements – Cash Budget - **Capital Budgeting** – Features of Capital Budgeting Proposals – Methods and Evaluation of Capital Budgeting Projects – Pay Back Method – Accounting Rate of Return (ARR) – Net Present Value (NPV) – Internal Rate Return (IRR) Method (simple problems)

Learning Outcomes:

At the end of the Unit, the learners will be able to

- Know the concept of capital budgeting and its importance in business
- Contrast and compare different investment appraisal methods
- Analyze the process of selection of investment alternatives using different appraisal methods

- Evaluate methods of capital budgeting for investment decision making and for maximizing returns
- Design different investment appraisals and make wise investments

UNIT –V

INTRODUCTION TO FINANCIAL ACCOUNTING AND ANALYSIS

Accounting Concepts and Conventions - Introduction Double-Entry Book Keeping, Journal, Ledger, Trial Balance - Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). **Financial Analysis** - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.

Learning Outcomes:

At the end of the Unit, the learners will be able to

- Know the concept, convention and significance of accounting
- Apply the fundamental knowledge of accounting while posting the journal entries
- Analyze the process and preparation of final accounts and financial ratios
- Evaluate the financial performance of an enterprise by using financial statements

Data Books Required:

Present Value Factors table

Course Outcomes:

At the end of the course, students will be able to

- Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets
- Apply concepts of production, cost and revenues for effective business decisions
- Students can analyze how to invest their capital and maximize returns
- Evaluate the capital budgeting techniques
- Prepare the accounting statements and evaluate the financial performance of business entity.

TEXT BOOKS:

1. Varshney & Maheswari: “Managerial Economics”, Sultan Chand, 2013.
2. Aryasri: “Business Economics and Financial Analysis”, 4th edition, MGH, 2019

REFERENCES:

1. Ahuja Hl “Managerial economics” 3rd edition, Schand, ,2013
2. S.A. Siddiqui and A.S. Siddiqui: “Managerial Economics and Financial Analysis”, New Age International,. 2013.

3. Joseph G. Nellis and David Parker: “Principles of Business Economics”, 2nd edition, Pearson, New Delhi.
4. Domnick Salvatore: “Managerial Economics in a Global Economy”, Cengage, 2013.

(19A52602c) BUSINESS ETHICS AND CORPORATE GOVERNANCE

Course Objectives :

The objectives of this course are

- To make the student understand the principles of business ethics
- To enable them in knowing the ethics in management
- To facilitate the student role in corporate culture
- Impart knowledge about the fair trade practices
- Encourage the student in knowing them about the corporate governance

Syllabus

BUSINESS ETHICS AND CORPORATE GOVERNANCE

UNIT -I

Introduction – Meaning - Nature and Scope – Loyalty and Ethical Behaviour, Values across Cultures; Business Ethics – Ethical Practices in Management. Types of Ethics – Characteristics – Factors influencing , Business Ethics – Importance of Business Ethics - Arguments for and against business ethics Basics of business ethics Corporate Social Responsibility – Issues of Management – Crisis Management

Learning Outcomes:

After completion of this unit student will

- Understand the meaning of loyalty and ethical Behavior
- Explain various types of Ethics
- Know about the factors influencing business ethics
- Understand the corporate social responsibility of management

UNIT –II

ETHICS IN MANAGEMENT

Introduction – Ethics in HRM – Marketing Ethics – Ethical aspects of Financial Management- Technology Ethics and Professional ethics. The Ethical Value System – Universalism, Utilitarianism, Distributive Justice, Social Contracts, Individual Freedom of Choice, Professional Codes; Culture and Ethics – Ethical Values in different Cultures, Culture and Individual Ethics.

Learning Outcomes:

After completion of this unit student will

- Understand the meaning of Marketing Ethics
- Analyze Differentiate between Technical ethics and professional ethics
- Know about the ethical value system
- Understand the Code and culture

UNIT-III

ROLE OF CORPORATE CULTURE IN BUSINESS

Meaning – Functions – Impact of corporate culture – cross cultural issues in ethics, Emotional Honesty – Virtue of humility – Promote happiness – karma yoga – proactive – flexibility and purity of mind. The Ethical Value System – Universalism, Utilitarianism, Distributive Justice, Social Contracts, Individual Freedom of Choice, Professional Codes; Culture and Ethics – Ethical Values in different Cultures, Culture and Individual Ethics.

Learning Outcomes:

After completion of this unit student will

- Understand the corporate culture in business
- Analyze Ethical Value System Know about the ethical value system
- Know Universalism, Utilitarianism, Distributive Justice
- Differentiate Ethical Values in different Cultures

UNIT- IV

Law and Ethics – Relationship between Law and Ethics, Other Bodies in enforcing Ethical Business Behavior, Impact of Laws on Business Ethics; Social Responsibilities of Business – Environmental Protection, Fair Trade Practices, Fulfilling all National obligations under various Laws, Safeguarding Health and wellbeing of Customers.

Learning Outcomes:

After completion of this unit student will

- Understand Law and Ethics
- Analyze Social Responsibilities of Business
- Know Environmental Protection and Fair Trade Practices
- Implementing National Safeguarding Health and wellbeing of Customers

UNIT –V

CORPORATE GOVERNANCE

Meaning – scope - Issues, need, corporate governance code, transparency & disclosure, role of auditors, board of directors and shareholders; Global issues of governance, accounting and regulatory frame work, corporate scams, committees in India and abroad, corporate social responsibility composition of BODs - Cadbury Committee - various committees - reports on corporate governance - Benefits and Limitations

of Corporate Governance with living examples.

Learning Outcomes:

After completion of this unit student will

- Understand corporate governance code
- Analyze role of auditors, board of directors and shareholders
- Know accounting and regulatory frame work
- Implementing corporate social responsibility

Course Outcomes:

At the end of the course, students will be able to

- Understand business ethics and ethical practices in management.
- Understand the role of ethics in management
- Apply the knowledge in cross cultural ethics
- Analyze law and ethics
- Evaluate corporate governance

TEXT BOOKS:

1. Murthy CSV: “Business Ethics and Corporate Governance”, HPH
2. Bholananth Dutta, S.K. Podder – “Corporation Governance”, VBH.

REFERENCE BOOKS:

1. Dr. K. Nirmala, KarunakaraReaddy : “Business Ethics and Corporate Governance”, HPH
2. H.R.Machiraju: “Corporate Governance”
3. K. Venkataramana, “Corporate Governance”, SHBP.
4. N.M.Khandelwal : “Indian Ethos and Values for Managers”

(19A52602d) ENTERPRISE RESOURCE PLANNING

Course Objectives :

The objectives of this course are

- To provide a contemporary and forward-looking on the theory and practice of
- Enterprise Resource Planning
- To enable the students in knowing the Advantages of ERP
- To train the students to develop the basic understanding of how ERP enriches the
- Business organizations in achieving a multidimensional growth.
- Impart knowledge about the historical background of BPR
- To aim at preparing the students, technologically competitive and make them ready to self-upgrade with the higher technical skills.

Syllabus

UNIT-I

Introduction to ERP: Enterprise – An Overview Integrated Management Information, Business Modeling, Integrated Data Model Business Processing Reengineering(BPR), Data Warehousing, Data Mining, On-line Analytical Processing(OLAP), Supply Chain Management (SCM), Customer Relationship Management(CRM),

Learning Outcomes:

After completion of this unit student will

- Understand the concept of ERP
- Explain various Business modeling
- Know the contemporary technology like SCM, CRM
- Understand the OLAP

UNIT-II

Benefits of ERP: Reduction of Lead-Time, On-time Shipment, Reduction in Cycle Time, Improved Resource Utilization, Better Customer Satisfaction, Improved Supplier Performance, Increased Flexibility, Reduced Quality Costs, Improved Information Accuracy and Design-making Capability

Learning Outcomes:

After completion of this unit student will

- Understand the Advantages of ERP
- Explain the challenges associated with ERP System
- Analyze better customer satisfaction
- Differentiate Improved Information Accuracy and Design-making Capability

UNIT-III

ERP Implementation Lifecycle: Pre-evaluation Screening, Package Evaluation, Project Planning Phase, Gap Analysis, Reengineering, Configuration, Implementation Team Training, Testing, Going Live, End-user Training, Post-implementation (Maintenance mode)

Learning Outcomes:

After completion of this unit student will

- Understand the implementation of ERP life cycle
- Explain the challenges associated with implementing ERP system
- Analyze the need of re-engineering
- Know the recent trends in team training testing and go-live

UNIT-IV

BPR: Historical background: Nature, significance and rationale of business process reengineering (BPR), Fundamentals of BPR. Major issues in process redesign: Business vision and process objectives, Processes to be redesigned, Measuring existing processes,

Learning Outcomes:

After completion of this unit student will

- Understand the business process reengineering
- Explain the challenges associated with BPR
- Analyze the need of process redesign
- Differentiate between process to be redesign and measuring existing process

UNIT-V

IT in ERP: Role of information technology (IT) and identifying IT levers. Designing and building a prototype of the new process: BPR phases, Relationship between BPR phases. MIS - Management Information System, DSS - Decision Support System, EIS - Executive Information System.

Learning Outcomes:

After completion of this unit student will

- Understand the role of IT
- Explain the challenges in Designing and building a prototype of the new process
- Analyze the need of MIS

- Differentiate between DSS and EIS

Course outcomes:

At the end of the course, students will be able to

- Understand the basic use of ERP Package and its role in integrating business functions.
- Explain the challenges of ERP system in the organization
- Apply the knowledge in implementing ERP system for business
- Evaluate the role of IT in taking decisions with MIS
- Create reengineered business processes with process redesign

TEXT BOOKS:

1. Pankaj Sharma. "Enterprise Resource Planning". Aph Publishing Corporation, New Delhi, 2004.
2. Alexis Leon, "Enterprise Resource Planning", IV Edition, Mc.Graw Hill, 2019

REFERENCE BOOKS:

1. Marianne Bradford "Modern ERP", 3rd edition.
2. "ERP making it happen Thomas f. Wallace and Michael
3. Directing the ERP Implementation Michael w pelphrey

(19A52602e) SUPPLY CHAIN MANAGEMENT

Course Objectives :

The objectives of this course are

- To provide Knowledge on logistics and supply chain management
- To enable them in designing the distribution network
- To train the students in knowing the supply chain Analysis
- Impart knowledge on Dimensions of logistic
- To know the recent trends in supply chain management

Syllabus

UNIT-1

Introduction to Supply Chain Management

Supply chain - objectives - importance - decision phases - process view -competitive and supply chain strategies - achieving strategic fit – supply chain drivers - obstacles – framework - facilities -inventory-transportation-information-sourcing-pricing.

Learning Outcomes:-

After completion of this unit student will

- Understand the meaning and objectives of supply chain management
- Explain supply chain drivers
- Know the steps involved in SCM frame work
- Understand transportation information and pricing

UNIT-2

Designing the distribution network

Role of distribution - factors influencing distribution - design options - e-business and its impact – distribution networks in practice –network design in the supply chain - role of network -factors affecting the network design decisions modeling for supply chain. Role of transportation - modes and their performance – transportation infrastructure and policies - design options and their trade-offs tailored transportation.

Learning Outcomes:-

After completion of this unit student will

- Understand the different distribution network

- Explain the factors influencing network design in the supply chain
- Know the Role of transportation
- Analyze design options and their trade-offs

UNIT-3

Supply Chain Analysis.

Sourcing - In-house or Outsource - 3rd and 4th PLs - supplier scoring and assessment, selection - design collaboration - Procurement process - Sourcing planning and analysis. Pricing and revenue management for multiple customers, perishable products, seasonal demand, bulk and spot contracts.

Learning Outcomes:-

After completion of this unit student will

- Understand the concept of supply chain Analysis
- Explain design collaboration
- Know procurement process -sourcing planning and analysis
- Understand seasonal demand, bulk and spot contracts

UNIT-4

Dimensions of Logistics

A macro and micro dimension - logistics interfaces with other areas - approach to analyzing logistics systems - logistics and systems analysis - techniques of logistics system analysis - factors affecting the cost and importance of logistics. Demand Management and Customer Service Outbound to customer logistics systems - Demand Management –Traditional Forecasting - CPFRP - customer service - expected cost of stock outs - channels of distribution.

Learning Outcomes:-

After completion of this unit student will

- Understand dimensions of logistics
- Explain logistics interfaces with other areas
- Know techniques of logistics system analysis
- Understand Demand Management

UNIT-5

Recent Trends in Supply Chain Management-Introduction, New Developments in Supply Chain Management, Outsourcing Supply Chain Operations, Co-Maker ship, The Role of E-Commerce in Supply Chain Management, Green Supply Chain Management, Distribution Resource Planning, World Class Supply Chain Management

Learning Outcomes:-

After completion of this unit student will

- Understand the recent trend in supply chain management
- Explain The Role of E-Commerce in Supply Management
- Know Green Supply Chain Management
- Understand Distribution Resource Planning

Course Outcomes:

At the end of the course, students will be able to

- Understand the strategic role of logistic and supply chain management in the cost reduction and offering best service to the customer
- Understand Advantages of SCM in business
- Apply the knowledge of supply chain Analysis
- Analyze reengineered business processes for successful SCM implementation
- Evaluate Recent trend in supply chain management

TEXT BOOKS:

1. Sunil Chopra and Peter Meindl, Supply Chain Management – “Strategy, Planning and Operation”, 3rd Edition, Pearson/PHI, 2007.
2. Supply Chain Management by Janat Shah Pearson Publication 2008.

REFERENCE BOOKS:

1. A Logistic approach to Supply Chain Management – Coyle, Bardi, Longley, Cengage Learning, 1/e
2. Donald J Bowersox, Dand J Closs, M Bixby Coluper, “Supply Chain Logistics Management”, 2nd edition, TMH, 2008.
3. Wisner, Keong Leong and Keah-Choon Tan, “Principles of Supply Chain Management A Balanced Approach”, Cengage Learning, 1/e
4. David Simchi-Levi et al, “Designing and Managing the Supply Chain” – Concepts

Course Objectives:

- Students can learn the basics of using DSP chips to perform real-time digital signal processing.
- Ability to apply knowledge of mathematics, science and engineering: Construction of tools for visualizing the basic concepts of discrete signal representation such as Fourier transforms, discrete time representations.
- Students will learn numerous programming tools for design and implementations of filtering algorithms.
- Understand the concept of Multi-rate signal processing and sample rate conversion.
- Develop and Implement DSP algorithms in software using CCS with DSP floating point Processor.

Conduct any eight experiments from part-A and any four experiments from part-B

List of Experiments:

PART-A

The following experiments shall be conducted using MATLAB / Lab View / C Programming/ Equivalent software.

1. Generation of sinusoidal waveform / signal based on recursive difference equations.
2. Find DFT / IDFT of given discrete time signal.
3. Find frequency response of a system given in transfer function/ differential equation form.
4. Implementation of FFT of given Sequence.
5. Design and implementation of IIR filter using bilinear transformation and impulse invariant method.
6. Design and implementation of IIR Butterworth (LP/HP) filter.
7. Design and implementation of IIR Chebyshev (LP/HP) filter.
8. Design and implementation of FIR with low pass filter using any three windowing techniques. Plot its magnitude and phase responses.
9. Design and implementation of FIR filter with high pass filter using any three windowing techniques. Plot its magnitude and phase responses.
10. Design and implementation of FIR filter with band pass / band stop filter using any three windowing techniques. Plot its magnitude and phase responses.

PART-B

The following experiments shall be conducted using (TI / Analog Devices / Motorola / Equivalent DSP processors).

11. Study the architecture of DSP chips – TMS 320C 5X/6X Instructions.
12. Find DFT / IDFT of given discrete time signal.
13. Implementation of FFT of given Sequence.
14. Design and implementation of IIR Butterworth / Chebyshev (LP/HP) filter.
15. Design and implementation of FIR with low pass / high pass filter using any three windowing techniques. Plot its magnitude and phase responses.

Course Outcomes

- Ability to design-test, to verify, to evaluate, and to benchmark a real-time DSP system.
- Ability to calculate discrete time domain and frequency domain of signals using discrete Fourier series and Fourier transform.
- Ability to design, using MATLAB-based filter design techniques, FIR and IIR digital filters and Determine the frequency response of filters.
- Implementation of basic signal processing algorithms such as convolution, difference equation implementation and application of them in the construction of FIR and IIR filters.
- Design DSP based real time processing systems to meet desired needs of the society.

Course Objectives:

- Write ALP for arithmetic and logical operations in 8086
- Familiarize with MASM, Embedded C & Code composer studio
- Write and execute programs in 8086, 8051 and ARM Cortex M0

Conduct all the experiments:

List of Experiments:

Intel 8086 (16 bit Micro Processor)

1. Perform simple arithmetic operations using different addressing modes.
2. Sort an array of binary numbers.
3. Code Conversion (Eg. ASCII to Packed BCD form).
4. Addition of an array of BCD numbers stored in packed form.
5. Multiplying two 3x3 matrices and print on DOS
6. Identification & displaying the activated key using DOS & BIOS function calls.

Intel 8051 (8 bit Microcontroller)

1. Detection of key closure (connected to a port line) by polling technique.
2. Delay generation using i) Nested loop & ii) Timers.
3. Counting of external event occurrence through port line

ARM Cortex M0 – NXP LPC Xpress/1115

1. Introduction to the Keil MDK-ARM tool, C and Assembly coding - Processing text in assembly language
2. Configure GPIO for Digital input and output
3. Study of mixed assembly and C programming – Calling a C function from assembly and Calling an assembly function from C

Course Outcomes:

- Execution of different programs for 8086, 8051 in Assembly Level Language using MASM Assembler
- Design and implement some specific real time applications.

(19A99501) MANDATORY COURSE: CONSTITUTION OF INDIA

COURSE OBJECTIVES :The objective of this course is

- To Enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and Election Commission of India.
- To understand the central-state relation in financial and administrative control

Syllabus

UNIT-I

Introduction to Indian Constitution – Constitution -Meaning of the term - Indian Constitution- Sources and constitutional history - Features– Citizenship – Preamble - Fundamental Rights and Duties - Directive Principles of State Policy.

Learning Outcomes:-

After completion of this unit student will

- Understand the concept of Indian constitution
- Apply the knowledge on directive principle of state policy
- Analyze the History and features of Indian constitution
- Learn about Preamble, Fundamental Rights and Duties

UNIT-II

Union Government and its Administration Structure of the Indian Union - Federalism - Centre-State relationship – President's Role, power and position - PM and Council of ministers - Cabinet and Central Secretariat –Lok Sabha - Rajya Sabha - The Supreme Court and High Court - Powers and Functions

Learning Outcomes:-

After completion of this unit student will

- Understand the structure of Indian government
- Differentiate between the state and central government

- Explain the role of President and Prime Minister
- Know the Structure of supreme court and High court

UNIT-III

State Government and its Administration - Governor - Role and Position -CM and Council of ministers - State Secretariat-Organization Structure and Functions

Learning Outcomes:-

After completion of this unit student will

- Understand the structure of state government
- Analyze the role of Governor and Chief Minister
- Explain the role of State Secretariat
- Differentiate between structure and functions of state secretariat

UNIT-IV

Local Administration - District's Administration Head - Role and Importance - Municipalities - Mayor and role of Elected Representatives -CEO of Municipal Corporation Pachayati Raj - Functions- PRI -Zilla Parishath - Elected officials and their roles - CEO,Zilla Parishath - Block level Organizational Hierarchy - (Different departments) - Village level - Role of Elected and Appointed officials - Importance of grass root democracy

Learning Outcomes:-

After completion of this unit student will

- Understand the local Administration
- Compare and contrast district administration's role and importance
- Analyze the role of Mayor and elected representatives of Municipalities
- Learn about the role of Zilla Parishath block level organization

UNIT-V

Election Commission - Election Commission- Role of Chief Election Commissioner and Election Commissionerate - State Election Commission -Functions of Commissions for the welfare of SC/ST/OBC and Women

Learning Outcomes:-

After completion of this unit student will

- Know the role of Election Commission
- Contrast and compare the role of Chief Election commissioner and Commissionerate
- Analyze the role of state election commission
- Evaluate various commissions viz SC/ST/OBC and women

Course Outcomes:

At the end of the course, students will be able to

- Understand historical background of the constitution making and its importance for building a democratic India.
- Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
- Understand the value of the fundamental rights and duties for becoming good citizen of India.
- Analyze the decentralization of power between central, state and local self-government
- Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

TEXT BOOKS

1. Durga Das Basu, “Introduction to the Constitution of India”, Prentice – Hall of India Pvt. Ltd.. New Delhi
2. Subash Kashyap, “Indian Constitution”, National Book Trust

REFERENCES:

1. J.A. Siwach, “Dynamics of Indian Government & Politics”.
2. H.M.Sreevai, “Constitutional Law of India”, 4th edition in 3 volumes (Universal Law Publication)
3. J.C. Johari, “Indian Government and Politics”, Hans India
4. M.V. Pylee, “Indian Constitution”, Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi

E-RESOURCES:

- 1.nptel.ac.in/courses/109104074/8
- 2.nptel.ac.in/courses/109104045/
- 3.nptel.ac.in/courses/101104065/
- 4.www.hss.iitb.ac.in/en/lecture-details
- 5.www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

Course Objectives:

- To understand the wave propagation in waveguides, principle of operation of optical sources, detectors, microwave active and passive devices.
- To apply the boundary conditions of the waveguides to solve for field expressions in waveguides.
- To derive the field expressions for different modes of the waveguides, and Scattering matrix for passive microwave devices.
- To differentiate Linear beam tubes and crossed field tubes in terms of operation and performance.
- To remember various types of fibers, modes, configurations and signal degradations.
- To analyze signal degradation in optical fibers and compare the performance of various optical sources and detectors.

UNIT I:

Waveguides (Microwave Transmission lines): Introduction, Rectangular waveguides, Field expressions for TE and TM modes, Wave propagation in the guide, Phase and group velocities, Power transmission and attenuation, Waveguide current and mode excitation, Circular waveguide – TE and TM modes, Wave propagation, waveguide resonators – problem solving.

Learning Outcomes:

After completing this Unit, students will be able to

- Know the importance of waveguides (L1)
- Derive field expressions for different modes of propagation in the waveguides(L3).
- Understand the concept of wave propagation in the guides (L1)
- Problem solving to find the parameters like cutoff frequency, phase and group velocities etc. in waveguides (L2)

UNIT II:

Passive Microwave Devices: Introduction to scattering parameters and their properties, Terminations, Variable short circuit, Attenuators, Phase shifters, Hybrid Tees (H-plane, E-plane, Magic Tees), Hybrid ring, Directional Couplers – Bethe hole and Two hole Couplers, Microwave propagation in Ferrites, Microwave devices employing Faraday rotation – Isolator, Circulator, Deriving Scattering matrix for Microwave passive devices.

Learning Outcomes:

After completing this Unit, students will be able to

- Understand principle of operation of all passive microwave devices (L1)
- Know the importance of Scattering parameters and their properties (L1)
- Derive the Scattering matrix for the microwave devices (L3)
- Apply the Scattering matrix to understand the working of passive devices and solve problems (L2)

UNIT III:

Microwave Amplifiers and Oscillators:

Microwave Tubes: (i) Linear Beam Tubes – Two cavity Klystron amplifier -velocity modulation, bunching process, output power, Reflex Klystron oscillator, power output and efficiency, Travelling Wave Tube (TWT) – Bunching process and amplification process (Qualitative treatment only).

(ii) Crossed Field Tubes – Magnetron oscillator, pi-mode operation, power output and efficiency, Hartree Condition, Mode jumping in Magnetron, Principle of operation of Cross Field Amplifier (CFA).

Microwave Semiconductor Devices: Gunn Oscillator – Principle of operation, Characteristics, Two valley model, IMPATT, TRAPATT diodes, Parametric Amplifier.

Learning Outcomes:

After completing this Unit, students will be able to

- Understand principle of operation of Microwave Tubes and semiconductor devices (L1)
- Derive the expressions power output and efficiency of all microwave devices (L3)
- Differentiate Linear beam tubes and crossed field tubes in terms of operation and performance (L5)

UNIT IV:**Optical Communications:**

Overview of Optical Fiber Communications, optical fibers – Structures, Optical fiber modes and configurations, Signal degradation in optical fibers – Signal attenuation, absorption, scattering losses, Bending Losses, Core and Cladding losses, Signal distortion in optical waveguides, Information capacity determination, Group delay, waveguide dispersion, Inter modal dispersion.

Learning Outcomes:

After completing this Unit, students will be able to

- Remember the optical fiber types, modes, configurations, and signal degradation types (L1)
- Analyze the signal degradation in optical fibers (L4)

UNITV:

Optical Sources and Detectors: Introduction, LEDs – structure – Light source, Quantum efficiency, Modulation of an LED, LASER diodes, Source to Fiber power launching, LASER diode to fiber coupling, LED coupling to single mode fibers, Fiber, Splicing, Optical Fiber connectors, Photo diodes – Principle of Photo diodes, Avalanche Photodiodes, Photo detector noise, detector response time, Comparison of Photo diodes.

Learning Outcomes:

After completing this Unit, students will be able to

- Understand the working principle of optical sources, detectors and power coupling (L2)
- Compare the performance of various optical source and detectors (L4)

Course Outcomes:

- Understand the wave propagation in waveguides, principle of operation of optical sources, detectors, microwave active and passive devices. Also remember various types of fibers, modes, configurations and signal degradations
- Apply the boundary conditions of the waveguides to solve for field expressions in waveguides.
- Derive the field expressions for different modes of the waveguides, and Scattering matrix for passive microwave devices. Analyze signal degradation in optical fibers and compare the performance of various optical sources and detectors
- Differentiate Linear beam tubes and crossed field tubes in terms of operation and performance.

TEXT BOOKS:

1. Matthew N. O. Sadiku, “Elements of Electromagnetics”, Oxford Publications, Third Edition, 2003. (For Unit 1)
2. R. E. Collin, “Foundations for Microwave Engineering”, Wiley Student Edition, Second Edition, 2009. (For Units 2, and 3)
3. Samuel Y. Liao, “Microwave Devices and Circuits”, PHI publications, Third Edition, 1997. (For Units 2, and 3)
4. Gerd Keiser, “Optical Fiber Communications”, McGraw Hill, Third Edition, 2000. (For Units 4, and 5)

REFERENCES:

1. Om. P. Gandhi, "Microwave: Engineering and Applications", Kai Fa Book Company, 1981.
2. Reich H. J., et al, "Microwave Principles", MIT Press, 1972.
3. F E Terman, "Electronic and Radio Engineering", McGraw Hill, 4th Edition, 1984.

(19A04702T) VLSI DESIGN

Course Objectives:

- To identify the design for testability methods for combinational & sequential CMOS Circuits.
- To understanding of CMOS fabrication flow, technology scaling, sheet resistance, square capacitance and propagation delays in CMOS circuits.
- To apply the design Rules and draw layout of a given logic circuit and basic circuit concepts to MOS circuits.
- To analyze the behaviour of amplifier circuits with various loads. Analyze the behaviour of static and dynamic logic circuits. Analyze the various test generation methods for static and dynamic CMOS circuits.
- To Design MOSFET based logic circuit, Amplifier circuits using MOS transistors and MOSFET based logic circuits using various logic styles like static and dynamic CMOS.

UNIT-I:

Introduction and Basic Electrical Properties of MOS Circuits: VLSI Design Flow, Introduction to IC technology, Fabrication process: nMOS, pMOS and CMOS. I_{ds} versus V_{ds} Relationships, Aspects of MOS transistor Threshold Voltage, MOS transistor Trans, Output Conductance and Figure of Merit. nMOS Inverter, Pull-up to Pull-down Ratio for nMOS inverter driven by another nMOS inverter, and through one or more pass transistors. Alternative forms of pull-up, The CMOS Inverter, Latch-up in CMOS circuits, Bi-CMOS Inverter, Comparison between CMOS and BiCMOS technology. MOS Layers, Stick Diagrams, Design Rules and Layout, Layout Diagrams for MOS circuits

Learning Outcomes:

After completing this Unit, students will be able to

- Understand CMOS fabrication flow and technology scaling (L1).
- Apply the design Rules and draw layout of a given logic circuit (L2).
- Design MOSFET based logic circuits (L4).

UNIT-II:

Basic Circuit Concepts: Sheet Resistance, Sheet Resistance concept applied to MOS transistors and Inverters, Area Capacitance of Layers, Standard unit of capacitance, Some area Capacitance Calculations, The Delay Unit, Inverter Delays, Driving large capacitive loads, Propagation Delays, Wiring Capacitances, Choice of layers.

Scaling of MOS Circuits: Scaling models and scaling factors, Scaling factors for device parameters, Limitations of scaling, Limits due to sub threshold currents, Limits on logic levels and supply voltage due to noise and current density. Switch logic, Gate logic.

Learning Outcomes:

After completing this Unit, students will be able to

- Apply basic circuit concepts to MOS circuits (L2).
- Estimate the sheet resistance, square capacitance and propagation delays in CMOS circuits (L3)

UNIT-III:

Basic building blocks of Analog IC design

Regions of operation of MOSFET, Modelling of transistor, body bias effect, biasing styles, single stage amplifier with resistive load, single stage amplifier with diode connected load, Common Source amplifier, Common Drain amplifier, Common Gate amplifier, current sources and sinks.

Learning Outcomes:

After completing this Unit, students will be able to

- Analyze the behavior of amplifier circuits with various loads (L3).
- Design amplifier circuits using MOS transistors (L4).

UNIT-IV:

CMOS Combinational and sequential logic circuit design

Static CMOS Design: Complementary CMOS, Ratioed Logic, Pass-Transistor Logic, **Dynamic CMOS Design:** Dynamic Logic-Basic Principles, Speed and Power Dissipation of Dynamic Logic, Issues in Dynamic Design, Cascading Dynamic Gates, Choosing a Logic Style, Gate Design in the Ultra Deep-Submicron Era, Latch Versus Register, Latch based design, timing decimation, positive feedback, instability, Metastability, multiplexer based latches, Master-Slave Based Edge Triggered Register, clock to q delay, setup time, hold time, reduced clock load master slave registers, Clocked CMOS register. Cross coupled NAND and NOR, SR Master Slave register, Storage mechanism, pipelining

Learning Outcomes:

After completing this Unit, students will be able to

- Analyze the behaviour of static and dynamic logic circuits (L3).
- Design MOSFET based logic circuits using various logic styles like static and dynamic CMOS (L4)

UNIT-V:

CAD Tools for Design and Simulation, Aspects of Design Tools, Test and Testability-System Partitioning, Layout and Testability, Reset/Initialization, Design for Testability, Testing Combinational Logic, Testing Sequential Logic, Practical Design for Test (OFT) Guidelines, Scan Design Techniques, Built-In-Self-Test (BIST), Future Trends.

Learning Outcomes:

After completing this Unit, students will be able to

- Identify the design for testability methods for combinational & sequential CMOS circuits (L1).
- Analyze the various test generation methods for static and dynamic CMOS circuits (L3).

Course Outcomes:

- Identify the design for testability methods for combinational & sequential CMOS circuits. Understand CMOS fabrication flow, technology scaling, sheet resistance, square capacitance and propagation delays in CMOS circuits.
- Apply the design Rules and draw layout of a given logic circuit and basic circuit concepts to MOS circuits.
- Analyze the behavior of amplifier circuits with various loads, static and dynamic logic circuits, various test generation methods for static and dynamic CMOS circuits.
- Design MOSFET based logic circuit, Amplifier circuits using MOS transistors and MOSFET based logic circuits using various logic styles like static and dynamic CMOS

TEXT BOOKS:

1. Kamran Eshraghian, “Essentials of VLSI Circuits and Systems”, Douglas and A. Pucknell and Sholeh Eshraghian, Prentice-Hall of India Private Limited, 2005 Edition.
2. Behzad Razavi, “Design of Analog CMOS Integrated Circuits”, McGraw Hill, 2003
3. Jan M. Rabaey, “Digital Integrated Circuits”, AnanthaChandrakasan and Borivoje Nikolic, Prentice-Hall of India Pvt.Ltd, 2nd edition, 2009.

REFERENCES:

1. John P. Uyemura, “Introduction to VLSI Circuits and Systems”, John Wiley & Sons, reprint 2009.

(19A04703a) SATELLITE COMMUNICATIONS
(Professional Elective III)

Course Objectives:

- To understand the basic concepts of satellite communications, orbital mechanics and launchers, various subsystems of a satellite and earth station, multiple access techniques, low earth orbit and geo-stationary satellite systems.
- To apply frequency allocation standards, reliability techniques, multiple access techniques power test methods to satellite systems.
- To analyze satellite navigation and global positioning system.
- To design Uplink and Downlink of a satellite.

UNIT- I

Introduction: Origin of Satellite Communications, Historical Back-ground, Basic Concepts of Satellite Communications, Frequency Allocations for Satellite Services, Applications, Future Trends of Satellite Communications.

Orbital Mechanics and Launchers: Orbital Mechanics, Look Angle determination, Orbital Perturbations, Orbit determination, Launches and Launch vehicles, Orbital Effects in Communication Systems Performance.

Learning Outcomes:

After completing this Unit, students will be able to

- Understand the basic concepts of satellite communications, orbital mechanics and launchers (L1).
- Excel in basic knowledge of orbital mechanics and launches for the satellite communication (L1).
- Apply the standards pertaining to frequency allocation for satellites (L2).

UNIT- II

Satellite Subsystems: Altitude and Orbit Control System, Telemetry, Tracking, Command and Monitoring, Power Systems, Communication Subsystems, Satellite Antennas, Equipment Reliability and Space Qualification.

Learning Outcomes:

After completing this Unit, students will be able to

- Understand various subsystems of a satellite (L1).
- Describe the electronic hardware systems associated with the satellite subsystem and earth station (L1)

- Apply reliability techniques to check the reliability for space qualification of equipment (L2).

UNIT- III

Satellite Link Design: Basic Transmission Theory, System Noise Temperature and G/T Ratio, Design of Down Links, Up Link Design, Design of Satellite Links for Specified C/N, System Design Examples.

Multiple Access: Frequency Division Multiple Access (FDMA), Intermodulation, Calculation of C/N, Time Division Multiple Access (TDMA), Frame Structure, Examples, Satellite Switched TDMA Onboard Processing, DAMA, Code Division Multiple Access (CDMA), Spread Spectrum Transmission and Reception.

Learning Outcomes:

After completing this Unit, students will be able to

- Understand various multiple access techniques (L1)
- Apply various multiple access techniques for satellite communications (L2)
- Apply frequency allocation standards, reliability techniques, multiple access techniques(L2)
- Analyze link budget of satellite signal for proper communication(L3)
- Design Uplink and Downlink of a satellite (L4)

UNIT- IV

Earth Station Technology: Introduction, Transmitters, Receivers, Antennas, Tracking Systems, Terrestrial Interface, Primary Power Test Methods.

Learning Outcomes:

After completing this Unit, students will be able to

- Understand various subsystems of an earth station (L1).
- Apply power test methods to earth stations (L2).
- Choosing different kinds of transmitter and receiver antennas to provide Uplink and Down Link Frequency(L5)

UNIT- V

Low Earth Orbit and Geo-Stationary Satellite Systems: Orbit Considerations, Coverage and Frequency Consideration, Delay & Throughput Considerations, System Considerations, Operational NGSO Constellation Designs.

Satellite Navigation & Global Positioning System: Radio and Satellite Navigation, GPS Position Location Principles, GPS Receivers and Codes, Satellite Signal Acquisition, GPS

Navigation Message, GPS Signal Levels, GPS Receiver Operation, GPS C/A Code Accuracy, Differential GPS.

Learning Outcomes:

After completing this Unit, students will be able to

- Understand the concepts of low earth orbit and geo-stationary satellite systems (L1).
- Demonstrate the impacts of GPS, Navigation, NGSO constellation design for tracking and launching (L3).
- Analyze satellite navigation and global positioning system (L3).

Course Outcomes

- Understand the basic concepts of satellite communications, orbital mechanics and launchers, various subsystems of a satellite and earth station, multiple access techniques
- low earth orbit and geo-stationary satellite systems
- Apply frequency allocation standards, reliability techniques, multiple access techniques power test methods to satellite systems
 - Analyze satellite navigation and global positioning system
 - Design Uplink and Downlink of a satellite
 - Choosing different kinds of transmitter and receiver antennas to provide Uplink and Down Link Frequency.

Text Books:

1. Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, “Satellite Communications”, Wiley Publications, 2nd Edition, 2003.
2. Wilbur L. Pritchard, Robert A Nelson and Henri G. Snyderhoud, “Satellite Communications Engineering” , 2nd Edition, Pearson Publications, 2003.

References:

1. M. Richharia, “Satellite Communications: Design Principles” –BS Publications, 2nd Edition, 2003.
2. D.C Agarwal, “Satellite Communication”, Khanna Publications, 5th Ed.
3. K.N. Raja Rao, “Fundamentals of Satellite Communications”, PHI, 2004
4. Dennis Roddy, “Satellite Communications”, McGraw Hill, 4th Edition, 2009.

(19A04703b) DIGITAL TV ENGINEERING
(Professional Elective III)

Course Objectives:

- To understand standards, principles of transmitters, radio-frequency systems, antennas and antenna patterns, process of radio-wave propagation and measurement techniques for digital T V transmission.
- To apply channel coding and modulation techniques, fundamentals of transmission lines, principles of antennas and radio-wave propagation to digital T V transmission.
- To analyse noise and interference effects on signals, power combiners, transmission line parameters, antenna parameters, and perturbations signals undergo in radio-wave propagation in digital T V transmission.

UNIT-I:

Digital Television Transmission Standards: ATSC terrestrial transmission standard, vestigial sideband modulation, DVB-T transmission standard, ISDB-T transmission standard, channel allocations, antenna height and power, MPEG-2.

Performance Objectives for Digital Television: System noise, external noise sources, transmission errors, error vector magnitude, eye pattern, interference, cochannel interference, adjacent channel interference, analog to digital TV, transmitter requirements.

Learning Outcomes:

After completing this Unit, students will be able to

- Understanding various digital T V standards followed world-wide (L2).
- Analysing noise and interference effects on T V signals (L4).

UNIT-II:

Channel Coding and Modulation for Digital Television: Data synchronization, randomization/scrambling, forward error correction, interleaving, inner code, frame sync insertion, quadrature modulation, 8 VSB, bandwidth, error rate, COFDM, flexibility, bandwidth.

Transmitters for Digital Television: Precorrection and equalization, up conversion, precise frequency control, RF amplifiers, solid-state transmitters, RF amplifier modules, power supplies, power combiners, Wilkinson combiner, ring combiner, Starpoint combiner, cooling, automatic gain or level control, ac distribution, transmitter control, tube transmitters, tube or solid-state transmitters, performance quality, retrofit of analog transmitters for DTV.

Learning Outcomes:

After completing this Unit, students will be able to

- Understanding the principles of digital T V transmitters (L2).
- Applying channel coding and modulation techniques to digital T V transmission (L3).
- Analysing various types of power combiners (L4).

UNIT-III:

Radio-Frequency Systems for Digital Television: Constant-impedance filter, output filters, elliptic function filters, cavities, channel combiners.

Transmission Line for Digital Television: Fundamental parameters, efficiency, effect of VSWR, system AERP, rigid coaxial transmission lines, dissipation, attenuation, and power handling, higher-order modes, peak power rating, frequency response, standard lengths, corrugated coaxial cables, wind load, waveguide, bandwidth, waveguide attenuation, power rating, frequency response, size trade-offs, waveguide or coax pressurization.

Learning Outcomes:

After completing this Unit, students will be able to

- Understanding various types of radio-frequency systems for digital T V transmission (L2).
- Applying fundamentals of transmission lines for digital T V transmission (L3).
- Analysing transmission line parameters for digital T V transmission (L4).

UNIT-IV:

Transmitting Antennas for Digital Television: Antenna patterns, elevation pattern, mechanical stability, null fill, azimuth pattern, slotted cylinder antennas, gain and directivity, power handling, antenna impedance, bandwidth and frequency response, multiple-channel operation, types of digital television broadcast antennas, antenna mounting.

Learning Outcomes:

After completing this Unit, students will be able to

- Understanding various types of antennas and patterns (L2).
- Applying principles of antennas for digital T V transmission (L3).
- Analysing antenna parameters for digital T V transmission (L4).

UNIT-V:

Radio-Wave Propagation: Free-space propagation, distance to the radio horizon, refraction, multipath, ground reflections, surface roughness, effect of earth's curvature, Fresnel zones, linear distortions, diffraction, fading, desired signal, field tests, Charlotte, North Carolina,

Chicago, Illinois, Raleigh, North Carolina.

Test and Measurement for Digital Television: Power measurements, average power measurement, calorimetry, power meters, peak power measurement, measurement uncertainty, testing digital television transmitters.

Learning Outcomes:

After completing this Unit, students will be able to

- Understanding the process of radio-wave propagation and measurement techniques as applied to digital T V systems (L2).
- Applying the principles of radio-wave propagation for digital T V transmission (L3).
- Analyzing perturbations signals undergo in radio-wave propagation (L4).

Course Outcomes:

- Understanding standards, principles of transmitters, radio-frequency systems, antennas and antenna patterns, process of radio-wave propagation and measurement techniques for digital T V transmission (L2).
- Applying channel coding and modulation techniques, fundamentals of transmission lines, principles of antennas and radio-wave propagation to digital T V transmission (L3).
- Analysing noise and interference effects on signals, power combiners, transmission line parameters, antenna parameters, and perturbations signals undergo in radio-wave propagation in digital T V transmission (L4).

Text Book:

1. Gerald W. Collins, "Fundamentals of Digital Television Transmission", John Wiley, 2001.

Reference Book:

1. R. R. Gulati, "Modern Television Practice, Principles, Technology and servicing", 2nd edition, New Age International Publishers, 2001.

(19A04703c) EMBEDDED SYSTEMS
(Professional Elective III)

Course Objectives:

- To introduce major components of an embedded system
- To expose role of firmware, operating systems in correlation with hardware systems.
- To explain interfacing of various communication and I/O devices to an embedded system
- To demonstrate implementation of embedded systems for different applications

UNIT –I

Introduction to Embedded Systems: Definition of embedded system, embedded systems vs general computing systems, history of embedded systems, classification of embedded systems, major application areas of embedded systems, purpose of embedded systems, Processor and OS trends in embedded system.

Embedded hardware units and devices in a system, embedded software in a system and an overview of programming languages, skills required for an embedded system designer, examples of the embedded systems.

Learning Outcomes:

After completing this Unit, students will be able to

- Differentiate embedded system and general computing system (L2)
- Classify embedded systems based on performance, complexity and era in which they are evolved (L4)
- Discuss basic hardware and software units used in embedded systems (L3)

UNIT –II

Core of the embedded system, memory, sensors and actuators, communication interface, embedded firmware, other system components, Characteristics of an embedded system, Quality attributes of embedded systems.

Learning Outcomes:

After completing this Unit, students will be able to

- Summarize different factors to be considered in the selection of memory for an embedded system (L2)
- Describe role of sensors, actuators and their interfacing with I/O subsystems(L2)
- Explain role of embedded firmware in embedded system (L2)
- Understand characteristics describing an embedded system (L2)

- Discuss important quality attributes of the embedded system for online and offline modes (L5)

UNIT- III

I/O, Communication devices and Interrupt Service Mechanism: I/O types and examples, serial communication devices, parallel device ports, wireless devices, timer and counting devices, Interrupt-driven input and output, interrupt service routine concept, interrupt sources, hardware interrupts, software interrupts, interrupt-servicing mechanism, multiple interrupts, interrupt service threads as second-level interrupt handlers, context and the periods for context switching, interrupt latency, interrupt-service deadline, interrupt service mechanism from context-saving angle, direct memory access driven I/O, Device driver programming.

Learning Outcomes:

After completing this Unit, students will be able to

- Summarize pros and cons of interrupt driven data transfer (L2)
- Discuss hardware and software interrupts with examples (L3)
- Know how interrupts can be used to minimize latency (L3)
- Differentiate ISRs & device driver functions (L2)
- Describe uses of hardware and software assigned priorities in an interrupt service mechanism (L2)

UNIT –IV

Inter-process Communication (IPC): Multiple processes in an application, multiple threads in an application, tasks, task and thread states, tasks and data, distinction between function, ISR, IST and task by their characteristics, inter-process communication and synchronization, signals, concept of semaphores, disabling and enabling functions, shared data problem, queues and mailboxes, pipe and socket functions, remote procedure call functions.

Learning Outcomes:

After completing this Unit, students will be able to

- Describe mechanism to create multiple tasks (processes & threads), control task states and allocate system resources to the tasks (L2)
- Explain IPC functions to enable communication of signals, semaphores and messages from ISRs and tasks (L2)
- Discuss IPC functions for pipes, sockets and RPCs (L3)

UNIT –V

REAL-TIME OPERATING SYSTEMS - Operating System Overview, Operating System - Functions, Types and Services of Operating Systems, Real-Time Operating System, RTOS overview, RTOS Task Scheduling, Keil RTX RTOS, RTOS on **Mbed** platform, **Mbed**RTOSAPI, Using **Mbed** RTOS API for your Project, Thread, Mutex and Semaphore.

Learning Outcomes:

After completing this Unit, students will be able to

- Explain about operating system and RTOS (L2)
- Summarize different features of RTOS (L2)
- Build RTOS based embedded system using Keil RTX mbed platform (L6)

Course Outcomes:

- Identify hardware and software components of an embedded system.
- Choose appropriate embedded system architecture for the given application.
- Discuss quality attributes and characteristics of an embedded system.
- Illustrate different Inter Process Communication (IPC) mechanisms used by tasks/process/tasks to communicate in multitasking environment.
- Design an RTOS based embedded system.

Text Books:

1. Shibu K V, “Introduction to Embedded Systems”, 2nd edition, McGraw Hill Education, 2017.
2. Raj Kamal, “Embedded Systems: Architecture, Programming and Design”, 3rd edition, McGraw Hill Education, 2017.

References:

1. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay, “The 8051 Microcontroller and Embedded Systems Using Assembly and C”, 2nd edition, Pearson Education India, 2007
2. Jonathan W. Valvano, “Embedded Microcomputer Systems Real Time Interfacing”, 3rd Edition Cengage Learning, 2012.
3. David. E. Simon, “An Embedded Software Primer” 1st Edition, Fifth Impression, Addison-Wesley Professional, 2007.

(19A04703d) IMAGE PROCESSING
(Professional Elective III)

Course Objectives:

- To introduce fundamentals of Image Processing.
- To expose various intensity transformations in spatial and frequency domains.
- To impart concepts of wavelets and various coding techniques for image compression.
- To dissimilate various segmentation techniques for images.
- To teach various color models and to introduce the concepts of color image segmentation.

UNIT I

Digital Image Fundamentals-Elements of visual perception, image sensing and acquisition, image sampling and quantization, basic relationships between pixels – neighbourhood, adjacency, connectivity, distance measures.

Learning Outcomes:

After completing this Unit, students will be able to

- Explain the basic building blocks of image processing(L2)
- Define image processing parameters such as adjacency and distance measures (L1)

UNIT II

Image Enhancements and Filtering- Gray level transformations, histogram equalization and specifications, pixel-domain smoothing filters – linear and order-statistics, pixel-domain sharpening filters – first and second derivative, two-dimensional DFT and its inverse, frequency domain filters – low-pass and high-pass.

Learning Outcomes:

After completing this Unit, students will be able to

- Compare image enhancement methods in spatial and frequency domains (L5)
- Apply frequency Domain filtering techniques for image enhancement (L3)

UNIT-III

Image Segmentation, Detection of discontinuities, edge linking and boundary detection, thresholding – global and adaptive, region-based segmentation.

Learning Outcomes:

After completing this Unit, students will be able to

- Describe various Image segmentation techniques (L2)
- Illustrate detection of discontinuities in an image (L2)

UNIT-IV

Wavelets and Multi-resolution image processing- Uncertainty principles of Fourier Transform, Time-frequency localization, continuous wavelet transforms, wavelet bases and multi-resolution analysis, wavelets and Sub-band filter banks.

Image Compression, -Redundancy, inter-pixel and psycho-visual; Loss less compression – predictive, entropy; Lossy compression- predictive and transform coding; Discrete Cosine Transform; Still image compression standards – JPEG and JPEG-2000.

Learning Outcomes:

After completing this Unit, students will be able to

- Describe various transform techniques for lossy compression (L2)
- Apply various coding techniques for lossless compression (L3)

UNIT V

Color Image Processing-Color models–RGB, YUV, HSI; Color transformations– formulation, color complements, color slicing, tone and color corrections; Color image smoothing and sharpening; Color Segmentation.

Learning Outcomes:

After completing this Unit, students will be able to

- Describe various color models for color image processing (L2)
- Apply various techniques for color image smoothing, sharpening and segmentation (L3)

Course Outcomes:

- Analyze various types of images mathematically.
- Compare image enhancement methods in spatial and frequency domains.
- Demonstrate various segmentation algorithms for given image.
- Justify DCT and wavelet transform techniques for image compression.
- Describe various color models for color image processing.

Text Books:

1. R.C. Gonzalez and R.E. Woods, “Digital Image Processing”, 2nd Edition, Pearson Education, 2008.
2. Anil Kumar Jain, “Fundamentals of Digital Image Processing”, Prentice Hall of India, 2nd edition 2004.

References:

1. Rafael C. Gonzalez, Richard E woods and Steven L. Eddins, “Digital Image processing using MATLAB”, Tata McGraw Hill, 2010.
2. Milan Sonka, Vaclav Hlavac, Roger Boule, “ Image Processing, Analysis, and Machine Vision”, 3rd Edition, Cengage Learning, 2016.
3. S Jayaraman, S Esakkirajan, T Veerakumar, “Digital Image processing”, Tata McGraw Hill.
4. William K. Pratt, “Digital Image Processing”, John Wiley, 3rd Edition, 2004.

(19A04703e) **ADVANCED DIGITAL SIGNAL PROCESSING**
(Professional Elective III)

Course Objectives:

- To understand the sampling rate conversion and summarize multirate DSP.
- To describe the various linear filtering techniques and its applications to DSP.
- To apply and estimate parametric and non-parametric power spectrum estimation.
- To analyze the finite word length effects in fixed- and floating-point DSP systems.
- To acquire the knowledge on applications of multi rate digital signal processing.

UNIT I:

Multirate Digital Signal Processing: Introduction, Decimation by a Factor D, Interpolation by a Factor I, Sampling Rate Conversion by a Rational Factor I/D, Filter Design and Implementation for Sampling-Rate Conversion, Direct-Form FIR Filter Structures, Polyphase Filter Structures, Time-Variant Filter Structures, Multistage Implementation of Sampling-Rate Conversion, Sampling-Rate Conversion of Bandpass Signals, Decimation and Interpolation by Frequency Conversion, Modulation-Free Method for Decimation and Interpolation, Sampling-Rate Conversion by an Arbitrary Factor, First-Order Approximation, Second-Order Approximation (Linear Interpolation).

Learning Outcomes:

After completing this Unit, students will be able to

- Understand the conversion of multiple sampling rates and Multirate signal processing in the digital domain. (L2)
- Design a sampling rate conversion by interpolation and decimation and their effects on frequency spectrum. (L6)

UNIT II:

Linear Prediction and Optimum Linear Filters:

Innovations Representation of a Stationary Random Process, Relationships Between the Filter Parameters and the Autocorrelation Sequence, Forward Linear Prediction, Backward Linear Prediction, The Optimum Reflection Coefficients for the Lattice Forward and Backward Predictors, Relationship of an AR Process to Linear Prediction, The Levinson-Durbin Algorithm, AR Lattice Structure, ARMA Processes and Lattice-Ladder Filters, Wiener Filters for Filtering and Prediction, FIR Wiener Filter, IIR Wiener Filter, Noncausal Wiener Filter.

Learning Outcomes:

After completing this Unit, students will be able to

- Understand the concepts and design of optimum filters for linear prediction. (L2)
- Solve the linear equations and analyze the optimum filters to estimate the signals corrupted by noise. (L4)

UNIT III:

Nonparametric Methods for Power Spectrum Estimation: Estimation of Spectra from Finite-Duration Observations of Signals, Estimation of the Autocorrelation and Power Spectrum of Random Signals, Use of the DFT in Power Spectrum Estimation, Bartlett Method, Welch Method, Blackman and Tukey Method, Performance Characteristics of Nonparametric Power Spectrum Estimators.

Parametric Methods for Power Spectrum Estimation: Relationships Between the Autocorrelation and the Model Parameters, The Yule-Walker Method for the AR Model Parameters, The Burg Method for the AR Model Parameters, Unconstrained Least-Squares Method for the AR Model Parameters, Sequential Estimation Methods for the AR Model Parameters, Selection of AR Model Order, MA Model for Power Spectrum Estimation, ARMA Model for Power Spectrum Estimation.

Learning Outcomes:

After completing this Unit, students will be able to

- Analyze various methods for estimating the power spectrum of discrete-time signals. (L4)
- Differentiate parametric and non-parametric methods for power spectrum estimation. (L5)

UNIT IV:

Analysis of Finite Word length Effects: Quantization Process and Errors, Quantization of Fixed-point Numbers, Quantization of Floating-point Numbers, Analysis of Coefficient Quantization Effects, Dynamic Range Scaling, Limit cycles in IIR digital filters, Round off errors in FFT algorithms.

Learning Outcomes:

After completing this Unit, students will be able to

- Ability to understand the finite word length effects in filter design, effect of quantization errors. (L3)
- Differentiate in fixed- and floating-point numbers. (L5)

UNIT V:

Applications of Digital Signal Processing: Dual Tone Multi-Frequency Signal Detection, Spectral Analysis of Sinusoidal Signals, Spectral Analysis of Non stationary Signals, Spectral Analysis of Random Signals, Musical Sound Processing, Discrete-Time Analytic Signal Generation, Subband Coding of Speech and Audio Signals, Over Sampling A/D Converter, Over Sampling D/A Converter.

Learning Outcomes:

After completing this Unit, students will be able to

- Apply the knowledge and implement different applications of sampling rate conversion in multirate signal processing systems. (L3)
- Describe the applications of DSP to real-time requirements. (L5)

Course Outcomes:

- Understand the sampling rate conversion, interpolation and decimation for signal processing applications also need of optimum linear filtering and its applications.
- Apply and explore the real-time applications to multirate DSP systems.
- Analyze the parametric and non-parametric methods for power spectrum estimation.
- Evaluate the finite word length effects in filter design such as FIR, IIR.

Text books:

1. J G Proakis, D G Manolakis, “Digital Signal Processing Principles, Algorithms and Applications” 3rd Edition, Prentice Hall.
2. Sanjit K Mitra, “Digital Signal Processing – A Computer Based Approach”, 2nd Edition, Tata Mc graw Hill Publications.

References:

1. A V Oppenheim, R W Schaffer, “Discrete-Time Signal Processing”, Pearson Education.
2. S. M .Kay, “Modern spectral Estimation Techniques” PHI, 1997.

(19A01704a) AIR POLLUTION AND CONTROL
OPEN ELECTIVE-III

Course Objectives:

- To identify the sources of air pollution
- To know the composition and structure of atmosphere
- To know the pollutants dispersion models
- To understand the working of air pollution control equipments
- To identify the sources of noise pollution and their controlling methods

UNIT I

Introduction: sources, effects on – ecosystems, characterization of atmospheric pollutants, air pollution episodes of environmental importance. Indoor Air Pollution– sources, effects.

Learning Outcomes:

After completing this Unit, students will be able to

- To understand the character of atmospheric pollutants and their effects

UNIT II

Meteorology - composition and structure of the atmosphere, wind circulation, solar radiation, lapse rates, atmospheric stability conditions, wind velocity profile, Maximum Mixing Depth (MMD), Temperature Inversions, Wind rose diagram.

Learning Outcomes:

After completing this Unit, students will be able to

- Understand the composition and structure and structure of atmosphere
- To understand the maximum mixing depth and windrose diagram

UNIT III

General characteristics of stack emissions, plume behaviour, heat island effect. Pollutants dispersion models – description and application of point, line and areal sources. Monitoring of particulate matter and gaseous pollutants –respirable, non-respirable and nano - particulate matter. CO, CO₂, Hydrocarbons (HC), SOX and NOX, photochemical oxidants.

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the general characteristics of stack emissions and their behavior
- To understand the monitoring of particulate matter and gaseous pollutants

UNIT IV

Air Pollution Control equipment for particulate matter & gaseous pollutants– gravity settling chambers, centrifugal collectors, wet collectors, fabric filters, electrostatic precipitator (ESP).
– Adsorption, Absorption, Scrubbers, Condensation and Combustion.

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the various air pollution control equipments

UNIT V

Noise - sources, measurements, effects and occupational hazards. Standards, Noise mapping, Noise attenuation equations and methods, prediction equations, control measures, Legal aspects of noise.

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the noise sources, mapping, prediction equations etc.,

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- Identify the sources of air pollution
- Understand the composition and structure and structure of atmosphere.
- Know about the general characteristics of stack emissions and their behavior
- Know about the general characteristics of stake emission and their behavior
- Know about the noise sources, mapping, prediction equations etc.,

REFERENCES:

1. WarkK ., Warner C.F., and Davis W.T., “Air Pollution - Its Origin and Control”, Harper & Row Publishers, New York.
2. Lee C.C., and Lin S.D., “Handbook of Environmental Engineering Calculations”, McGraw Hill, New York.
3. Perkins H.C., “Air Pollution”, McGraw Hill.
4. Crawford M., “Air Pollution Control Theory”, TATA McGraw Hill.
5. Stern A.C., “Air Pollution”, Vol I, II, III.
6. Seinfeld N.J., “Air Pollution”, McGraw Hill.
7. Stern A.C. Vol. V, “Air Quality Management”.
8. M N Rao and HVN Rao, Air Pollution” Tata McGraw Hill publication

(19A01704b) BASICS OF CIVIL ENGINEERING
OPEN ELECTIVE-III

Course Objectives:

- To identify the traditional materials that are used for building constructions
- To know the principles of building planning
- To know the causes of dampness in structures and its preventive measures
- To know about the low cost housing techniques
- To know the basic principles of surveying

UNIT I

Traditional materials: Stones- Types of stone masonry -Brick-types of brick masonry- lime Cement – Timber – Seasoning of timber - their uses in building works

Learning Outcomes:

After completing this Unit, students will be able to

- To understand the characteristics of different building materials.

UNIT II

Elements of building planning- basic requirements-orientation-planning for energy efficiency-planning based on utility-other requirements.

Learning Outcomes:

After completing this Unit, students will be able to

- To understand the principles of planning in buildings

UNIT III

Dampness and its prevention: Causes of dampness- ill effects of dampness-requirements of an ideal material for damp proofing-materials for damp proofing –methods of damp proofing.

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the causes of dampness in buildings and its ill effects
- To know about the general characteristics of ideal material for damp proofing

UNIT IV

Cost effective construction techniques in mass housing schemes: Minimum standards – Approach to cost effective mass housing schemes- cost effective construction techniques.

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the various cost effective techniques in mass housing schemes.

UNIT V

Introduction to Surveying: Object and uses of surveying- Primary divisions in surveying- Fundamental principles of surveying- Classification of surveying-plans and maps-scales-types of graphical scales- units and measurements

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the objects of surveying and its classification.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- Identify the traditional building materials that are used in building construction.
- Plan the buildings based on principles of planning.
- Identify the sources of dampness and its ill effects on buildings and its prevention.
- Know the cost effective construction in mass housing schemes.
- Know the importance of surveying in planning of the buildings.

Text books:

1. S.S.Bhavikatti, “Basic civil engineering”, New age international publishers.
2. S.S.Bhavikatti, “Building Construction”, Vikas Publishing house, New Delhi.
3. G.C.Sahu and Joygopal jena, “Building materials and Construction”, McGraw Hill Education.

Reference books:

1. N.Subramanian, “Building Materials testing and sustainability”, Oxford university press.

(19A02704a) RENEWABLE ENERGY SYSTEMS

OPEN ELECTIVE-III

Course Objectives:

At the end of the course the student will be able to

- Identify various sources of Energy and the need of Renewable Energy Systems.
- Understand the concepts of Solar Radiation, Wind energy and its applications.
- Distinguish between solar thermal and solar PV systems
- Interpret the concept of geo thermal energy and its applications.
- Understand the use of biomass energy and the concept of Ocean energy and fuel cells.

UNIT -I

Solar Energy

Solar radiation - beam and diffuse radiation, solar constant, earth sun angles, attenuation and measurement of solar radiation, local solar time, derived solar angles, sunrise, sunset and day length. flat plate collectors, concentrating collectors, storage of solar energy-thermal storage.

Learning Outcomes:

At the end of the course the student will be able to

- To understand about solar thermal parameters
- To distinguish between flat plate and concentrated solar collectors
- To know about thermal storage requirements
- To know about measurement of solar radiation

UNIT – II

PV Energy Systems

Introduction, The PV effect in crystalline silicon basic principles, the film PV, Other PV technologies, Electrical characteristics of silicon PV cells and modules, PV systems for remote power, Grid connected PV systems.

Learning Outcomes:

After completing this Unit, students will be able to

- Understand the concept of PV effect in crystalline silicon and their characteristics
- Understand other PV technologies
- To know about electrical characteristics of PV cells & modules
- To know about grid connected PV systems

UNIT - III

Wind Energy

Principle of wind energy conversion; Basic components of wind energy conversion systems; wind mill components, various types and their constructional features; design considerations of horizontal and vertical axis wind machines; analysis of aerodynamic forces acting on wind mill blades and estimation of power output; wind data and site selection considerations.

Learning Outcomes:

After completing this Unit, students will be able to

- To understand basics of wind energy conversion and system
- To distinguish between VAWT and HAWT systems
- To understand about design considerations
- To know about site selection considerations of WECS

UNIT - IV

Geothermal Energy

Estimation and nature of geothermal energy, geothermal sources and resources like hydrothermal, geo-pressured hot dry rock, magma. Advantages, disadvantages and application of geothermal energy, prospects of geothermal energy in India.

Learning Outcomes:

After completing this Unit, students will be able to

- Understand the Geothermal energy and its mechanism of production and its applications
- Analyze the concept of producing Geothermal energies
- To learn about disadvantages and advantages of Geo Thermal Energy Systems
- To know about various applications of GTES

UNIT -V

Miscellaneous Energy Technologies

Ocean Energy: Tidal Energy-Principle of working, performance and limitations. Wave Energy-Principle of working, performance and limitations.

Bio mass Energy: Biomass conversion technologies, Biogas generation plants, Classification, advantages and disadvantages, constructional details, site selection, digester design consideration

Fuel cell: Principle of working of various types of fuel cells and their working, performance and limitations.

Learning Outcomes:

After completing this Unit, students will be able to

- Analyze the operation of tidal energy
- Analyze the operation of wave energy
- Analyze the operation of bio mass energy
- Understand the principle, working and performance of fuel cell technology
- Apply these technologies to generate power for usage at remote centres

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- To distinguish between various alternate sources of energy for different suitable application requirements
- To differentiate between solar thermal and PV system energy generation strategies
- To understand about wind energy system
- To get exposed to the basics of Geo Thermal Energy Systems
- To know about various diversified energy scenarios of ocean, biomass and fuel cells

Text Books:

1. Stephen Peake, “Renewable Energy Power for a Sustainable Future”, Oxford International Edition, 2018.
2. G. D. Rai, “Non-Conventional Energy Sources”, 4th Edition, Khanna Publishers, 2000.

References:

1. S. P. Sukhatme, “Solar Energy”, 3rd Edition, Tata Mc Graw Hill Education Pvt. Ltd, 2008.
2. B H Khan , “ Non-Conventional Energy Resources”, 2nd Edition, Tata Mc Graw Hill Education Pvt Ltd, 2011.
3. S. Hasan Saeed and D.K.Sharma, “Non-Conventional Energy Resources”, 3rd Edition, S.K.Kataria & Sons, 2012.
4. G. N. Tiwari and M.K.Ghosal, “Renewable Energy Resource: Basic Principles and Applications”, Narosa Publishing House, 2004.

(19A02704b) ELECTRIC VEHICLE ENGINEERING
OPEN ELECTIVE-III

Course Objectives:

After completing this Unit, students will be able to

- To get exposed to new technologies of battery electric vehicles, fuel cell electric vehicles
- To get exposed to EV system configuration and parameters
- To know about electro mobility and environmental issues of EVs
- To understand about basic EV propulsion and dynamics
- To understand about fuel cell technologies for EV and HVEs
- To know about basic battery charging and control strategies used in electric vehicles

UNIT-I

Introduction to EV Systems and Parameters

Past, Present and Future EV, EV Concept, EV Technology, State-of-the Art EVs, EV configuration, EV system, Fixed and Variable gearing, single and multiple motor drive, in-wheel drives, EV parameters: Weight, size, force and energy, performance parameters.

Learning Outcomes:

After completing this Unit, students will be able to

- To know about past, present and latest technologies of EV
- To understand about configurations of EV systems
- To distinguish between EV parameters and performance parameters of EV systems
- To distinguish between single and multiple motor drive EVs
- To understand about in-wheel EV

UNIT-II

EV and Energy Sources

Electro mobility and the environment, history of Electric power trains, carbon emissions from fuels, green houses and pollutants, comparison of conventional, battery, hybrid and fuel cell electric systems

Learning Outcomes:

After completing this Unit, students will be able to

- To know about various types of EV sources
- To understand about e-mobility
- To know about environmental aspects of EV

- To distinguish between conventional and recent technology developments in EV systems

UNIT-III

EV Propulsion and Dynamics

Choice of electric propulsion system, block diagram, concept of EV Motors, single and multi motor configurations, fixed and variable geared transmission, In-wheel motor configuration, classification, Electric motors used in current vehicle applications, Recent EV Motors, Vehicle load factors, vehicle acceleration.

Learning Outcomes:

After completing this Unit, students will be able to

- To know about what is meant by propulsion system
- To understand about single and multi motor EV configurations
- To get exposed to current and recent applications of EV
- To understand about load factors in vehicle dynamics
- To know what is meant acceleration in EV

UNIT-IV

Fuel Cells

Introduction of fuel cells, basic operation, model, voltage, power and efficiency, power plant system – characteristics, sizing, Example of fuel cell electric vehicle.

Introduction to HEV, brake specific fuel consumption, comparison of series, series-parallel hybrid systems, examples

Learning Outcomes:

After completing this Unit, students will be able to

- To know about fuel cell technology of EV
- To know about basic operation of FCEV
- To know about characteristics and sizing of EV with suitable example
- To get exposed to concept of Hybrid Electric Vehicle using fuel cells
- To know about the comparison of various hybrid EV systems

UNIT-V

Battery Charging and Control

Battery charging: Basic requirements, charger architecture, charger functions, wireless charging, power factor correction.

Control: Introduction, modelling of electro mechanical system, feedback controller design approach, PI controllers designing, torque-loop, speed control loop compensation, acceleration of battery electric vehicle

Learning Outcomes:

After completing this Unit, students will be able to

- To understand about basic requirements of battery charging and its architecture
- To know about charger functions
- To get exposed to wireless charging principle
- To understand about block diagram, modelling of electro mechanical systems of EV
- To be able to design various compensation requirements

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- To understand and differentiate between conventional and latest trends in Electric Vehicles
- To know about various configurations in parameters of EV system
- To know about propulsion and dynamic aspects of EV
- To understand about fuel cell technologies in EV and HEV systems
- To understand about battery charging and controls required of EVs

TEXT BOOKS:

1. C.C Chan, K.T Chau: “Modern Electric Vehicle Technology”, Oxford University Press Inc., New York 2001.
2. James Larminie, John Lowry, “Electric Vehicle Technology Explained”, Wiley, 2003.

REFERENCE BOOKS:

1. Iqbal Husain, “Electric and Hybrid Vehicles Design Fundamentals”, CRC Press 2005.
2. Ali Emadi, “Advanced Electric Drive Vehicles”, CRC Press, 2015.

(19A03704a) FINITE ELEMENT METHODS
OPEN ELECTIVE-III

Course Objectives:

- Familiarize basic principles of finite element analysis procedure.
- Explain theory and characteristics of finite elements that represent engineering structures.
- Apply finite element solutions to structural, thermal, dynamic problem.
- Learn to model complex geometry problems and solution techniques.

UNIT – I

Introduction to finite element methods for solving field problems, Stress and equilibrium, Boundary conditions, Strain-Displacement relations, Stress- strain relations for 2D and 3D Elastic problems. Potential energy and equilibrium, The Rayleigh-Ritz method, Formulation of Finite Element Equations.

One dimensional problems: Finite element modeling coordinates and shape functions. Assembly of global stiffness matrix and load vector. Finite element equations, Treatment of boundary conditions, Quadratic shape functions.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the concept of nodes and elements.(l2)
- Understand the general steps of finite element methods.(l2)
- Understand the role and significance of shape functions in finite element formulations (l2)
- Formulate and solve axially loaded bar problems. (l6)

UNIT - II

Analysis of trusses: Stiffness Matrix for plane truss element. Stress Calculations and Problems.

Analysis of beams: Element Stiffness Matrix for two noded, two degrees of freedom per node beam element and simple problems.

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Learning Outcomes:

At the end of the unit, the student will be able to

- Explain the use of the basic finite elements for structural applications using truss and beam. (l2)

- Formulate and analyze truss and beam problems. (16)

UNIT - III

Finite element modeling of two dimensional stress analysis - constant strain triangles-quadrilateral element-treatment of boundary conditions. Estimation of load Vector, Stresses.Finite element modeling of Axi-symmetric solids subjected to axi-symmetric loading with triangular elements.Two dimensional four noded Isoparametric elements and problems.

Learning Outcomes:

At the end of the unit, the student will be able to

- Explain the formulation of two – dimensional elements (Triangular and Quadrilateral Elements). (L2)
- Apply the formulation techniques to solve two – dimensional problems using triangle and quadrilateral elements. (L3)
- Formulate and solve axisymmetric problems.(L6)

UNIT - IV

Steady state heat transfer analysis: One dimensional analysis of slab and fin, two dimensional analysis of thin plate.

Analysis of a uniform shaft subjected to torsion loading.

Learning Outcomes:

At the end of the unit, the student will be able to

- Explain the application and use of the Finite Element Methods for heat transfer problems. (L2)
- Formulate and solve heat transfer problems. (L6)
- Analyse the

UNIT V

Dynamic analysis: Formulation of finite element model, element –mass matrices, evaluation of Eigen values and Eigen vectors for a stepped bar truss.

3D Problems: Finite Element formulation- Tetrahedron element-Stiffness matrix.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand problems involving dynamics using Finite Element Methods.
- Evaluate the Eigen values and Eigen Vectors for stepped bar.
- Develop the stiffness matrix for tetrahedron element.

Course Outcomes:

Upon successful completion of this course you should be able to

- Understand the concepts behind variational methods and weighted residual methods in FEM.
- Identify the application and characteristics of FEA elements such as bars, beams, and isoparametric elements, and 3-D element.
- Develop element characteristic equation procedure and generation of global stiffness equation will be applied.
- Able to apply Suitable boundary conditions to a global structural equation, and reduce it to a solvable form.
- Able to identify how the finite element method expands beyond the structural domain, for problems involving dynamics, heat transfer and fluid flow.

TEXT BOOKS

1. Chandraputla, Ashok & Belegundu, “Introduction to Finite Element in Engineering”, Prentice Hall.
2. S.S.Rao, “The Finite Element Methods in Engineering”, 2nd Edition, Elsevier Butterworth - Heinemann 2011.

REFERENCE BOOKS

1. J N Reddy, “An introduction to the Finite Element Method”, McGraw – Hill, New York, 1993.
2. R D Cook, D S Malkus and M E Plesha, “Concepts and Applications of Finite Element Analysis”, 3rd Edition, John Wiley, New York, 1989.
3. K J Bathe, “Finite Element Procedures in Engineering Analysis”, Prentice-Hall, Englewood Cliffs, 1982.
4. T J R Hughes, “the Finite Element Method, Prentice”, Hall, Englewood Cliffs, NJ, 1986.
5. C Zienkiewicz and R L Taylor, “the Finite Element Method”, 3rd Edition. McGraw-Hill, 1989.

(19A03704b) PRODUCT MARKETING
OPEN ELECTIVE-III

Course Objectives:

- Introduce the basic concepts of Product marketing.
- Familiarize with market information systems and research
- Understand the nature and importance of industrial market
- Discuss the major stages in new product development
- Identify the factors affecting pricing decisions

UNIT I:

Introduction (7 Hours)

Historical development of marketing management, Definition of Marketing, Core marketing concepts, Marketing Management philosophies, Micro and Macro Environment, Characteristics affecting Consumer behaviour, Types of buying decisions, buying decision process, Classification of consumer products, Market Segmentation Concept of Marketing Myopia. Importance of marketing in the Indian Socio economic system.

Learning Outcomes:

At the end of this student, the student will be able to

- Define Marketing. (L1)
- Discuss marketing philosophies. (L2)
- Sketch the buying decision process. (L3)
- Understand the importance of marketing in the Indian socio economic system. (L2)

UNIT II:

Marketing of Industrial Products (6 Hours)

Components of marketing information system–benefits & uses marketing research system, marketing research procedure, Demand Estimation research, Test marketing, Segmentation Research - Cluster analysis, Discriminate analysis. Sales forecasting: objective and subjective methods. Nature and importance of the Industrial market, classification of industrial products, participants in the industrial buying process, major factors influencing industrial buying behavior, characteristics of industrial market demand. Determinants of industrial market demand Buying power of Industrial users, buying motives of Industrials users, the industrial buying process, buying patterns of industrial users.

Learning Outcomes:

At the end of this student, the student will be able to

- Identify the components of marketing information system. (L2)
- List the advantages and uses of marketing research system. (L1)
- Demonstrate sales forecasting. (L3)
- Explain the major factors influencing industrial buying behaviour. (L2)

UNIT III:

Product Management And Branding (7 Hours)

The concept of a product, features of a product, classification of products, product policies – product planning and development, product line, product mix – factors influencing change in product mix, product mix strategies, meaning of “New – product; major stages in new – product development product life cycle. Branding: Reasons for branding, functions of branding features of types of brands, kinds of brand name.

Learning Outcomes:

At the end of this student, the student will be able to

- Identify the factors influencing change in product mix. (L2)
- Sketch various stages in product life cycle. (L2)
- Recall the features of a product and product policies. (L1)
- Demonstrate on features, functions and reasons of branding. (L3)

UNIT IV:

Pricing And Pacakaging (7Hours)

Importance of Price, pricing objectives, factors affecting pricing decisions, procedure for price determination, kinds of pricing, pricing strategies and decisions Labeling: Types, functions advantages and disadvantages, Packaging: Meaning, growth of packaging, function of packaging, kinds of packaging.

Learning Outcomes:

At the end of this student, the student will be able to

- List the factors affecting pricing decisions. (L1)
- Explain the procedure for price determination. (L2)
- Employ Pricing strategies and decisions. (L3)
- Understand the functions of labelling and packaging. (L2)

UNIT V:

Product Promotion (6Hours)

Importance of Price, pricing objectives, factors affecting pricing decisions, procedure for price determination, kinds of pricing, pricing strategies and decisions. Advertising and sales promotion: Objectives of advertisement function of advertising, classification of advertisement copy, advertisement media – kinds of media, advantages of advertising. Objectives of sales promotion, advantages sales promotion. Personal Selling : Objectives of personal selling, qualities of good salesman, types of salesman, major steps in effective selling

Learning Outcomes:

At the end of this student, the student will be able to

- Discuss the procedures for price determination. (L2)
- Explain the objectives of advertisement function of advertising. (L2)
- List the advantages and disadvantages of advertising. (L1)
- Describe the major steps in effecting selling. (L2)

Course Outcomes:

At the end of the course, the student will be able to

- Understand basic marketing management concepts and their relevance to business development. (L2)
- Prepare a questionnaire for market research. (L5)
- Design marketing research plan for business organizations. (L5)
- Optimize marketing mix to get competitive advantage. (L4)

Text Books:

1. Philip Kotler, “Principles of Marketing”, Prentice – Hall.
2. Philip Kotler, “Marketing Management”, Prentice – Hall.

Reference Books:

1. Wiliam J Stanton, “Fundamentals of Marketing”, McGraw Hill
2. R.S.N. Pillai and Mrs.Bagavathi, “Marketing”, S. Chand & Co. Ltd
3. Rajagopal, “Marketing Management Text & Cases”, Vikas Publishing House

(19A04704a) INTRODUCTION TO MICROCONTROLLERS & APPLICATIONS
OPEN ELECTIVE-III

Course Objectives:

This course will enable students to:

- Describe the Architecture of 8051 Microcontroller and Interfacing of 8051 to external memory.
- Write 8051 Assembly level programs using 8051 instruction set.
- Describe the Interrupt system, operation of Timers/Counters and Serial port of 8051.
- Interface simple switches, simple LEDs, ADC 0804, LCD and Stepper Motor to 8051.

UNIT – I

8051 Microcontroller:

Microprocessor Vs Microcontroller, Embedded Systems, Embedded Microcontrollers, 8051 Architecture- Registers, Pin diagram, I/O ports functions, Internal Memory organization. External Memory (ROM & RAM) interfacing.

Learning Outcomes:

At the end of this student, the student will be able to

- Understand the importance of Microcontroller and acquire the knowledge of Architecture of 8051 Microcontroller. (L1)
- Analyze interface required memory of RAM & ROM. (L3)

UNIT – II

Addressing Modes, Data Transfer instructions, Arithmetic instructions, Logical instructions, Branch instructions, Bit manipulation instructions. Simple Assembly language program examples to use these instructions.

Learning Outcomes:

At the end of this student, the student will be able to

- Explain different types instruction set of 8051. (L1)
- Develop the 8051 Assembly level programs using 8051 instruction set. (L3)

UNIT – III

8051 Stack, Stack and Subroutine instructions. Simple Assembly language program examples to use subroutine instructions. 8051 Timers and Counters – Operation and

Assembly language programming to generate a pulse using Mode-1 and a square wave using Mode- 2 on a port pin.

Learning Outcomes:

At the end of this student, the student will be able to

- Describe Stack and Subroutine of 8051. (L1)
- Design Timer /counters using of 8051. (L4)

UNIT –IV

8051 Serial Communication- Basics of Serial Data Communication, RS- 232 standard, 9 pin RS232 signals, Simple Serial Port programming in Assembly and C to transmit a message and to receive data serially.**8051 Interrupts.** 8051 Assembly language programming to generate an external interrupt using a switch.

Learning Outcomes:

At the end of this student, the student will be able to

- Acquire knowledge of Serial Communication and develop serial port programming. (L1)
- Develop an ALP to generate an external interrupt using a switch. (L3)

UNIT – V

8051 C programming to generate a square waveform on a port pin using a Timer interrupt. Interfacing 8051 to ADC-0804, DAC, LCD and Interfacing with relays and opto isolators, Stepper Motor Interfacing, DC motor interfacing, PWM generation using 8051.

Learning Outcomes:

At the end of this student, the student will be able to

- Apply and Interface simple switches, simple LEDs, ADC 0804 and LCD to using 8051 I/O ports. (L2)
- Design Stepper Motor and f motor interfacing of 8051. (L4)

Course outcomes:

- Understand the importance of Microcontroller and Acquire the knowledge of Architecture of 8051 Microcontroller.
- Apply and Interface simple switches, simple LEDs, ADC 0804, LCD and Stepper Motor to using 8051 I/O ports.
- Develop the 8051 Assembly level programs using 8051 instruction set.
- Design the Interrupt system, operation of Timers/Counters and Serial port of 8051.

TEXT BOOKS:

1. Muhammad Ali Mazidi and Janice Gillespie Mazidi and Rollin D. McKinlay; “The 8051 Microcontroller and Embedded Systems – using assembly and C”, PHI, 2006 / Pearson, 2006.
2. Kenneth J. Ayala, “The 8051 Microcontroller”, 3rd Edition, Thomson/Cengage Learning.

REFERENCE BOOKS:

1. Manish K Patel, “The 8051 Microcontroller Based Embedded Systems”, McGraw Hill, 2014, ISBN: 978-93-329-0125-4.
2. Raj Kamal, “Microcontrollers: Architecture, Programming, Interfacing and System Design”, Pearson Education, 2005.

(19A04704b) PRINCIPLES OF DIGITAL SIGNAL PROCESSING
OPEN ELECTIVE-III

Course Objectives:

- To explain about signals and perform various operations on it.
- To understand discrete time signals and systems.
- To solve Laplace transforms and z-transforms for various signals.
- To find Discrete Fourier Transform of a sequence by using Fast Fourier Transform.
- To design and realize IIR and FIR filters.

UNIT- I:

INTRODUCTION TO SIGNALS

Classification of Signals: Analog, Discrete, Digital, Deterministic & Random, Periodic & Aperiodic, Even & Odd, Energy & Power signals. Basic operations on signals: Time shifting, Time scaling, Time reversal, Amplitude scaling and Signal addition. Elementary Signals: Unit step, Unit ramp, Unit parabolic, Impulse, Sinusoidal function, Exponential function, Gate function, Triangular function, Sinc function and Signum function.

Learning Outcomes:

At the end of this student, the student will be able to

- Define basic signals and its operations, Classify discrete time signals and systems. (L1)
- Understand various basic operations on signals (L1)

UNIT – II:

DISCRETE TIME SIGNALS AND SYSTEMS

Discrete Time Signals: Elementary discrete time signals, Classification of discrete time signals: power and energy signals, even and odd signals. Simple manipulations of discrete time signals: Shifting and scaling of discrete-time signals.

Discrete Time Systems: Input-Output description of systems, Block diagram representation of discrete time systems, Linear Constant Coefficient Difference Equations, Classification of discrete time systems: linear and nonlinear, time-invariant and variant systems, causal and non causal, stable and unstable systems.

Learning Outcomes:

At the end of this student, the student will be able to

- Define basic signals and its operations, Classify discrete time signals and systems. (L1)
- Understand various basic operations on signals (L1)

UNIT- III:

LAPLACE TRANSFORMS AND Z- TRANSFORMS

Laplace Transforms: Laplace transforms, Partial fraction expansion, Inverse Laplace transform, Concept of Region of Convergence (ROC), Constraints on ROC for various classes of signals, Properties of Laplace transforms.

Z-Transforms: Concept of Z-transform of a discrete sequence, Region of convergence in Z-Transform, constraints on ROC for various classes of signals, inverse Z-transform, properties of Z-Transforms.

Learning Outcomes:

At the end of this student, the student will be able to

- Understand the basic concepts of Laplace and Z transforms (L1)
- Apply the transform techniques to solve the problems (L2)

UNIT – IV:

FAST FOURIER TRANSFORMS

Discrete Time Fourier Transform (DTFT), Discrete Fourier Transform (DFT), Radix-2 Fast Fourier Transforms (FFT), Decimation in Time and Decimation in Frequency FFT Algorithms: radix-2 DIT-FFT, DIF-FFT, and Inverse FFT: IDFT-FFT.

Learning Outcomes:

At the end of this student, the student will be able to

- Understand the importance of DTFT, DFT, FFT and their inverse transforms with respect to signals and systems (L1)
- Analyze the Decimation in time and frequency algorithms (L3)

UNIT – V:

IIR AND FIR DIGITAL FILTERS

IIR DIGITAL FILTERS: Analog filters approximations: Butterworth and Chebyshev, Design of IIR digital filters from analog filters. Realization of IIR filters: Direct form-I, Direct form-II, cascade form and parallel form.

FIR DIGITAL FILTERS: Characteristics of FIR digital filters, frequency response. Design of FIR digital filters using window techniques: Rectangular window, Triangular or Bartlett window, Hamming window, Hanning window, Blackman window. Realization of FIR filters: Linear phase and Lattice structures.

Learning Outcomes:

At the end of this student, the student will be able to

- Understand the importance of IIR and FIR digital Filters (L1)
- Realize IIR filters and analyze various windowing techniques in FIR filters (L2)
- Design IIR and FIR filters (L4)

Course outcomes:

- Define basic signals and its operations, Classify discrete time signals and systems.
- Solve Laplace Transform and z-Transform for various signals, Calculate DFT of a given sequence by using Fast Fourier Transform.
- Analyze the continuous and discrete signals and systems
- Design and realize IIR and FIR filters from the given specifications.

TEXT BOOKS:

1. B. P. Lathi, "Signals, Systems and Communications", BS Publications, 2008.
2. John G. Proakis, Dimitris G. Manolakis, "Digital signal processing, principles, Algorithms and applications", 4th edition , Pearson Education/PHI, 2007.
3. A.V. Oppenheim and R.W. Schaffer, "Discrete Time Signal Processing", 2nd edition., PHI.

REFERENCES:

1. A.V. Oppenheim, A.S. Will sky and S.H. Nawab, "Signals and Systems", PHI, 2nd Edition, 2013.
2. A. Anand Kumar, "Signals and Systems", PHI Publications, Third Edition, 2013
3. P. Ramesh Babu. "Digital Signal Processing".
4. Andreas Antoniou, "Digital signal processing", Tata McGraw Hill, 2006.
5. R S Kaler, M Kulkarni,, Umesh Gupta, "A Text book on Digital Signal processing" –I K International Publishing House Pvt. Ltd.
6. M H Hayes, Schaum's Outlines, "Digital Signal Processing", Tata Mc-Graw Hill, 2007.

(19A05704a) FUNDAMENTALS OF GAME DEVELOPMENT

(Common to CSE & IT)

Course Objectives:

This course is designed to:

- Get familiarized with the various components in a game and game engine.
- Explore the leading open source game engine components.
- Elaborate on game physics.
- Introduce to the game animation.
- Expose to network-based gaming issues.

Unit – 1: Introduction to Game

What is a Game? The Birth of Games, The Rise of Arcade Games, The Crash and Recovery, The Console Wars, Online Games and Beyond.

The Game Industry: Game Industry Overview, Game Concept Basics, Pitch Documentation, pitching a Game to a Publisher, Managing the developer-Publisher Relationship, Legal Agreements, Licenses, Console Manufacturers Approval.

Roles on the Team: Production, Art, Engineering, Design, Quality Assurance Testing, Team Organization, Corporate.

Learning Outcomes:

After completing this Unit, students will be able to

- Demonstrate online games and beyond. [L2]
- Outline the process carried out in the Game Industry [L2]
- Inspect the roles on the Team[L4]

Unit – 2: Teams

Project Leadership, Picking Leads, Team Building, Team Buy-in and Motivation.

Effective Communication: Written Communication, Oral Communication, Nonverbal Communication, Establishing Communication Norms, Communication Challenges.

Game Production Overview: Production Cycle, Preproduction, Production, Testing, Postproduction.

Learning Outcomes:

After completing this Unit, students will be able to

- Build a team and pick a leader. [L6]
- Develop Effective communication. [L3]
- Outline the Game Production cycle [L2]

Unit – 3: Game Concept

Introduction, Beginning the Process, Defining the Concept, Game Programming Basics, Prototyping, Risk Analysis, Pitch Idea, Project Kickoff.

Characters, setting, and Story: Story Development, Gameplay, Characters, Setting, Dialogue, Cinematics, Story Documentation.

Game Requirements: Define Game Features, Define Milestones and Deliverables, Evaluate Technology, Define Tools and Pipeline, Documentation, Approval, Game Requirements Outline

Learning Outcomes:

After completing this Unit, students will be able to

- Design a game. [L6]
- Demonstrate the game play. [L2]
- Identify the Game requirements [L3]

Unit – 4 : Game Plan

Dependencies, Schedules, Budgets, Staffing, Outsourcing, Middleware, Game Plan Outline.

Production Cycle: Design Production Cycle, Art Production Cycle, Engineering Production Cycle, Working Together.

Voiceover and Music: Planning for Voiceover, choosing a Sound Studio, Casting Actors, Recording Voiceover, Voiceover Checklist, Planning for Music, Working with a Composer, Licensing Music.

Learning Outcomes:

After completing this Unit, students will be able to

- Outline the Game plan. [L2]
- Define the production cycle. [L1]
- Make use of voiceover and music in game development. [L3]

Unit – 5 :Localization

Creating International Content, Localization-Friendly Code, Level of Localization, Localization Plan, Testing, Localization Checklist.

Testing and Code Releasing: Testing Schedule, Test Plans, Testing Pipeline, Testing Cycle, External Testing, Determining Code Release, Code Release Checklist, Gold Masters, Postmortems.

Marketing and Public Relations: Software Age Ratings, Working with Marketing, Packaging, Demos, Marketing Assets, Game Builds, Working with Public Relations, Asset Deliverable Checklist.

Learning Outcomes:

After completing this Unit, students will be able to

- Explain the importance of localization. [L2]
- Summarize Testing and code releasing [L2]
- Illustrate Marketing and public relations. [L2]

Course Outcomes:

Upon completion of the course, the students should be able to:

- Design games for commercialization (L6)
- Predict the trends in game development (L5)
- Design Game Plan and production cycle (L6)
- Dramatize the game playing environment (L4)

Text Book:

1. Heather Maxwell Chandler, and Rafael Chandler, “Fundamentals of Game Development”, Jones& Bartlett Learning, 2011.

References:

1. Flint Dille and John Zuur Platten, The Ultimate guide to Video Game Writing, Loan Eagle publisher, 2008.
2. Adams, Fundamentals of Game Design, 3rd edition, Pearson Education India, 2015.

(19A05704b) CYBER SECURITY
(Common to CSE & IT)

Course Objectives:

This course is designed to:

- Understand essential building blocks and basic concepts of cyber security
- Explore Web security and Network security
- Explain the measures for securing the networks and cloud
- Understand privacy principles and policies
- Describe the legal issues and ethics in computer security

UNIT I

Introduction: Introduction to Computer Security, Threats, Harm, Vulnerabilities, Controls, Authentication, Access Control, and Cryptography, Authentication, Access Control, Cryptography.

Programs and Programming: Unintentional (Non-malicious) Programming Oversights, Malicious Code—Malware, Countermeasures.

Learning Outcomes:

After completing this Unit, students will be able to

- Explain Vulnerabilities, threats and. Counter measures for computer security[L2]
- Interpret the design of the malicious code [L2]

UNIT II

Web Security: User Side, Browser Attacks, Web Attacks Targeting Users, Obtaining User or Website Data, Email Attacks.

Operating Systems Security: Security in Operating Systems, Security in the Design of Operating Systems, Rootkit.

Learning Outcomes:

After completing this Unit, students will be able to

- Outline the attacks on browser, Web and email. [L2]
- Explain the security aspects of Operating Systems. [L3]

UNIT III

Network Security: Network Concepts, Threats to Network Communications, Wireless Network Security, Denial of Service, Distributed Denial-of-Service Strategic Defenses:

Security Countermeasures, Cryptography in Network Security, Firewalls, Intrusion Detection and Prevention Systems, Network Management .

Cloud Computing and Security: Cloud Computing Concepts, Moving to the Cloud, Cloud Security Tools and Techniques, Cloud Identity Management, Securing IaaS.

Learning Outcomes:

After completing this Unit, students will be able to

- Identify the network security threats and attacks. [L3]
- Design the Counter measures to defend the network security attacks. [L6]
- Analyze the security tools and techniques for Cloud computing [L4]

UNIT IV

Privacy: Privacy Concepts, Privacy Principles and Policies, Authentication and Privacy, Data Mining, Privacy on the Web, Email Security, Privacy Impacts of Emerging Technologies, Where the Field Is Headed.

Management and Incidents: Security Planning, Business Continuity Planning, Handling Incidents, Risk Analysis, Dealing with Disaster.

Learning Outcomes:

After completing this Unit, students will be able to

- Interpret the need for Privacy and its impacts of Emerging Technologies. [L2]
- Explain how to handle incidents and deal with Disaster. [L2]

UNIT V

Legal Issues and Ethics: Protecting Programs and Data, Information and the Law, Rights of Employees and Employers, Redress for Software Failures, Computer Crime, Ethical Issues in Computer Security, Incident Analysis with Ethics, Emerging Topics: The Internet of Things, Economics, Computerized Elections, Cyber Warfare.

Learning Outcomes:

After completing this Unit, students will be able to

- Adapt legal issues and ethics in computer security. [L6]
- Elaborate on the Emerging topics. [L6]

Course Outcomes:

Upon completion of the course, the students should be able to:

- Illustrate the broad set of technical, social & political aspects of Cyber Security and

security management methods to maintain security protection (L2)

- Assess the vulnerabilities and threats posed by criminals, terrorist and nation state to national infrastructure (L5)
- Identify the nature of secure software development and operating systems (L3)
- Demonstrate the role security management in cyber security defense (L2)
- Adapt the legal and social issues at play in developing solutions. (L6)

Text Books:

- 1) Pfleeger, C.P., Security in Computing, Prentice Hall, 2010, 5th edition.
- 2) Schneier, Bruce. Applied Cryptography, Second Edition, John Wiley & Sons, 1996

Reference Books:

- 1) Rhodes-Ousley, Mark. Information Security: The Complete Reference, Second Edition, Information Security Management: Concepts and Practice, McGraw-Hill, 2013.
- 2) Whitman, Michael E. and Herbert J. Mattord. Roadmap to Information Security for IT and Infosec Managers. Boston, MA: Course Technology, 2011.

(19A27704a) CORPORATE GOVERNANCE IN FOOD INDUSTRIES
OPEN ELECTIVE III

PREAMBLE

This text focuses on corporate governance, business ethics and emerging trends in food industries.

Course Objectives

- To understand the concepts of corporate governance in view of food industry

UNIT – I

Corporate Governance- A Conceptual Foundation: Concept, nature, issues and importance of corporate governance, origin and development of corporate governance, concept of corporate management, Different models of corporate governance, corporate governance in family business, corporate governance failure with examples.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Concept, nature, issues and importance of corporate governance
- origin and development of corporate governance, concept of corporate management
- Different models of corporate governance
- corporate governance in family business, corporate governance failure with examples

UNIT – II

Role Players: Role of various players viz. Role of shareholders their rights and responsibilities, Role of board of directors in corporate governance- executive and non executive directors, independent and nominee directors, Role of Auditors, audit committee, media.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Role of shareholders their rights and responsibilities
- Role of board of directors in corporate governance- executive and non executive directors, independent and nominee directors

- Role of Auditors, audit committee, media.

UNIT – III

Corporate governance in India and the Global Scenario: Corporate Governance practices /codes in India, UK, Japan, USA. Contributions of CII-recommendations on corporate governance by different committees in India, SEBI guidelines, Kumar Manglam Birla Committee, Naresh Chandra committee Report, OECD Principles, Cadbury Committee

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Corporate Governance practices /codes in India, UK, Japan, USA.
- Contributions of CII-recommendations on corporate governance by different committees in India, SEBI guidelines,
- Have detail study of committees like Kumar Manglam Birla Committee, Naresh Chandra committee Report, OECD Principles, Cadbury Committee

UNIT – IV

Emerging trends: Emerging Trends and latest developments in Corporate Governance. Corporate Governance initiative in India and Abroad, Corporate Governance Rating- Role of rating agencies in corporate governance. ICRA Corporate governance rating method for examining the quality and effectiveness of corporate governance.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Emerging Trends and latest developments in Corporate Governance.
- Corporate Governance initiative in India and Abroad,
- Corporate Governance Rating- Role of rating agencies in corporate governance
- ICRA Corporate governance rating method for examining the quality and effectiveness of corporate governance.

UNIT – V

Business ethics and corporate governance. Social responsibility and corporate governance. Corporate governance and value creation. Political economy of corporate governance.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Business ethics and corporate governance.

- Social responsibility and corporate governance.
- Corporate governance and value creation.
- Political economy of corporate governance.

Course Outcomes:

By the end of the course, the students will

- Attain knowledge on system of corporate governance in food industries.
- Get to know about business ethics and values.

TEXT BOOKS

1. Subhash Chandra Das, “Corporate Governance in India”, PHI Pvt. Ltd., New Delhi(2008),
2. Dennis Campbell, “Susan Woodley TrendsandDevelopments In Corporate Governance”. (2004)

REFERENCES

1. Jayati Sarkar. “Corporate Governance in India”. Sage Publications, New Delhi,2012.
2. Vasudha, Joshi “Corporate Governance The Indian Scenario”. Foundations Books Pvt. Ltd. New Delhi. 2012,

(19A27704b) PROCESS TECHNOLOGY FOR CONVENIENCE & RTE FOODS
OPEN ELECTIVE III

PREAMBLE

This text focuses on various aspects and technologies involved in processing of convenience and Read-to-eat foods.

Course Objectives:

- To understand the importance and demand for convenience foods in present day scenario
- To learn the various technical aspects of convenience and Read-to-eat foods.

UNIT – I

Overview of grain-based snacks: whole grains – roasted, toasted, puffed, popped and flakes
Coated grains-salted, spiced and sweetened Flour based snack– batter and dough based products; savoury and farsans; formulated chips and wafers, papads.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Role of cereal based ingredients in snacks industries.
- Various technologies and equipments involved in Snacks industries

UNIT – II

Technology for fruit and vegetable based snacks: chips, wafers, papads etc. Technology of ready to eat fruits and vegetable based food products like, sauces, fruit bars, glazed candy etc. Technology of ready to eat canned value added fruits/vegetables and mixes and ready to serve beverages etc.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Role of Fruits and vegetables in convenience products.
- Processing of various Fruit and vegetable based products.

UNIT – III

Technology of ready- to- eat baked food products, drying, toasting roasting and flaking, coating, chipping. Extruded snack foods: Formulation and processing technology, colouring, flavouring and packaging. Technology for coated nuts – salted, spiced and sweetened products- chikkis, Sing bhujia.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Various methods involved in processing of ready to eat baked products
- Various methods involved in processing of extruded snack foods
- Technology involved in processing different coated nuts

UNIT IV

Technology for ready-to-cook food products- different puddings and curried vegetables etc. Technology for ready-to-cook and ready to eat meat and meat food products. Technology for preparation of instant cooked rice, carrot and other cereals based food products.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Technology involved in processing different ready to cook food products
- Technology involved in processing different ready to cook and ready to eat meat and meat products
- Technology involved in processing different instant cooked cereal products

UNIT – V

Technology of ready to eat instant premixes based on cereals, pulses etc. Technology for RTE puffed snack- sand puffing, hot air puffing, explosion puffing, gun puffing etc. Technology for preparation of traditional Indian dairy products.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Technology involved in processing different ready to eat instant premixes based on cereals and pulses and etc.
- Technology involved in processing different RTE puffed snacks
- Technology involved in processing different traditional dairy products

Course Outcomes:

By end of the course students will understand

- Technology for processing ready to eat and ready cook different products and equipment used for manufacturing of RTE products

TEXT BOOKS

1. Edmund WL. "Snack Foods Processing". AVI Publ.
2. Kamaliya M.K and Kamaliya K.B. 2001. Vol.1 and 2, "Baking Science and Industries", M.K.Kamaliya Publisher, Anand.

REFERENCES

1. Frame ND . "Technology of Extrusion Cooking". Blackie Academic1994. .
2. Gordon BR. "Snack Food", AVI Publ, 1997.
3. Samuel AM. "Snack Food Technology", AVI Publ. 1976.

(19A54704a) NUMERICAL METHODS FOR ENGINEERS
OPEN ELECTIVE-III
(ECE , CSE, IT & CIVIL)

Course objectives:

This course aims at providing the student with the knowledge on various numerical methods for solving equations, interpolating the polynomials, evaluation of integral equations and solution of differential equations.

UNIT-I:

Solution of Algebraic & Transcendental Equations:

Introduction-Bisection method-Iterative method-Regula falsi method-Newton Raphson method. System of Algebraic equations: Gauss Jordan method-Gauss Siedal method.

Learning Outcomes:

Students will be able to

- Calculate the roots of equation using Bisection method and Iterative method.
- Calculate the roots of equation using Regula falsi method and Newton Raphson method.
- Solve the system of algebraic equations using Gauss Jordan method and Gauss Siedal method.

UNIT-II:

Curve Fitting

Principle of Least squares- Fitting of curves- Fitting of linear, quadratic and exponential curves.

Learning Outcomes:

Students will be able to

- understand curve fitting
- understand fitting of several types of curves

UNIT-III:

Interpolation

Finite differences-Newton's forward and backward interpolation formulae – Lagrange's formulae. Gauss forward and backward formula, Stirling's formula, Bessel's formula.

Learning Outcomes:

Students will be able to

- Understand the concept of interpolation.
- Derive interpolating polynomial using Newton's forward and backward formulae.
- Derive interpolating polynomial using Lagrange's formulae.
- Derive interpolating polynomial using Gauss forward and backward formulae.

UNIT-IV:**Numerical Integration**

Numerical Integration: Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule

Learning Outcomes:

Students will be able to

- Solve integral equations using Simpson's 1/3 and Simpson's 3/8 rule.
- Solve integral equations using Trapezoidal rule.

UNIT-V:**Solution of Initial value problems to Ordinary differential equations**

Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Modified Euler's Method-Runge-Kutta Methods.

Learning Outcomes:

Students will be able to

- Solve initial value problems to ordinary differential equations using Taylor's method.
- Solve initial value problems to ordinary differential equations using Euler's method and Runge Kutta methods.

Course Outcomes:

After the completion of course, students will be able to

- Apply numerical methods to solve algebraic and transcendental equations.
- Understand fitting of several kinds of curves.
- Derive interpolating polynomials using interpolation formulae.
- Solve differential and integral equations numerically.

Text Books:

1. B.S.Grewal, "Higher Engineering Mathematics", Khanna publishers.
2. Ronald E. "Probability and Statistics for Engineers and Scientists", Walpole, PNIE.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India

Reference Books:

1. B.V.Ramana, "Higher Engineering Mathematics", Mc Graw Hill publishers.
2. Alan Jeffrey, "Advanced Engineering Mathematics", Elsevier.

(19A51704a) CHEMISTRY OF NANOMATERIALS AND APPLICATIONS

Course Objectives:

- To understand synthetic principles of Nanomaterials by various methods
- And also characterise the synthetic nanomaterials by various instrumental methods
- To enumerate the applications of nanomaterials in engineering

Unit I:

Introduction: Scope of nanoscience and nanotechnology, nanoscience in nature, classification of nanostructured materials, importance of nano materials.

Synthetic Methods: Bottom-Up approach:- Sol-gel synthesis, microemulsions or reverse micelles, co-precipitation method, solvothermal synthesis, hydrothermal synthesis, microwave heating synthesis and sonochemical synthesis.

Learning Outcomes:

At the end of this unit, the students will be able to

- Classify the nanostructure materials (L2)
- Describe scope of nano science and technology (L2)
- Explain different synthetic methods of nano materials (L2)
- Identify the synthetic methods of nanomaterial which is suitable for preparation of particular material (L3)

UNIT-II

Top-Down approach:- Inert gas condensation, arc discharge method, aerosol synthesis, plasma arc technique, ion sputtering, laser ablation, laser pyrolysis, and chemical vapour deposition method, electrodeposition method, high energy ball milling.

Learning Outcomes:

At the end of this unit, the students will be able to

- Describe the top down approach (L2)
- Explain aerosol synthesis and plasma arc technique (L2)
- Differentiate chemical vapour deposition method and electrodeposition method (L2)
- Discuss about high energy ball milling (L3)

UNIT-III

Techniques for characterization: Diffraction technique, spectroscopy techniques, electron microscopy techniques for the characterization of nanomaterials, BET method for surface area analysis, dynamic light scattering for particle size determination.

Learning Outcomes:

At the end of this unit, the students will be able to

- Discuss different technique for characterization of nanomaterial (L3)
- Explain electron microscopy techniques for characterization of nanomaterial (L3)
- Describe BET method for surface area analysis (L2)
- Apply different spectroscopic techniques for characterization (L3)

UNIT-IV

Studies of Nano-structured Materials: Synthesis, properties and applications of the following nanomaterials, fullerenes, carbon nanotubes, core-shell nanoparticles, nanoshells, self-assembled monolayers, and monolayer protected metal nanoparticles, nanocrystalline materials, magnetic nanoparticles and important properties in relation to nanomagnetic materials, thermoelectric materials, non-linear optical materials, liquid crystals.

Learning Outcomes:

At the end of this unit, the students will be able to

- Explain synthesis and properties and applications of nanomaterials (L2)
- Discuss about fullerenes and carbon nanotubes (L3)
- Differentiate nanomagnetic materials and thermoelectric materials (L2)
- Describe liquid crystals (L2)

UNIT.V

Engineering Applications of Nanomaterials

Learning Outcomes:

At the end of this unit, the students will be able to

- Illustrate applications of nanomaterials (L2)
- Discuss the magnetic applications of nanomaterials (L3)
- list the applications of non-linear optical materials (L1)

- Describe the applications fullerenes, carbon nanotubes (L2)

Course Outcome

At the end of the course, the student will be able to:

- Understand the state of art synthesis of nano materials
- Characterize nano materials using ion beam, scanning probe methodologies, position sensitive atom probe and spectroscopic ellipsometry.
- Analyze nanoscale structure in metals, polymers and ceramics
- Analyze structure-property relationship in coarser scale structures
- Understand structures of carbon nano tubes

TEXT BOOKS:

1. **NANO: The Essentials** : T Pradeep, MaGraw-Hill, 2007.
2. **Textbook of Nanoscience and nanotechnology**: B S Murty, P Shankar, Baldev Rai, BB Rath and James Murday, Univ. Press, 2012.

REFERENCE BOOKS:

1. Concepts of Nanochemistry; Ludovico Cademrtiri and Geoffrey A. Ozin & Geoffrey A. Ozin, Wiley-VCH, 2011.
2. **Nanostructures & Nanomaterials; Synthesis, Properties & Applications**: Guozhong Cao, Imperial College Press, 2007.
3. **Nanomaterials Chemistry**, C. N. R. Rao, Achim Muller, K.Cheetham, Wiley-VCH, 2007.

HUMANITIES ELECTIVE-II

(19A52701a) ORGANISATIONAL BEHAVIOUR

Course Objectives :

The objectives of this course are

- To make the student understand about the organizational behavior
- To enable them to develop self motivation, leadership and management
- To facilitate them to become powerful leaders
- Impart knowledge about group dynamics
- To make them understand the importance of change and development

Syllabus

UNIT-I

Organizational Behavior - Introduction to OB - Meaning and definition, scope - Organizing Process – Making organizing effective - Understanding Individual Behavior – Attitude - Perception - Learning - Personality Types

Learning Outcomes:

After completion of this unit student will

- Understand the concept of Organizational Behavior
- Contrast and compare Individual & Group Behavior and attitude
- Analyze Perceptions
- Evaluate personality types

UNIT-II

Motivation and Leading - Theories of Motivation - Maslow's Hierarchy of Needs - Herzberg's Two Factor Theory - Leading - Leading Vs Managing

Learning Outcomes:

After completion of this unit student will

- Understand the concept of Motivation
- Understand the Theories of motivation
- Explain how employees are motivated according to Maslow's Needs Hierarchy
- Compare and contrast leading and managing

UNIT-III

Leadership and Organizational Culture and Climate - Leadership - Traits Theory–Managerial Grid - Transactional Vs Transformational Leadership - Qualities of good Leader - Conflict Management - Evaluating Leader - Women and Corporate leadership.

Learning Outcomes:

After completion of this unit student will

- Know the concept of Leadership
- Contrast and compare Traits theory and Managerial Grid
- Know the difference between Transactional and Transformational Leadership
- Evaluate the qualities of good leaders
- Emerge as the good leader

UNIT – IV

Group Dynamics - Types of groups - Determinants of group behavior - Group process – Group Development - Group norms - Group cohesiveness - Small Groups - Group decision making - Team building - Conflict in the organization – Conflict resolution

Learning Outcomes:

After completion of this unit student will

- Know the concept of Group Dynamics
- Contrast and compare Group behavior and group development
- Analyze Group decision making
- Know how to resolve conflicts in the organization

UNIT - V

Organizational Change and Development - Organizational Culture - Changing the Culture – Change Management – Work Stress Management - Organizational management – Managerial implications of organization's change and development

Learning Outcomes:

- After completion of this unit student will
- Know the importance of organizational change and development
- Apply change management in the organization
- Analyze work stress management
- Evaluate Managerial implications of organization

Course outcomes:

At the end of the course, students will be able to

- Understand the nature and concept of Organizational behavior
- Apply theories of motivation to analyze the performance problems
- Analyze the different theories of leadership
- Evaluate group dynamics
- Develop as powerful leader

TEXT BOOKS:

1. Luthans, Fred, “Organisational Behaviour” , McGraw-Hill, 12 Th edition 2011
2. P Subba Rao, Organisational Behaviour, Himalya Publishing House 2017

REFERENCES BOOKS:

1. McShane, “Organizational Behaviour”, TMH 2009
2. Nelson, “Organisational Behaviour”, Thomson, 2009.
3. Robbins, P. Stephen, Timothy A. Judge, “Organisational Behaviour”, Pearson 2009.
4. Aswathappa, “Organisational Behaviour”, Himalaya, 2009

(19A52701b) MANAGEMENT SCIENCE

Course objectives :

The objectives of this course are

- To provide fundamental knowledge on Management, Administration, Organization & its concepts.
- To make the students understand the role of management in Production
- To impart the concept of HRM in order to have an idea on Recruitment, Selection, Training & Development, job evaluation and Merit rating concepts
- To create awareness on identify Strategic Management areas & the PERT/CPM for better Project Management
- To make the students aware of the contemporary issues in management

Syllabus

UNIT- I

INTRODUCTION TO MANAGEMENT

Management - Concept and meaning - Nature-Functions - Management as a Science and Art and both. Schools of Management Thought - Taylor's Scientific Theory-Henry Fayol's principles - Eltan Mayo's Human relations - Systems Theory - **Organisational Designs** - Line organization - Line & Staff Organization - Functional Organization - Matrix Organization - Project Organization - Committee form of Organization - Social responsibilities of Management.

Learning Outcomes:

At the end of the Unit, the learners will be able to

- Understand the concept of management and organization
- Apply the concepts & principles of management in real life industry.
- Analyze the organization chart & structure for an enterprise.
- Evaluate and interpret the theories and the modern organization theory.

UNIT II

OPERATIONS MANAGEMENT

Principles and Types of Plant Layout - Methods of Production (Job, batch and Mass Production), Work Study - Statistical Quality Control- Deming's contribution to Quality.

Material Management - Objectives - Inventory-Functions - Types, Inventory Techniques - EOQ-ABC Analysis - Purchase Procedure and Stores Management - **Marketing Management** - Concept - Meaning - Nature-Functions of Marketing - Marketing Mix - Channels of Distribution - Advertisement and Sales Promotion - Marketing Strategies based on Product Life Cycle.

Learning Outcomes:

At the end of the Unit, the learners will be able to

- Understand the core concepts of Management Science and Operations Management
- Apply the knowledge of Quality Control, Work-study principles in real life industry.
- Evaluate Materials departments & Determine EOQ
- Analyze Marketing Mix Strategies for an enterprise.
- Create and design advertising and sales promotion

UNIT III

HUMAN RESOURCES MANAGEMENT (HRM)

HRM - Definition and Meaning – Nature - Managerial and Operative functions - Evolution of HRM - Job Analysis - Human Resource Planning(HRP) - Employee Recruitment-Sources of Recruitment - Employee Selection - Process and Tests in Employee Selection - Employee Training and Development - On-the- job & Off-the-job training methods - Performance Appraisal Concept - Methods of Performance Appraisal – Placement - Employee Induction - Wage and Salary Administration

Learning Outcomes:

At the end if the Unit, the learners will

- Understand the concepts of HRM in Recruitment, Selection, Training & Development
- Apply Managerial and operative Functions
- Analyze the need of training
- Evaluate performance appraisal
- Design the basic structure of salaries and wages

UNIT IV STRATEGIC & PROJECT MANAGEMENT

Definition& Meaning - Setting of Vision - Mission - Goals - Corporate Planning Process - Environmental Scanning - Steps in Strategy Formulation and Implementation - SWOT Analysis - **Project Management** - Network Analysis - Programme Evaluation and Review Technique (PERT) - Critical Path Method (CPM) Identifying Critical Path - Probability of Completing the project within given time - Project Cost- Analysis - Project Crashing (Simple problems).

Learning Outcomes:

At the end of the Unit, the learners will be able to

- Understand Mission, Objectives, Goals & strategies for an enterprise
- Apply SWOT Analysis to strengthen the project
- Analyze Strategy formulation and implementation
- Evaluate PERT and CPM Techniques
- Creative in completing the projects within given time

UNIT V**CONTEMPORARY ISSUES IN MANAGEMENT**

The concept of Management Information System(MIS) - Materials Requirement Planning (MRP) - Customer Relations Management(CRM) - Total Quality Management (TQM) - Six Sigma Concept - Supply Chain Management(SCM) - Enterprise Resource Planning (ERP) - Performance Management - Business Process Outsourcing (BPO) - Business Process Re-engineering and Bench Marking - Balanced Score Card - Knowledge Management.

Learning Outcomes:

At the end if the Unit, the learners will be able to

- Understand modern management techniques
- Apply Knowledge in Understanding in modern
- Analyze CRM, MRP, TQM
- Evaluate Six Sigma concept and SCM

Course Outcomes:

At the end of the course, students will be able to

- Understand the concepts & principles of management and designs of organization in a practical world
- Apply the knowledge of Work-study principles & Quality Control techniques in industry
- Analyze the concepts of HRM in Recruitment, Selection and Training & Development.
- Evaluate PERT/CPM Techniques for projects of an enterprise and estimate time & cost of project & to analyze the business through SWOT.
- Create Modern technology in management science.

TEXT BOOKS:

1. A.R Aryasri, "Management Science", TMH, 2013
2. Stoner, Freeman, Gilbert, Management, Pearson Education, New Delhi, 2012.

REFERENCES:

1. Koontz & Weihrich, "Essentials of Management", 6th edition, TMH, 2005.
2. Thomas N.Duening & John M.Ivancevich, "Management Principles and Guidelines", Biztantra.
3. Kanishka Bedi, "Production and Operations Management", Oxford University Press, 2004.
4. Samuel C.Certo, "Modern Management", 9th edition, PHI, 2005

(19A52701c) BUSINESS ENVIRONMENT

Course Objectives :

The objectives of this course are

- To make the student understand about the business environment
- To enable them in knowing the importance of fiscal and monetary policy
- To facilitate them in understanding the export policy of the country
- Impart knowledge about the functioning and role of WTO
- Encourage the student in knowing the structure of stock markets

Syllabus

UNIT – I

An Overview of Business Environment – Types of Environment - Internal & External - Micro and Macro environment - Competitive structure of industries - Environmental analysis - Scope of business - Characteristics of business - Process & limitations of environmental analysis.

Learning Outcomes:

After completion of this unit student will

- Understand the concept of Business environment
- Explain various types of business environment
- Know about the environmental analysis of business
- Understand the business process

UNIT – II

FISCAL POLICY - Public Revenues - Public Expenditure - Public debt - Development activities financed by public expenditure - Evaluation of recent fiscal policy of Government of India - Highlights of Budget - **MONETARY POLICY** - Demand and Supply of Money – RBI -Objectives of monetary and credit policy - Recent trends - Role of Finance Commission.

Learning Outcomes:

After completion of this unit student will

- Understand the concept of public revenue and public Expenditure
- Explain the functions of RBI and its role
- Analyze the Monetary policy in India
- Know the recent trends and the role of Finance Commission in the development of our country

- Differentiate between Fiscal and Monetary Policy

UNIT – III

INDIA'S TRADE POLICY - Magnitude and direction of Indian International Trade - Bilateral and Multilateral Trade Agreements - EXIM policy and role of EXIM bank - **BALANCE OF PAYMENTS** – Structure & Major components - Causes for Disequilibrium in Balance of Payments - Correction measures.

Learning Outcomes:

After completion of this unit student will

- Understand the role of Indian international trade
- Understand and explain the need for Export and EXIM Policies
- Analyze causes for Disequilibrium and correction measure
- Differentiate between Bilateral and Multilateral Trade Agreements

UNIT – IV

WORLD TRADE ORGANIZATION - Nature and Scope - Organization and Structure - Role and functions of WTO in promoting world trade - Agreements in the Uruguay Round – TRIPS, TRIMS, and GATT - Dispute Settlement Mechanism - Dumping and Anti-dumping Measures.

Learning Outcomes:

After completion of this unit student will

- Understand the role of WTO in trade
- Analyze Agreements on trade by WTO
- Understand the Dispute Settlement Mechanism
- Compare and contrast the Dumping and Anti-dumping Measures.

UNIT – V

MONEY MARKETS AND CAPITAL MARKETS - Features and components of Indian financial systems - Objectives, features and structure of money markets and capital markets - Reforms and recent development – SEBI - Stock Exchanges - Investor protection and role of SEBI.

Learning Outcomes:

After completion of this unit student will

- Understand the components of Indian financial system

- Know the structure of Money markets and Capital markets
- Analyze the Stock Markets
- Apply the knowledge in future investments
- Understand the role of SEBI in investor protection.

Course Outcomes:

At the end of the course, students will be able to

- Understand various types of business environment.
- Understand the role of WTO
- Apply the knowledge of Money markets in future investment
- Analyze India's Trade Policy
- Evaluate fiscal and monetary policy
- Develop a personal synthesis and approach for identifying business opportunities

TEXT BOOKS:

1. Francis Cherunilam (2009), "International Business": Text and Cases, Prentice Hall of India.
2. K. Aswathappa, "Essentials of Business Environment": Texts and Cases & Exercises 13th Revised Edition. HPH 2016.

REFERENCE BOOKS:

1. K. V. Sivayya, V. B. M Das (2009), Indian Industrial Economy, Sultan Chand Publishers, New Delhi, India.
2. Sundaram, Black (2009), International Business Environment Text and Cases, Prentice Hall of India, New Delhi, India.
3. Chari. S. N (2009), International Business, Wiley India.
4. E. Bhattacharya (2009), International Business, Excel Publications, New Delhi.

(19A52701d) STRATEGIC MANAGEMENT

Course objectives :

The objectives of this course are

- To introduce the concepts of strategic management and understand its nature in
- competitive and organizational landscape
- To provide an understanding of internal and external analysis of a firm/individual
- To provide understanding of strategy formulation process and frame work
- Impart knowledge of Corporate culture
- Encourage the student in understanding SWOT analysis BCG Matrix

Syllabus

UNIT: I

Introduction of Strategic Management: meaning, nature, importance and relevance. The Strategic Management Process: – Corporate, Business and Functional Levels of strategy. Vision, mission and purpose –Business definition, objectives and goals – Stakeholders in business and their roles in strategic management. Balance scorecard.

Learning Outcomes:

After completion of this unit student will

- Understand the meaning and importance of strategic management
- Explain Strategic Management Process and Corporate, Business
- Know about the Business definition, objectives and goals
- Understand Stakeholders their roles in strategic management

UNIT: II

External and Internal Analysis: The Strategically relevant components of a Company's External Environment Analysis, Industry Analysis - Porter's Five Forces model – Industry driving forces – Key Success Factors. Analyzing a company's resources and competitive position

Learning Outcomes:

After completion of this unit student will

- Understand the components of a Company's environment
- Explain External Environment Analysis, Industry Analysis

- Know how to analyze industry competition through the Porter's Five Forces model
- Analyze Key Success Factors in a company's competitive position

UNIT: III

Competitive Strategies: Generic Competitive Strategies: Low cost, Differentiation, Focus. Grand Strategies: Stability, Growth (Diversification Strategies, Vertical Integration Strategies, Mergers, Acquisition & Takeover Strategies, Strategic Alliances & Collaborative Partnerships), Retrenchment, Outsourcing Strategies. Tailoring strategy to fit specific industry – Life Cycle Analysis - Emerging, Growing, Mature & Declining Industries.

Learning Outcomes:

After completion of this unit student will

- Understand the Competitive Strategies
- Explain Stability, Growth Mergers, Acquisition & Takeover Strategies
- Know about the Retrenchment, Outsourcing Strategies
- Differentiate Life Cycle Analysis, Mature & Declining Industries

UNIT: IV

Strategy Implementation and control - Strategy implementation; Organization Structure – Matching structure and strategy. Behavioral issues in implementation – Corporate culture – Mc Kinsey's 7s Framework. Functional issues – Functional plans and policies – Financial, Marketing, Operations, Personnel, IT.

Learning Outcomes:

After completion of this unit student will

- Understand the Organization Structure
- Explain Matching structure and strategy
- Know about the Corporate culture
- Analyze Functional plans and policies

Unit: V

Strategy Evaluation: Strategy Evaluation – Operations Control and Strategic Control- Relationship between a Company's Strategy and its Business Model.- SWOT analysis – Value Chain Analysis –Benchmarking- Portfolio Analysis: BCG Matrix – GE 9 Cell Model.

Learning Outcomes:

After completion of this unit student will

- Understand the Operations Control and Strategic Control
- Explain Company's Strategy and its Business Model
- Know about the SWOT analysis

- Analyze BCG Matrix and GE 9 Cell Model

Course Outcomes:

At the end of the course, students will be able to

- Understand the relevance and importance of strategic management
- Explain industry driving forces
- Analyze the competitive strategy
- Evaluate strategy implementation and control
- Create SWOT Analysis

Suggested Text Books and References

TEXT BOOKS:

1. Arthur A. Thompson Jr., AJ Strickland III, John E Gamble, “Crafting and Executing Strategy”, 18th edition, Tata McGraw Hill, 2012.
2. Subba Rao P, “Business Policy and Strategic Management” –HPH

REFERENCES:

1. Robert A. Pitts & David Lei, “Strategic Management: Building and Sustaining Competitive Advantage” 4th edition, Cengage Learning.
2. Hunger, J. David, “Essentials of Strategic Management” 5th edition, Pearson.
3. Ashwathappa, “Business Environment for Strategic Management”, HPH.

(19A52701e) E-BUSINESS

Course Objectives:

- To provide knowledge on emerging concept on E-Business related aspect.
- To understand various electronic markets models which are trending in India
- To give detailed information about electronic payment systems net banking.
- To exact awareness on internet advertising, market research strategies and supply chain management.
- To understand about various internet protocols-security related concept.

SYLLABUS

UNIT – I

Electronic Business: Definition of Electronic Business - Functions of Electronic Commerce (EC) - Advantages of E-Commerce – E-Commerce and E-Business Internet Services Online Shopping-Commerce Opportunities for Industries.

Learning Outcomes:

After completion of this unit student will

- Understand the concept of E-Business
- Contrast and compare E-Commerce E-Business
- Analyze Advantages of E-Commerce
- Evaluate opportunities of E-commerce for industry

UNIT – II

Electronic Markets and Business Models:E-Shops-E-Malls E-Groceries - Portals - Vertical Portals-Horizontal Portals - Advantages of Portals - Business Models-Business to Business(B2B)-Business to Customers(B2C)-Business to Government(B2G)-Auctions-B2B Portals in India

Learning Outcomes:

After completion of this unit student will

- Understand the concept of business models
- Contrast and compare Vertical portal and Horizontal portals
- Analyze Advantages of portals
- Explain the B2B,B2C and B2G model

UNIT – III

Electronic Payment Systems: Digital Payment Requirements-Designing E-payment System-Electronic Fund Transfer (EFT)-Electronic Data Interchange (EDT)-Credit Cards-Debit Cards-E-Cash-Electronic Cheques -Smart Cards-Net Banking-Digital Signature.

Learning Outcomes:

After completion of this unit student will

- Understand the Electronic payment system
- Contrast and compare EFT and EDT
- Analyze debit card and credit card
- Explain the on Digital signature

UNIT – IV

E-Security: Internet Protocols - Security on the Internet –Network and Website Security – Firewalls –Encryption – Access Control – Secure Electronic transactions.

Learning Outcomes:

After completion of this unit student will

- Understand E-Security
- Contrast and compare security and network
- Analyze Encryption
- Evaluate electronic transitions

UNIT – V

E-Marketing: Online Marketing – Advantages of Online Marketing – Internet Advertisement – Advertisement Methods – Conducting Online Online Market Research– Data mining and Marketing Research Marketing Strategy On the Web – E-Customer Relationship Management(e-CRM) –E- Supply Chain Management.(e-SCM) –New Trends in Supply Chain Management.

Learning Outcomes:

After completion of this unit student will

- Understand the concept of online marketing
- Analyze advantages of online marketing
- Compare the e-CRM and e-SCM
- Explain the New trends in supply chain management

Course Outcomes:

- They will be able to identify the priority of E-Commerce in the present globalised world.
- Will be able to understand E-market-Models which are practicing by the organization
- Will be able to recognize various E-payment systems & importance of net banking.
- By knowing E-advertisement, market research strategies, they can identify the importance of customer role.
- By understanding about E-security, they can ensure better access control to secure the information.

TEXT BOOKS:

3. C.S.V Murthy “E-Commerce”, Himalaya publication house, 2002.
4. P.T.S Joseph, “E-Commerce”, 4th Edition, Prentice Hall of India 2011

REFERENCES:

5. Kamallesh KBajaj, Debjani Na, “E-Commerce”, 2nd Edition TataMcGrwHills 2005
6. Dave Chaffey – “E-Commerce E-Management”, 2nd Edition, Pearson, 2012.
7. Henry Chan, “E-Commerce Fundamentals and Application”, Raymond Lee, Tharm Wiley India 2007
8. S. Jaiswall “E-Commerce”, Galgotia Publication Pvt Ltd 2003.

Note: All the experiments shall be conducted and there is no choice.

Microwave Engineering:

1. Set up the Full Microwave bench and know the importance of each block. Identify the pin configuration of Reflex Klystron with the help of its power supply cable connected from the power supply unit. Also identify the Microwave signal coupling from Klystron Oscillator to the waveguide.
2. Make use of the bench set up and conduct the experiment to find mode characteristics of Reflex Klystron: (i) Repeller voltage vs output power (ii) Repeller voltage vs Frequency.
3. Measurement of Frequency and wavelength of generated Microwave signal using Reflex Klystron oscillator.
4. Verify the negative resistance characteristics of Gunn oscillator using the Microwave bench set up with Gunn oscillator set up.
5. Find the Scattering matrix of E-plane, H-plane, and Magic Tees experimentally.
6. Make use of Microwave bench setup to find VSWR and impedance of an unknown load that is connected at the end of the bench set up. Make use of VSWR meter for the measurement of VSWR of a given load.
7. Determine directivity, insertion loss and coupling factor of a given Directional Coupler experimentally.
8. Making use of Microwave bench set up, find the radiation characteristics in both the planes and determine HPBW and directivity of a pyramidal horn antenna.

Optical Communication:

9. Conduct the experiment to draw the DC characteristics of LED and Photo diode.
10. Make use of Fiber optic kit to determine the **numerical aperture** and **bending losses** of a given optical fiber (transmission line).
11. Establish an optical link between transmitter and receiver and determine the signal strength at the receiver. Give the comments about the experiment by transmitting (i) **analog signal** (ii) **digital signal**.
12. Attenuation measurement in Fibers for various lengths.

Course Outcomes:

- Understand the mode characteristics of Reflex Klystron oscillator and negative resistance characteristics of Gunn Oscillator.
- Determine the Scattering matrix of given passive device experimentally and verify the same theoretically. Also determine numerical aperture and bending losses of a given optical fiber
- Analyze the radiation characteristics to find the directivity and HPBW of a given antenna.
- Establish optical link between transmitter and receiver **experimentally** to find attenuation and signal strength of the received signal.

(19A04702P) VLSI DESIGN LABORATORY

Objectives:

- To understand and develop HDL source code for the given problem/experiment
- To analyze the obtained results of the given experiment/problem
- To simulate the given circuit with suitable simulator and verify the results
- To understand how to use FPGA/CPLD hardware tools in the lab
- To design and implement the experiments using FPGA/CPLD hardware tools

List of Experiments:

PART (A): FPGA Level Implementation (Any Seven Experiments)

Note 1: The students need to develop VHDL Source code, perform simulation using relevant simulator and analyze the obtained simulation results using necessary synthesizer.

Note 2: All the experiments need to be implemented on the latest FPGA/CPLD Hardware in the Laboratory.

1. Realization of Logic gates

Design and Implementation of the following

2. 4-bit ripple carry and carry look ahead adder using behavioral, dataflow and structural modelling
 - a) 16:1 mux through 4:1 mux
 - b) 3:8 decoder realization through 2:4 decoder
3. 8:3 encoder
4. 8-bit parity generator and checker
5. Flip-Flops
6. 8 bit synchronous up-down counter
7. 4bit sequence detector through Mealy and Moore state machines.

EDA Tools/Hardware Required:

1. EDA Tool that supports FPGA Programming including Xilinx Vivado / Altera (Intel) / Cypress / Equivalent Industry Standard tool along with corresponding FPGA Hardware.
2. Desktop Computer with appropriate Operating system that supports the EDA tools.

PART (B): Back-end Level Design and Implementation (Any Five Experiments)

Note: The students need to design the following experiments at schematic level using CMOS logic and verify the functionality. Further students need to draw the corresponding layout and verify the functionality including parasites. Available state of the art technology libraries can be used while simulating the design using Industry standard EDA Tools.

Design and Implementation of the following

1. Universal Gates
2. an Inverter
3. Full Adder
4. Full Subtractor
5. Decoder
6. D-Flip-Flop

EDA Tools/Hardware Required:

1. Mentor Graphics Software / Cadence/Synopsys/Tanner or Equivalent Industry Standard Software/CAD Tool.
2. Desktop Computer with appropriate Operating system that supports the EDA tools.

Course Outcomes:

- Understand how to use FPGA/CPLD hardware tools in the lab.
- Develop HDL source code for the given problem/experiment, and simulate the given circuit with suitable simulator and verify the results.
- Analyze the obtained results of the given experiment/problem.
- Design and implement the experiments using FPGA/CPLD hardware tools.

List of Experiments

PART (A): Any Seven Experiments

Note 1: The students need to develop VHDL Source code, perform simulation using relevant simulator and analyze the obtained simulation results using necessary synthesizer.

Note 2: All the experiments need to be implemented on the latest FPGA/CPLD Hardware in the Laboratory.

1. Realization of Logic gates
2. Design and Implementation of 4-bit ripple carry and carry look ahead adder using behavioral, dataflow and structural modelling
3. Design and Implementation of
 - a. 16:1 mux through 4:1 mux
 - b. 3:8 decoder realization through 2:4 decoder
4. Design and Implementation of 8:3 encoder
5. Design and Implementation of 8-bit parity generator and checker
6. Design and Implementation of different Flip-Flops
7. Design and Implementation of 8 bit synchronous up-down counter
8. Design and Implementation of 4bit sequence detector through Mealy and Moore state machines.

Equipment/Software required:

1. FPGA Programming Software like Xilinx Vivado / Altera (Intel) / Cypress / Equivalent Industry Standard Software
2. FPGA Hardware like Xilinx / Altera (Intel) / Cypress / Equivalent Industry Standard Hardware
3. Personal computer system with necessary software to run the programs and Implement.

PART (B): Any Five Experiments

Note: The students need to design the schematic diagrams using CMOS logic and to draw the layout diagrams, to perform the following experiments using 130nm technology with the Industry standard EDA Tools.

1. Design and Implementation of Universal Gates
2. Design and Implementation of an Inverter
3. Design and Implementation of Full Adder
4. Design and Implementation of Full Subtractor
5. Design and Implementation of Decoder
6. Design and Implementation of D-Latch

Software Required:

1. Mentor Graphics Software / Cadence/Synopsys/Tanner or Equivalent Industry Standard Software/CAD Tool.
- b. Personal computer system with necessary software to run the programs and to implement.

(19A04801a) ADVANCED 3G AND 4G WIRELESS MOBILE COMMUNICATIONS
Professional Elective - IV

Course Objectives:

- To understand the concepts of wireless communications and standards (L1).
- To apply a wireless technique to solve engineering problem (L2).
- To analyze working of wireless technologies (L3).
- To evaluate a wireless technique in a given situation (L4).
- To plan a wireless system for deployment (L5).

UNIT-I:

Introduction to 3G and 4G standards.

Teletraffic Theory:

Introduction to teletraffic theory, Cellular traffic modelling and blocking probability.

Large Scale Path Loss:

Introduction to wireless propagation models, Ground reflection model, Okumura model, Hata model, Link budget analysis, Log normal shadowing.

Learning Outcomes:

At the end of the unit, student shall be able to

- Understand the concept of a standard, teletraffic and signal loss model (L1).
- Apply a model to study the signal losses (L2).
- Analyze the suitability of a model to a given situation (L3).
- Evaluate a model in a given situation (L4).
- Plan a wireless system for deployment (L5).

UNIT-II:

Small Scale Fading and Multipath:

Fading in wireless channel, Rayleigh fading, BER in wired and wireless channels. Wireless channel and delay spread, Coherence bandwidth of wireless channel, ISI and Doppler in wireless channel, Doppler spectrum and Jake's model.

Diversity Techniques:

Introduction to diversity techniques, MRC for multi-antenna system, BER with diversity, Spatial diversity and diversity order.

Learning Outcomes:

At the end of the unit, student shall be able to

- Understand the concept of fading and diversity (L1).
- Apply a diversity technique to improve BER (L2)
- Compare various diversity techniques (L3)
- Evaluate channel model in a given situation (L4)

UNIT-III:

Code Division Multiple Access

Introduction to CDMA, spread spectrum and LFSR. Generation and properties of PN sequences, Correlation of PN sequences and Jammer margin, CDMA advantages and RAKE receiver, Multiuser CDMA downlink, Multiuser CDMA uplink and asynchronous CDMA, CDMA near-far problem.

Learning Outcomes:

At the end of the unit, student shall be able to

- Understand the concept of PN sequence (L1).
- Apply CDMA in a multiuser environment (L2).
- Analyze near-far problem (L3).
- Evaluate CDMA technique in a multiuser environment (L4).

UNIT-IV:

Multiple Input Multiple Output Systems:

Introduction to MIMO, MIMO system model, Zero-forcing receiver, MIMO MMSE receiver, Introduction to SVD, SVD based optimal MIMO transmission and capacity, OSTBCs, V-blast receiver, MIMO beam forming.

Orthogonal Frequency Division Multiplexing:

Introduction to OFDM, Multicarrier modulation, IFFT sampling for OFDM, OFDM schematic, Cyclic prefix, OFDM based parallelization, OFDM examples.

Learning Outcomes:

At the end of the unit, student shall be able to

- Understand the concept of MIMO and OFDM (L1).
- Apply MIMO/ OFDM techniques in a given situation (L2).
- Analyze working of MIMO/ OFDM systems (L3).
- Evaluate aMIMO/ OFDM techniques in a given situation (L4).

UNIT-V:

MIMO-OFDM:

Introduction to MIMO-OFDM, Impact of carrier frequency offset in OFDM, PAPR in OFDM systems, Introduction to SC-FDMA.

3G and 4G Standards:

WCDMA, LTE/ LTE Advanced and WiMAX.

Learning Outcomes:

At the end of the unit, student shall be able to

- Understand 3G and 4G standards and the combined concept of MIMO-OFDM (L1).
- Apply MIMO-OFDM techniques in a given situation (L2).
- Analyze working of MIMO-OFDM systems (L3).
- Evaluate aMIMO-OFDM techniques in a given situation (L4).

Course Outcomes:

At the end of the course, the student should be able to

- Understand the concepts of wireless communications and standards (L1).
- Apply a wireless technique to solve engineering problem (L2).
- Analyze working of wireless technologies (L3).
- Evaluate a wireless technique in a given situation (L4).
- Plan a wireless system for deployment (L5).

REFERENCES:

1. Aditya K. Jagannatham, “Principles of Modern Wireless Communications Systems – Theory and Practice”, McGraw-Hill International, 2015.
2. Theodore S. Rappaport, “Wireless Communications – Principles and Practice”, 2nd Edition, PHI, 2004.
3. David Tse and Pramod Viswanath, “Fundamentals of Wireless Communications”, Cambridge University Press.
4. Andrea Goldsmith, “Wireless Communications”, Cambridge University Press.
5. Ezio Biglieri, “MIMO Wireless Communications”, Cambridge University Press.

(19A04801b) INTRODUCTION TO INTERNET OF THINGS

Professional Elective – IV

Course Objectives:

- To present interconnection and integration of the physical world and the cyber space.
- To demonstrate applications of Internet of Things
- To educate building blocks and characteristics of Internet of Things
- To introduce communication protocols used in Internet of Things
- To impart knowledge on design & develop IoT devices

UNIT-I

Introduction & Concepts: Introduction to Internet of Things, physical design of IoT, logical design of IoT, IoT enabling Technologies, IoT levels.

Learning Outcomes:

At the end of the unit, student shall be able to

- Explain characteristics, protocols, functional blocks of IoT (L2)
- Explain physical and logical design of IoT (L2)
- Categorize different levels of IoT (L4)

UNIT –II

Domain Specific IOTs: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style.

Learning Outcomes:

At the end of the unit, student shall be able to

- Categorize different domains where IoT can be applied (L4)
- Select physical design components for real time applications (L3)

UNIT –III

M2M & System Management with NETCONF-YANG: M2M, Difference between IOT and M2M, SDN and NFV for IOT, Software defined Networking, Network Function Virtualization, Need for IOT Systems Management, Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IOT Systems management with NETCONF-YANG.

Learning Outcomes:

At the end of the unit, student shall be able to

- Describe concept of M2M and differentiate it with IoT (L2)
- Explain about SDN and NFV for IoT (L2)
- Examine NETCONF and YANG modelling language for IoT (L4)

UNIT –IV

Internet of Things Systems - Logical Design using Python: Introduction, Motivation for using Python, Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/ Time Operations, Classes, Python Packages of Interest for IoT.

Learning Outcomes:

At the end of the unit, student shall be able to

- Explain the data manipulation and file handling using Python (L2)
- Apply various Python packages of interest for IoT (L3)

UNIT-V

IOT Physical Devices & Endpoints: What is an IOT Device, Exemplary Device, Board, Linux on Raspberry Pi, Interfaces, and Programming with Python; Python web application framework – Django, Designing a Restful web API.

Learning Outcomes:

At the end of the unit, student shall be able to

- Discuss about Django and RESTful web API with respect to IoT (L5)
- Design IoT applications using Raspberry Pi (L6)

Course Outcomes:

- Examine the application areas of IoT (L4)
- Illustrate revolution of Internet in Mobile Devices, Cloud & Sensor Networks (L2)
- Examine communication protocols used in IoT (L4)
- Make use of python programming to implement Internet of Things (L3)
- Design IoT applications using Raspberry Pi (L6)

TEXT BOOKS:

1. Vijay Madisetti, ArshdeepBahga, “Internet of Things A Hands-On- Approach”,2014.

REFERENCES:

1. Matt Richardson & Shane Wallace, Getting Started with Raspberry Pi, O'Reilly (SPD), 2014.
2. Adrian McEwen, "Designing the Internet of Things", Wiley Publishers, 2013
3. Daniel Kellmerein, "The Silent Intelligence: The Internet of Things", 2013

(19A04801c) FUZZY SETS, LOGIC AND SYSTEMS & APPLICATIONS
(Professional Elective IV)

Course Objectives:

- To introduce fuzzy sets, logic and systems from an engineering perspective.
- To provide solid foundation of fundamental concepts of fuzzy logic, systems and its applications.
- To teach about the concept of fuzziness involved in various systems.
- To expose to the concepts of neural networks.
- To explain how neuro-fuzzy concepts can be used for solving real world problems.

UNIT – I

Introduction to Neuro–Fuzzy and Soft Computing, Fuzzy Sets, Basic Definition and Terminology, Set-theoretic Operations, Member Function Formulation and parameterization, Fuzzy set properties, Arithmetic operations on fuzzy numbers, complement, T-norm and S-norm on fuzzy sets, parameterized T-norm and parameterized S-norm.

Learning Outcomes:

At the end of the unit, student shall be able to

- Explain important features of Neuro – Fuzzy and Soft Computing (L2)
- Familiarize with basic definitions, notations and operations of fuzzy sets(L2)

UNIT – II

Fuzzy Rules and Fuzzy Reasoning, Extension Principle and Fuzzy Relations, Fuzzy If-Then Rules, Fuzzy Reasoning, Fuzzy Inference Systems – Introduction, Mamdani Fuzzy Models, – Sugeno Fuzzy Models, Tsukamoto Fuzzy Models, Input Space Partitioning and Fuzzy modeling

Learning Outcomes:

At the end of the unit, student shall be able to

- Understand concepts of Extension Principle and Fuzzy Relations (L2)
- Investigate different schemes of fuzzy reasoning(L3)
- Compare strengths and weaknesses of different fuzzy inference systems(L4)
- Compare different ways of partitioning the input space(L4)
- Understand features and problems of fuzzy modelling(L2)

UNIT – III

Neural networks: Adaptive networks, Introduction, architecture, backpropagation for feedforward networks, perceptrons, adaline, backpropagation for multilayer perceptrons, radial basis function networks, unsupervised learning, introduction, competitive learning networks, kohonen self-organizing networks

Learning Outcomes:

At the end of the unit, student shall be able to

- Explain architectures and learning procedures for adaptive networks(L2)
- Differentiate supervised and unsupervised learning (L2)
- Modelling problems with desired input-output data sets using supervised learning rules(L3)
- Analyze data without desired outputs using unsupervised learning(L4)

UNIT – IV

Neuro fuzzy modeling: Adaptive Neuro-Fuzzy Inference Systems (ANFIS), Architecture, Hybrid Learning Algorithm, Learning Methods that Cross-fertilize ANFIS and RBFN, Coactive Neuro Fuzzy Modeling, Framework, Neuron Functions for Adaptive Networks, Neuro Fuzzy Spectrum

Learning Outcomes:

At the end of the unit, student shall be able to

- Explain architecture & features of ANFIS (L2)
- Demonstrate RBFN is functionally equivalent to ANFIS(L2)
- Understand the nature of Coactive neuro fuzzy inference system from neural network perspective(L2)
- Characterize neuro fuzzy models using neuro fuzzy spectrum(L4)

UNIT- V

ANFIS Applications: Printed Character Recognition, Inverse Kinematics Problems , Automobile Fuel Efficiency Prediction, Nonlinear system identification, Channel equalization.

Learning Outcomes:

At the end of the unit, student shall be able to

- Examine several applications of ANFIS to a variety of domains viz., pattern recognition, robotics, nonlinear systems and adaptive signal processing (L4)

Course Outcomes:

After completion of the course students will be able to

- Identify and describe Fuzzy Logic and Neural Network techniques in building intelligent machines(L3)
- Apply Neural Network & Fuzzy Logic models to handle uncertainty and solve engineering problems (L3)
- Recognize the feasibility of applying a Neuro-Fuzzy model for a particular problem(L5)

TEXT BOOKS:

1. Neuro-“Fuzzy and Soft Computing”, J.S.R.Jang, C.T.Sun and E.Mizutani, PHI, 2004, Pearson Education.

REFERENCE BOOKS:

1. T.J. Ross: “Fuzzy Logic with Engineering Applications”, 3rd Ed., Wiley India Pvt. Ltd., 2011.
2. Neural Networks, “Fuzzy Logic and Genetic Algorithms”, S. Rajasekaran and G.A.V.Pai, PHI, 2003.
3. H.J. Zimmerman: Fuzzy Set Theory and its Application, 3rd Ed., Springer India Pvt. Ltd., 2006.
4. Kosko, B, “Neural Networks and Fuzzy Systems: A Dynamical Approach to Machine Intelligence”, Prentice Hall, NewDelhi, 2004.

(19A04801d) BIOMEDICAL SIGNAL PROCESSING

(Professional Elective IV)

Course Objectives:

- Describe the origin, properties and suitable models of important biological signals such as ECG and EEG.
- Interrelate the students mathematical and computational skills relevant to the field of biomedical signal processing.
- Introduce students to basic signal processing techniques in analyzing biological signals.
- Develop a thorough understanding on basics of ECG signal compression algorithms.
- Increase the student's awareness of the complexity of various biological phenomena and cultivate an understanding of the promises, challenges of the biomedical engineering.

UNIT- I:

Preliminaries:

Concept of Biological signals – Electrical, Mechanical, Chemical, Magnetic, Optical etc. Origin of electrical signal from Biological cell – Structure of Biological cell, Characteristics of Cell membrane, Distribution and movement of ions across the cell membrane, Generation of Biological cell Action Potential. Concept of Electrocardiogram (ECG), Electroencephalogram (EEG), Phonocardiogram (PCG), Electromyogram (EMG), Electroneurogram (ENG), Electrooculogram (EOG), Respiratory signals etc.

Learning Outcomes:

At the end of the unit, student shall be able to

- Understand the origin, properties of biomedical signals like ECG, EEG, PCG, ENG and EOG signals. (L1)
- Analyze the structure and characteristics of various signals. (L3)

UNIT -II:

Signal Conditioning:

Band limiting of different Biological signals, Representation of biological signals in analog, discrete and digital forms. **Filtering for Removal of artifacts** - Statistical Preliminaries, Time domain filtering - Synchronized Averaging, Moving Average Filter to Integration, Derivative-based operator, **Frequency Domain Filtering** – FIR and IIR methods for implementing Notch, band selective filters, Weiner, Adaptive Filtering concepts.

Learning Outcomes:

At the end of the unit, student shall be able to

- Understand classical and modern filtering and compression techniques required for biomedical signal processing. (L1)
- Compare different filtering techniques. (L3)

Unit -III:

Electrocardiogram (ECG) Analysis:

Concepts of morphological and rhythm analysis, Different types of arrhythmias, Derivative based Approaches for QRS Detection, Pan Tompkins Algorithm, Concepts of detecting the P, T waves, PR, ST intervals, QRS duration, etc. Heart Rate Variability (HRV) study and its importance.

Learning Outcomes:

At the end of the unit, student shall be able to

- Apply filters to remove noise, signal compression techniques & averaging technique on biomedical signals and extract the features of ECG signals. (L2)
- Analyze the nature of biomedical signals and related concepts, and event detection techniques for ECG signals(L3)

UNIT -IV:

EEG, EMG signals Analysis:

Basics of EEG and EMG signals. Signal strength, Signal entropy in time and frequency domain, Correlation coefficient, Envelop Extraction, Root Mean Square value, Zero-crossing rate, Form factor, Periodogram, Minimum phase correspondent, Power Spectral Density concepts in analyzing EEG and EMG signals.

Learning Outcomes:

At the end of the unit, student shall be able to

- Apply filters to remove noise, signal compression techniques and averaging technique on biomedical signals and extract the features of EEG and EMG signals. (L2)
- Analyze the nature of biomedical signals and related concepts, and event detection techniques for EEG and EMG signals. (L3)

UNIT -V:

Modelling of Biomedical Systems:

Motor unit firing pattern, Cardiac rhythm, Formants and pitch of speech, Point process, Parametric system modelling, Autoregressive model, Autocorrelation method, Application to random signals, Computation of model parameters, Levinson-Durbin algorithm, Computation of gain factor, Covariance method, Spectral matching and parameterization, Model order selection, Relation between AR and Cepstral coefficients, ARMA model, Sequential estimation of poles and zeros.

Learning Outcomes:

At the end of the unit, student shall be able to

- Demonstrate an ability to integrate different concepts to develop new models that suits current trends of Industries and analyze its performance. (L2)
- Develop an interest to simulate the models and validate its functionality in real time systems. (L5)

Course Outcomes:

- Understand the origin, properties of biomedical signals like ECG, EEG, PCG, ENG, EOG signals, modern filtering techniques.
- Apply filters to remove noise, signal compression techniques & averaging technique on biomedical signals to extract the features of ECE, EEG and EMG signals.
- Analyze the nature of biomedical signals and related concepts, and event detection techniques for ECG, EEG, and EMG signals. Also compare different filtering techniques.
- Develop an interest to simulate the models and validate its functionality in real time systems.

TEXT BOOKS

1. R M Rangayyan “Biomedical Signal Analysis: A case Based Approach”, IEEE Press, John Wiley & Sons. Inc, 2002.
2. Willis J. Tompkins, “Biomedical Digital Signal Processing”, EEE, PHI, 2004.
3. D C Reddy “Biomedical Signal Processing: Principles and Techniques”, Tata McGraw-Hill Publishing Co. Ltd, 2005.

REFERENCES:

1. Suresh R Devasahayam, “Signals and Systems in Biomedical Engineering: Physiological Systems Modeling and Signal Processing”, Springer, 3rd Edition, 2019.
2. J G Webster “Medical Instrumentation: Application & Design”, John Wiley & Sons Inc., 2001.

(19A04801e) ANALOG IC DESIGN
(Professional Elective IV)

Course Objectives:

The student will be able to

- Understand the behaviour of MOS Devices and Small-Signal & Large-Signal Modelling of MOS Transistor and Analog Sub-Circuits.
- Learn and understand CMOS Amplifiers like Differential Amplifiers, Cascode Amplifiers, Output Amplifiers, and Operational Amplifiers.
- Design and Develop the Analog CMOS Circuits for different Analog operations.

UNIT -I:

MOS Devices and Modelling: The MOS Transistor, Passive Components- Capacitor & Resistor, Integrated circuit Layout, CMOS Device Modelling - Simple MOS Large-Signal Model, Other Model Parameters, Small-Signal Model for the MOS Transistor, Computer Simulation Models, Sub-threshold MOS Model.

Learning Outcomes:

At the end of the unit, student shall be able to

- Understand the behaviour of MOS Devices (L1)
- Analyze Small-Signal and Large-Signal Modelling of MOS Transistor (L3)

UNIT -II:

Analog CMOS Sub-Circuits: MOS Switch, MOS Diode, MOS Active Resistor, Current Sinks and Sources, Current Mirrors-Current mirror with Beta Helper, Degeneration, Cascode current Mirror and Wilson Current Mirror, Current and Voltage References, Band gap Reference.

Learning Outcomes:

At the end of the unit, student shall be able to

- Design current mirror circuits using MOSFETs (L4)
- Compare different Current mirror Circuits. (L5)

UNIT -III:

CMOS Amplifiers: Inverters, Differential Amplifiers, Cascode Amplifiers, Current Amplifiers, Output Amplifiers, High Gain Amplifiers Architectures.

Learning Outcomes:

At the end of the unit, student shall be able to

- Analyze Analog circuits like Differential amplifiers, current amplifiers, inverters (L3)
- Design Amplifier circuits using MOSFETs (L4)

UNIT -IV:

CMOS Operational Amplifiers: Design of CMOS Op Amps, Compensation of Op Amps, Design of Two-Stage Op Amps, Power- Supply Rejection Ratio of Two-Stage Op Amps, Cascode Op Amps, Measurement Techniques of OP Amp.

Learning Outcomes:

At the end of the unit, student shall be able to

- Implement Analog Circuits using Op Amps in real time applications. (L3)
- Model and simulate different MOS Devices using small signal Model. (L4)

UNIT -V:

Comparators: Characterization of Comparator, Two-Stage, Open-Loop Comparators, Other Open-Loop Comparators, Improving the Performance of Open-Loop Comparators, Discrete-Time Comparators.

Learning Outcomes:

At the end of the unit, student shall be able to

- Characterize two stage and open loop Comparators (L2)
- Design Comparator circuits using MOSFET (L4)

Course Outcomes:

- Understand the behaviour of MOS Devices.
- Characterize two stage and open loop Comparators.
- Analyze and derive Small-Signal and Large-Signal Modelling of MOS Transistors for analog applications like Differential amplifiers, current amplifiers, inverters.
- Design current mirror circuits using MOSFETs and CMOS amplifier circuits for real time amplification applications.
- Develop Op-Amp based analog circuits.

TEXT BOOKS:

1. Design of Analog CMOS Integrated Circuits- Behzad Razavi, TMH Edition, Second Edition.
2. CMOS Analog Circuit Design - Philip E. Allen and Douglas R. Holberg, Oxford University Press, International Second Edition/Indian Edition, 2010.

REFERENCES:

1. Paul R. Gray, Paul J. Hurst, S. Lewis and R. G. Meyer, "Analysis and Design of Analog Integrated Circuits", Wiley India, Fifth Edition, 2010.
2. David A. Johns, Ken Martin, "Analog Integrated Circuit Design", Wiley Student Edition, 2013.

(19A01802a) DISASTER MANGEMENT
OPEN ELECTIVE-IV

Course Objectives:

The objective of this course is to:

- Develop an understanding of why and how the modern disaster manager is involved with pre-disaster and post-disaster activities.
- Develop an awareness of the chronological phases of natural disaster response and refugee relief operations. Understand how the phases of each are parallel and how they differ.
- Understand the ‘relief system’ and the ‘disaster victim.’
- Describe the three planning strategies useful in mitigation.
- Identify the regulatory controls used in hazard management.
- Describe public awareness and economic incentive possibilities.
- Understand the tools of post-disaster management.

SYLLABUS

UNIT-I:

Natural Hazards And Disaster Management: Introduction of DM – Inter disciplinary -nature of the subject– Disaster Management cycle – Five priorities for action. Case study methods of the following: floods, draughts – Earthquakes – global warming, cyclones & Tsunamis – Post Tsunami hazards along the Indian coast – landslides.

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the natural hazards and its management
- To understand about the global warming, cyclones and tsunamis

UNIT-II:

Man Made Disaster And Their Management Along With Case Study Methods Of The Following: Fire hazards – transport hazard dynamics – solid waste management – post disaster – bio terroritism -threat in mega cities, rail and air craft’s accidents, and Emerging infectious diseases & Aids and their management.

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the fire hazards and solid waste management
- To understand about the emerging infectious diseases and aids their management.

UNIT-III:

Risk and Vulnerability: Building codes and land use planning – social vulnerability – environmental vulnerability – Macroeconomic management and sustainable development, climate change risk rendition – financial management of disaster – related losses.

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the regulations of building codes and land use planning related to risk and vulnerability.
- To understand about the financial management of disaster and related losses

UNIT-IV:

Role Of Technology In Disaster Managements: Disaster management for infra structures, taxonomy of infra structure – treatment plants and process facilities-electrical substations-roads and bridges- mitigation programme for earth quakes –flowchart, geospatial information in agriculture drought assessment-multimedia technology in disaster risk management and training- transformable indigenous knowledge in disaster reduction.

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the technological aspects of disaster management
- To understand about the factors for disaster reduction

UNIT-V:

Education and Community Preparedness: Education in disaster risk reduction-Essentials of school disaster education-Community capacity and disaster resilience-Community based disaster recovery -Community based disaster management and social capital-Designing resilience- building community capacity for action.

Learning Outcomes:

After completing this Unit, students will be able to

- To impart the education related to risk reduction in schools and communities

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- Affirm the usefulness of integrating management principles in disaster mitigation work
- Distinguish between the different approaches needed to manage pre- during and post-disaster periods
- Explain the process of risk management
- Relate to risk transfer

TEXT BOOKS

1. Rajib shah & R R Krishnamurthy “Disaster Management” – Global Challenges and Local Solutions’ Universities press. (2009),
2. Tushar Bhattacharya, “Disaster Science & Management” Tata McGraw Hill Education Pvt. Ltd., New Delhi.
3. Jagbir Singh “Disaster Management” – Future Challenges and Opportunities’ I K International Publishing House Pvt. Ltd. (2007),

REFERENCE BOOKS

1. Harsh. K . Gupta “Disaster Management edited”, Universities press, 2003.

(19A01802b) GLOBAL WARMING AND CLIMATE CHANGES
OPEN ELECTIVE-IV

Course Objectives:

The objective of this course is to:

- To know the basics, importance of global warming.
- To know the concepts of mitigation measures against global warming
- To know the impacts of climate changes

UNIT I

EARTH'S CLIMATE SYSTEM:

Introduction to environment, Ozone, ozone layer and its functions, Ozone depletion and ozone hole, Vienna convention and Montreal protocol, Green house gases and green house effect, Hydrological cycle and Carbon cycle, Global warming and its impacts

Learning Outcomes:

After completing this Unit, students will be able to

- To identify the importance of Ozone and effect of green house gases
- To know the effect of global warming

UNIT II

ATMOSPHERE & ITS COMPONENTS: Atmosphere and its layers-Characteristics of Atmosphere - Structure of Atmosphere - Composition of Atmosphere - Atmospheric stability - Temperature profile of the atmosphere - Temperature inversion and effects of inversion on pollution dispersion.

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the layers of atmosphere and their characteristics

UNIT III

IMPACTS OF CLIMATE CHANGE : Causes of Climate change - Change of Temperature in the environment - Melting of ice and sea level rise - Impacts of Climate Change on various sectors - Projected impacts for different regions, uncertainties in the projected impacts and risk of irreversible changes.

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the causes of climate change and its effects on various sectors.

UNIT IV

OBSERVED CHANGES AND ITS CAUSES: Climate change and Carbon credits-Clean Development Mechanism (CDM), CDM in India - Kyoto Protocol - Intergovernmental Panel on Climate Change (IPCC) - Climate Sensitivity - Montreal Protocol - United Nations Framework Convention on Climate Change (UNFCCC) - Global change in temperature and climate and changes within India

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the causes of climate change and carbon credits, effect of change in temperature and climate on india.

UNIT V

CLIMATE CHANGE AND MITIGATION MEASURES: CDM and Carbon Trading - Clean Technology, biodiesel, compost, biodegradable plastics - Renewable energy usage as an alternative - Mitigation Technologies and Practices within India and around the world - Non-renewable energy supply to all sectors - Carbon sequestration - International and regional cooperation for waste disposalbiomedical wastes, hazardous wastes, e-wastes, industrial wastes, etc.,

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the clean technology, use of renewable energy, mitigation technologies and their practices.

Course Outcomes

Upon the successful completion of this course, the students will be able to:

- An ability to apply knowledge of mathematics, science, and engineering
- Design a system, component or process to meet desired needs with in realistic constraints such as economic ,environmental ,social ,political ,ethical ,health and safety , manufacturability and sustainability
- An ability to identify, formulate, and solve engineering problems

REFERENCE BOOKS

1. Dash Sushil Kumar, “Climate Change – An Indian Perspective”, Cambridge University Press India Private limited 2007.
2. Adaptation and mitigation of climate change-Scientific Technical Analysis. Cambridge University Press ,Cambridge,2006.
3. Atmospheric Science, J.M. Wallace and P.V. Hobbs, Elsevier / Academic Press 2006.
4. Jan C. van Dam, Impacts of “Climate Change and Climate Variability on Hydrological Regimes”, Cambridge university press ,2003.
5. David Archer, Global Warming: Understanding the Forecast, 2 nd ed. (Wiley, 2011
6. John Houghton, Global Warming: The Complete Briefing, 5th Edition, 2015, Cambridge Univ. Press. Useful

(19A02802a) IoT APPLICATIONS IN ELECTRICAL ENGINEERING

(OE-IV)

Course Objectives:

- To learn about a few applications of Internet of Things
- To distinguish between motion less and motion detectors as IoT applications
- To know about Micro Electro Mechanical Systems (MEMS) fundamentals in design and fabrication process
- To understand about applications of IoT in smart grid
- To introduce the new concept of Internet of Energy for various applications

UNIT-I:

Sensors

Definitions, Terminology, Classification, Temperature sensors, Thermoresistive, Resistance, temperature detectors, Silicon resistive thermistors, Semiconductor, Piezoelectric, Humidity and moisture sensors. Capacitive, Electrical conductivity, Thermal conductivity, time domain reflectometer, Pressure and Force sensors: Piezoresistive, Capacitive, force, strain and tactile sensors, Strain gauge, Piezoelectric

Learning Outcomes:

After completing this Unit, students will be able to

- To know about basic principles of sensors and their classification
- To learn about various motion less sensors
- To understand about Piezoelectric sensor applications to detect temperature, pressure etc.
- To understand about Capacitive sensors to detect temperature, force and pressure etc.
- To know about concepts of tactile sensors, for a few applications

UNIT-II:

Occupancy and Motion detectors

Capacitive occupancy, Inductive and magnetic, potentiometric - Position, displacement and level sensors, Potentiometric, Capacitive, Inductive, magnetic velocity and acceleration sensors, Capacitive, Piezoresistive, piezoelectric cables, Flow sensors, Electromagnetic, Acoustic sensors - Resistive microphones, Piezoelectric, Photo resistors

Learning Outcomes:

After completing this Unit, students will be able to

- To know about Capacitive occupancy
- To understand about Motion detectors
- To distinguish between Potentiometric, inductive and capacitive sensors for a few applications
- To learn about a few velocity and acceleration sensors
- To know about various flow sensors

UNIT-III:**MEMS**

Basic concepts of MEMS design, Beam/diaphragm mechanics, electrostatic actuation and fabrication, Process design of MEMS based sensors and actuators, Touch sensor, Pressure sensor, RF MEMS switches, Electric and Magnetic field sensors

Learning Outcomes:

After completing this Unit, students will be able to

- To understand about the basic concept of MEMS
- To know about electrostatic actuation
- To learn about process design of MEMS based sensors
- To learn about process design of MEMS based actuators
- To distinguish between RF switches with respect to electric and magnetic sensors

UNIT-IV:**IoT for Smart grid**

Driving factors, Generation level, Transmission level, Distribution level, Applications, Metering and monitoring applications, Standardization and interoperability, Smart home

Learning Outcomes:

After completing this Unit, students will be able to

- To get exposure fundamental applications of IoT to Smart grid
- To learn about driving factors of IoT in Generation level
- To learn about driving factors of IoT in Transmission level
- To learn about driving factors of IoT in Distribution level
- To distinguish between metering level and monitoring applications
- To get introduced to the concept of Smart home

UNIT-V:

IoE: Concept of Internet of Energy, Evaluation of IoE concept, Vision and motivation of IoE, Architecture, Energy routines, information sensing and processing issues, Energy internet as smart grid

Learning Outcomes:

After completing this Unit, students will be able to

- To get exposed the new concept of internet of energy
- To learn about architecture of IoE
- To know about energy routines
- To learn about information sensing and processing issues
- To understand the use of energy internet as smart grid

Course Outcomes:

- To get exposed to recent trends in few applications of IoT in Electrical Engineering
- To understand about usage of various types of motionless sensors
- To understand about usage of various types of motion detectors
- To get exposed to various applications of IoT in smart grid
- To get exposed to future working environment with Energy internet

TEXT BOOKS:

1. Jon S. Wilson, "Sensor Technology Hand book", Newnes Publisher, 2004
2. Tai Ran Hsu, "MEMS and Microsystems: Design and manufacture", 1st Edition, Mc Grawhill Education, 2017
3. Ersan Kabalci and Yasin Kabalci, "From Smart grid to Internet of Energy", 1st Edition, Academic Press, 2019

REFERENCE BOOKS:

1. Raj Kumar Buyya and Amir Vahid Dastjerdi, "Internet of Things: Principles and Paradigms", Kindle Edition, Morgan Kaufmann Publisher, 2016
2. Yen Kheng Tan and Mark Wong, "Energy Harvesting Systems for IoT Applications": Generation, Storage and Power Management, 1st Edition, CRC Press, 2019
3. RMD Sundaram Shriram, K. Vasudevan and Abhishek S. Nagarajan, "Internet of Things", Wiley, 2019

(19A02802b) SMART ELECTRIC GRID

(OE-IV)

Course Objectives:

- To learn about recent trends in grids as smart grid
- To understand about smart grid architecture and technologies
- To know about smart substations
- To learn about smart transmission systems
- To learn about smart distribution systems

UNIT-I:

Introduction to Smart Grid

Working definitions of Smart Grid and Associated Concepts – Smart Grid Functions – Traditional Power Grid and Smart Grid – New Technologies for Smart Grid – Advantages – Indian Smart Grid – Key Challenges for Smart Grid

Smart Grid Architecture: Components and Architecture of Smart Grid Design – Review of the proposed architectures for Smart Grid. The fundamental components of Smart Grid designs – Transmission Automation – Distribution Automation – Renewable Integration

Learning Outcomes:

After completing this Unit, students will be able to

- To understand basic definitions and architecture of Smart grid
- To learn about new technologies for smart grid
- To know about fundamental components of smart grid
- To understand key challenges of smart grid
- To understand the need for integration of Renewable energy sources

UNIT-II:

Smart grid Technologies

Characteristics of Smart grid, Micro grids, Definitions, Drives, benefits, types of Micro grid, building blocks, Renewable energy resources, needs in smart grid, integration impact, integration standards, Load frequency control, reactive power control, case studies and test beds

Learning Outcomes:

After completing this Unit, students will be able to

- To know about basic characteristic features of smart grid technologies

- To understand about definition, types, building blocks of Microgrids
- To know about integration requirements, standards of renewable energy sources in Microgrids
- To understand Load frequency and reactive power control of Microgrid
- To understand about Microgrid through a case study

UNIT-III:

Smart Substations

Protection, Monitoring and control devices, sensors, SCADA, Master stations, Remote terminal unit, interoperability and IEC 61850, Process level, Bay level, Station level, Benefits, role of substations in smart grid, Volt/VAR control equipment inside substation

Learning Outcomes:

After completing this Unit, students will be able to

- To know about protection, monitor and control devices in Smart substations
- To know about the importance of SCADA in substations
- To understand about interoperability and IEC 61850
- To know about role of substations in Smart grid
- To understand about Volt/VAR control equipment inside substation

UNIT-IV:

Smart Transmission

Energy Management systems, History, current technology, EMS for the smart grid, Wide Area Monitoring Systems (WAMS), protection & Control (WAMPC), needs in smart grid, Role of WAMPC smart grid, Drivers and benefits, Role of transmission systems in smart grid, Synchro Phasor Measurement Units (PMUs)

Learning Outcomes:

After completing this Unit, students will be able to

- To know about Energy Management Systems in smart transmission systems
- To understand about WAMPC
- To know about role of transmission systems in Smart grid
- To know about Synchro Phasor Measurement units

UNIT-V:

Smart Distribution Systems

DMS, DSCADA, trends in DSCADA and control, current and advanced DMSs, Voltage fluctuations, effect of voltage on customer load, Drivers, objectives and benefits, voltage-VAR

control, VAR control equipment on distribution feeders, implementation and optimization, FDIR - Fault Detection Isolation and Service restoration (FDIR), faults, objectives and benefits, equipment, implementation

Learning Outcomes:

After completing this Unit, students will be able to

- To know about DSCADA in Smart Distribution Systems
- To distinguish between current and advanced DMSs
- To know about occurrence of voltage fluctuations
- To understand about VAR control and equipment on distribution feeders
- To know about FDIR objectives and benefits

Course Outcomes:

- To be able to understand trends in Smart grids
- To understand the needs and roles of Smart substations
- To understand the needs and roles of Smart Transmission systems
- To understand the needs and roles of Smart Distribution systems
- To distinguish between SCADA and DSCADA systems in practical working environment

Text Books:

1. Stuart Borlase, “Smart Grids - Infrastructure, Technology and Solutions”, 1st edition, CRC Press, 2013
2. Gil Masters, “Renewable and Efficient Electric Power System”, 2nd edition, Wiley–IEEE Press, 2013.

Reference Books:

1. A.G. Phadke and J.S. Thorp, “Synchronized Phasor Measurements and their Applications”, Springer Edition, 2e, 2017.
2. T. Ackermann, “Wind Power in Power Systems”, Hoboken, NJ, USA, John Wiley, 2e, 2012.

(19A03802a) ENERGY CONSERVATION AND MANAGEMENT
OPEN ELECTIVE-IV

Course Objective:

- Familiarize present energy scenario, and energy auditing methods.
- Explain components of electrical systems, lighting systems and improvements in performance.
- Demonstrate different thermal systems, efficiency analysis, and energy conservation methods.
- Train on energy conservation in major utilities.
- Instruct principles of energy management and energy pricing.

UNIT I

Introduction: Energy – Power – Past & Present Scenario Of World; National Energy Consumption Data – Environmental Aspects Associated With Energy Utilization –Energy Auditing: Need, Types, Methodology And Barriers. Role Of Energy Managers. Instruments For Energy Auditing.

Learning Outcomes

At the end of this unit, the student will be able to

- Infer energy consumption patterns and environmental aspects of energy utilization. (I2)
- Outline energy auditing requirements, tools and methods. (I2)
- Identify the function of energy manager. (I3)

UNIT II

Electrical Systems: Components Of EB Billing – HT And LT Supply, Transformers, Cable Sizing, Concept Of Capacitors, Power Factor Improvement, Harmonics, Electric Motors – Motor Efficiency Computation, Energy Efficient Motors, Illumination – Lux, Lumens, Types Of Lighting, Efficacy, LED Lighting And Scope Of Economy In Illumination.

Learning Outcomes

At the end of this unit, the student will be able to

- Outline components of electricity billing, transmission and distribution. (I2)
- Analyze performance characteristics of transformers, capacitors, and electric motors. (I4)
- Examine power factor improvements, and electric motor efficiency. (I4)
- Evaluate lighting systems. (L4)

UNIT III

Thermal Systems: Stoichiometry, Boilers, Furnaces and Thermic Fluid Heaters – Efficiency Computation and Encon Measures. Steam: Distribution & Usage: Steam Traps, Condensate Recovery, Flash Steam Utilization, Insulators & Refractories.

Learning Outcomes

At the end of this unit, the student will be able to

- Determine efficiency of boilers, furnaces and other thermal systems. (15)
- Recommend energy conservation measures in thermal systems. (15)
- Justify steam systems in energy conservation. (14)

UNIT IV

Energy Conservation In Major Utilities: Pumps, Fans, Blowers, Compressed Air Systems, Refrigeration And Air Conditioning Systems – Cooling Towers – D.G. Sets.

Learning Outcomes

At the end of this unit, the student will be able to

- Explain energy conservation measures in major utilities. (12)
- Apply performance test criteria for fans, pumps, compressors, hvac systems. (13)
- Assess energy conservation in cooling towers and d.g. sets. (15)

UNIT V

Energy Management: Principles of Energy Management, Energy demand estimation, Organising and Managing Energy Management Programs, Energy pricing.

Learning Outcomes

At the end of this unit, the student will be able to

- Describe principles of energy management. (12)
- Assess energy demand and forecast. (15)
- Organize energy management programs. (16)
- Design elements of energy pricing. (16)

Course Outcomes:

At the end of this course, the student will be able to:

- Explain energy utilization and energy auditing methods.(12)
- Analyze electrical systems performance of electric motors and lighting systems.(14)
- Examine energy conservation methods in thermal systems.(14)
- Estimate efficiency of major utilities such as fans, pumps, compressed air systems, hvac and d.g. Sets. (14)

- Elaborate principles of energy management, programs, energy demand and energy pricing. (16)

TEXT BOOKS:

1. Energy Manager Training Manual (4 Volumes) Available At www.energymanagertraining.com, A Website Administered By Bureau Of Energy Efficiency (BEE), A Statutory Body Under Ministry Of Power, Government Of India, 2004.

REFERENCES:

1. Witte. L.C., P.S. Schmidt, D.R. Brown, "Industrial Energy Management and Utilisation" Hemisphere Publ, Washington, 1988.
2. Callaghn, P.W. "Design And Management For Energy Conservation", Pergamon Press, Oxford, 1981.
3. Dryden. I.G.C., "The Efficient Use Of Energy" Butterworths, London, 1982
4. Murphy. W.R. And G. Mc KAY, "Energy Management", Butterworths, London 1987.
5. Turner, W. C., Doty, S. and Truner, W. C., "Energy Management Hand book", 7th edition, Fairmont Press, 2009.
6. De, B. K., "Energy Management audit & Conservation", 2nd Edition, Vrinda Publication, 2010.
7. Smith, C. B., "Energy Management Principles", Pergamon Press, 2007.

(19A03802b) NON-DESTRUCTIVE TESTING
OPEN ELECTIVE-IV

Course Objectives

- Introduce basic concepts of non destructive testing.
- Familiarize with characteristics of ultrasonic test, transducers, rejection and effectiveness.
- Describe concept of liquid Penetrant, eddy current and magnetic particle tests, its applications and limitations.
- Explain the principles of infrared and thermal testing, applications and honey comb and sandwich structures case studies.
- Impart NDE and its applications in pressure vessels, casting and welded constructions.

UNIT I

Introduction to non-destructive testing: Radiographic test, Sources of X and Gamma Rays and their interaction with Matter, Radiographic equipment, Radiographic Techniques, Safety Aspects of Industrial Radiography.

Learning outcomes:

At the end of this unit, the student will be able to

- Explain non destructive testing techniques (L2)
- Summarize the basic concepts of Radiographic test (L2)
- Outline the concepts of sources of X and Gamma Rays (L2)
- Explain the radiographic techniques (L2)
- Discuss the safety aspects of industrial radiography. (L4)

UNIT II

Ultrasonic test: Principle of Wave Propagation, Reflection, Refraction, Diffraction, Mode Conversion and Attenuation, Sound Field, Piezo-electric Effect , Ultrasonic Transducers and their Characteristics, Ultrasonic Equipment and Variables Affecting Ultrasonic Test, Ultrasonic Testing, Interpretations and Guidelines for Acceptance, Rejection - Effectiveness and Limitations of Ultrasonic Testing.

Learning outcomes:

At the end of this unit, the student will be able to

- Explain the principle of ultrasonic test. (l2)
- Analyze the performance of wave propagation, reflection, refraction, diffraction and sound field in ultrasonic test. (l4)

- Discuss the characteristics of ultrasonic transducers. (14)
- Outline the limitations of ultrasonic testing. (12)

UNIT III

Liquid Penetrant Test: Liquid Penetrant Test, Basic Concepts, Liquid Penetrant System, Test Procedure, Effectiveness and Limitations of Liquid Penetrant Testing.

Eddy Current Test: Principle of Eddy Current, Eddy Current Test System, Applications of Eddy Current-Testing Effectiveness of Eddy Current Testing.

Magnetic Particle Test: Magnetic Materials, Magnetization of Materials, Demagnetization of Materials, Principle of Magnetic Particle Test, Magnetic Particle Test Equipment, Magnetic Particle Test Procedure, Standardization and Calibration, Interpretation and Evaluation, Effective Applications and Limitations of the Magnetic Particle Test.

Learning Outcomes:

At the end of this unit, the student will be able to

- Illustrate the procedure of Liquid Penetrant, eddy current and magnetic particle tests.(L2)
- Outline the limitations of Penetrant, eddy current and magnetic particle tests. (L2)
- Explain the effectiveness of Penetrant, eddy current and magnetic particle tests. (L2)
- Apply the applications of Magnetic particle test. (L3)

UNIT IV

Infrared And Thermal Testing: Introduction and fundamentals to infrared and thermal testing–Heat transfer –Active and passive techniques –Lock in and pulse thermography–Contact and non contact thermal inspection methods–Heat sensitive paints –Heat sensitive papers —thermally quenched phosphors liquid crystals –techniques for applying liquid crystals –other temperature sensitive coatings –Inspection methods –Infrared radiation and infrared detectors–thermo mechanical behavior of materials–IR imaging in aerospace applications, electronic components, Honey comb and sandwich structures–Case studies.

Learning Outcomes:

At the end of this unit, the student will be able to

- Discuss the fundamentals of thermal testing. (16)
- Explain the techniques of liquid crystals, active and passive. (12)
- Illustrate thermal inspection methods. (12)
- Outline the limitations of thermal testing. (12)
- Explain the applications of honey comb and sandwich structures. (12)

UNIT V

Industrial Applications of NDE: Span of NDE Activities Railways, Nuclear, Non-nuclear and Chemical Industries, Aircraft and Aerospace Industries, Automotive Industries, Offshore Gas and Petroleum Projects, Coal Mining Industry, NDE of pressure vessels, castings, welded constructions

Learning Outcomes:

At the end of this unit, the student will be able to

- Illustrate applications of NDE. (L2)
- Explain the applications of Railways, Nuclear and chemical industries. (L2)
- Outline the limitations and disadvantages of NDE. (L2)
- Explain the applications of NDA of pressure vessels, casting and welding constructions (L2)

Course Outcomes

At the end of the course, student will be able to

- Explain various methods of non-destructive testing. (l3)
- Apply relevant non-destructive testing method different applications. (l3)
- Explain the applications of railways, nuclear and chemical industries. (l2)
- Outline the limitations and disadvantages of nde. (l2)
- Explain the applications of nda of pressure vessels, casting and welding constructions (l2)

TEXT BOOKS:

1. J Prasad, GCK Nair , “Non destructive test and evaluation of Materials”, Tata mcgraw-Hill Education Publishers, 2008.
2. Josef Krautkrämer, Herbert Krautkrämer, “Ultrasonic testing of materials”, 3rd edition, Springer-Verlag, 1983.
3. X. P. V. Maldague, “Non destructive evaluation of materials by infrared thermography”, 1st edition, Springer-Verlag, 1993.

REFERENCES:

1. Gary L. Workman, Patrick O. Moore, Doron Kishoni, “Non-destructive, Hand Book, Ultrasonic Testing”, 3rd edition, Amer Society for Nondestructive, 2007.
2. ASTM Standards, Vol 3.01, Metals and alloys

Social Relevant Projects

1. Solid waste conversion into energy (Gasification)
2. Plastic waste into fuel.
3. Bio-gas digester.
4. Development of mechanisms for farmers.

5. Smart irrigation for saving water.
6. Mechanized water segregation.
7. Applications of solar technologies for rural purpose.
8. Power generation from wind turbine.
9. Applications of drones for agriculture.
10. Solar drying.

(19A04802a) INTRODUCTION TO IMAGE PROCESSING

OPEN ELECTIVE-IV

Course Objectives:

- To interpret fundamental concepts of digital image processing.
- To exemplify image enhancement.
- To interpret fundamental concepts of color image processing.
- To assess image compression techniques for digital images.
- To summarize segmentation for digital images.

UNIT-I:

INTRODUCTION TO DIGITAL IMAGE PROCESSING

Introduction: Digital image representation, Fundamental steps in image processing, Elements of digital image processing, Elements of visual perception, Simple image model, Sampling and Quantization, Basic relationships between pixels, Image transformations.

Applications: Medical imaging, Robot vision, Character recognition, Remote sensing.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the fundamental concepts of image processing, Sampling process and basis relationships between pixels (L1)
- Explain the elements of Digital Image Processing (L2)

UNIT-II:

IMAGE ENHANCEMENT

Need for image enhancement, Point processing, Histogram processing, Spatial filtering- Smoothing and Sharpening.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the need for enhancement process (L1)
- Explain the terminology involved in enhancement process (L2)

UNIT-III:

COLOR IMAGE PROCESSING

Colour fundamentals, Colour models, Color transformations, Pseudo colour image processing, Full colour image processing.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the need for enhancement process (L1)
- Explain the terminology involved in enhancement process (L2)

UNIT-IV:

IMAGE COMPRESSION

Redundancies, Fidelity criteria, Image compression model, Lossless compression: Huffman coding, Arithmetic coding. Lossy compression: Lossy Predictive Coding, JPEG Compression Standard.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the need for image compression (L1)
- Explain the image compression and various types of compression techniques

(L2)

UNIT-V:

IMAGE SEGMENTATION

Detection of discontinuities: point, line and edge detection, Edge linking and Boundary detections: Local Processing, Global processing via Hough transform, Thresholding, Region oriented segmentation: Region growing, Region splitting and merging.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the principle of image segmentation and its importance (L1)
- Explain the image compression and various types of compression techniques (L2)
- Analyze the various terminologies involved in image segmentation like edge, boundary detection etc. (L3)

Course Outcomes:

- Interpret fundamental concepts of digital and color image processing.
- Exemplify image enhancement.
- Analyze the various terminologies involved in image segmentation like edge, boundary detection etc. Assess image compression techniques for digital images.
- Summarize segmentation techniques for digital images.

TEXT BOOKS:

1. Rafael C. Gonzalez and Richard E. Woods, “Digital Image Processing”, 3rd Edition, Pearson Education, 2011.

REFERENCE BOOKS:

1. S Jayaraman, S Esakkirajan and T Veerakumar, “Digital Image Processing”, TMH, 2011.
2. S. Sridhar, “Digital Image Processing”, 2nd Edition, Oxford Publishers, 2016.

(19A04802b) PRINCIPLES OF CELLULAR AND MOBILE COMMUNICATIONS
OPEN ELECTIVE-IV

Course Objectives:

- To understand the concepts and operation of cellular systems.
- To apply the concepts of cellular systems to solve engineering problems.
- To analyse cellular systems for meaningful conclusions.
- To evaluate suitability of a cellular system in real time applications.
- To design cellular patterns based on frequency reuse factor.

UNIT-I:

Introduction to Cellular Mobile Systems

Why cellular mobile communication systems? A basic cellular system, Evolution of mobile radio communications, Performance criteria, Characteristics of mobile radio environment, Operation of cellular systems. Examples for analog and digital cellular systems.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand the concepts and operation of cellular systems (L1).
- Analyze the characteristics of mobile radio environment (L3).

UNIT-II:

Cellular Radio System Design

General description of the problem, Concept of frequency reuse channels, Cochannel interference reduction, Desired C/I ratio, Cell splitting and sectoring.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand the concept of frequency reuse and cochannel interference in cellular systems (L1).
- Apply the concept of cellular systems to solve engineering problems (L2).
- Analyze the design problems of cellular systems (L3).
- Design of cellular patterns based frequency reuse factor (L5).

UNIT-III:

Handoffs and Dropped Calls

Why handoffs and types of handoffs, Initiation of handoff, Delaying a handoff, Forced handoffs, Queuing of handoffs, Power-difference handoffs, Mobile assisted handoff and soft handoff, Cell-site handoff, Intersystem handoff. Introduction to dropped call rate.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand why handoff is required (L1).
- Apply handoff techniques to solve engineering problems (L2).
- Compare various types of handoffs (L3).

UNIT-IV:

Multiple Access Techniques for Wireless Communications

Introduction, Frequency Division Multiple Access, Time Division Multiple Access, Code Division Multiple Access and Space Division Multiple Access.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand various types of multiple access techniques (L1).
- Apply the concept of multiple access to solve engineering problems (L2).
- Compare various types of multiple access techniques (L3).

UNIT-V:

Digital Cellular Systems

Global System for Mobile Systems, Time Division Multiple Access Systems, Code Division Multiple Access Systems. Examples for 2G, 3G and 4G systems. Introduction to 5G system.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand operation of various types of digital cellular systems (L1).
- Compare various types of digital cellular systems (L3).
- Evaluate suitability of a cellular system in real time applications (L4).

Note: The main emphasis is on qualitative treatment. Complex mathematical treatment may be avoided.

Course Outcomes:

At the end of the course, the student should be able to

- Understand the concepts and operation of cellular systems (L1)
- Apply the concepts of cellular systems to solve engineering problems (L2).
- Analyse cellular systems for meaningful conclusions, Evaluate suitability of a cellular system in real time applications (L3).
- Design cellular patterns based on frequency reuse factor (L4).

TEXT BOOKS:

1. William C. Y. Lee, “Mobile Cellular Telecommunications”, 2nd Edition, McGraw-Hill International, 1995.
2. Theodore S. Rappaport, “Wireless Communications – Principles and Practice”, 2nd Edition, PHI, 2004.

REFERENCES:

6. Aditya K. Jagannatham “Principles of Modern Wireless Communications Systems – Theory and Practice”, McGraw-Hill International, 2015.

Blooms’ Learning levels:

L1: Remembering and Understanding

L2: Applying

L3: Analyzing, Evaluating

L4: Designing, Creating

(19A04802c) INDUSTRIAL ELECTRONICS
OPEN ELECTIVE-IV

Course Objectives:

This course will enable students to:

- Describe semi-conductor devices (such as PN junction diode & Transistor) and their switching characteristics.
- Understand the characteristics of AC to DC converters.
- Understand about the practical applications Electronics in industries
- Describe the Ultrasonics and its application.

UNIT I

Scope of industrial Electronics, Semiconductors, Merits of semiconductors, crystalline structure, Intrinsic semiconductors, Extrinsic semiconductors, current flow in semiconductor, Open-circuited p-n junction, Diode resistance, Zener diode, Photoconductors and junction photo diodes, Photo voltaic effect, Light emitting diodes(LED).

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the importance of Electronics and semiconductor devices in industry, operation of semiconductor devices (L1)
- Describe the working of semiconductor diodes (L1)

UNIT II

Introduction, The junction transistor, Conventions for polarities of voltages and currents, Open circuited transistor, Transistor biased in the active region, Current components in transistors, Currents in a transistor, Emitter efficiency, Transport factor and transistor- α , Dynamic emitter resistance, Transistor as an amplifier, Transistor construction, Lettersymbols for semiconductor Devices, Characteristic curves of junction transistor in common configuration, static characteristic curves of PNP junction transistor in common emitter configuration, The transistor in common collector Configuration.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the working of Transistor and its different configurations (L1)
- Describe the working of CE, CC, CB configurations (L1)

UNIT III

AC to DC converters- Introduction, Classification of Rectifiers, Half wave Rectifiers, Fullwave Rectifiers, Comparison of Half wave and full wave rectifiers, Bridge Rectifiers, Bridge Rectifier meter, Voltage multiplying Rectifier circuits, Capacitor filter, LC Filter, Metal Rectifiers, Regulated Power Supplies, Classification of Voltage Regulators, Short period Accuracy of Regulators, Long period Accuracy of Voltage Regulator, Principle of automatic voltage Regulator, Simple D.C. Voltage stabilizer using Zener diode, D.C. Voltage Regulators, Series Voltage Regulators, Complete series voltage regulator circuit, Simple series voltage regulator.

UNIT IV

Resistance welding controls: Introduction, Resistance welding process, Basic Circuit for A.C. resistance welding, Types of Resistance welding, Electronic welding control used in Resistance welding, Energy storage welding. **Induction heating:** Principle of induction heating, Theory of Induction heating merits of induction heating, Application of induction heating, High frequency power source of induction heating. **Dielectric heating:** Principle of dielectric heating, theory of dielectric heating, dielectric properties of typical materials, electrodes used in dielectric heating, method of coupling of electrodes to the R.F. generator, Thermal losses in Dielectric heating, Applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the principle of operation of Resistance welding, Induction heating and Dielectric heating (L1)
- Apply the process of Resistance welding, Induction heating and Dielectric heating in the industry (L2)

UNIT V:

Ultrasonics: Introduction, Generation of Ultrasonic waves, Application of Ultrasonic waves, Ultrasonic stroboscope, ultrasonic as means of communication, ultrasonic flaw detection, Optical image on non-homogeneities, ultrasonic study of structure of matter, Dispersive study of structure of matter, Dispersive and colloidal effect of Ultrasonic, Coagulating action of Ultrasonic, separation of mixtures by ultrasonic waves, cutting and machining of hard materials by ultrasonic vibrations, Degassing of liquids by ultrasonic waves, Physio-chemical effects of ultrasonics, chemical effects of ultrasonics, Thermal effects of Ultrasonics, soldering and welding by ultrasonics, Ultrasonic Drying

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the principle of operation of Ultrasonics and its applications (L1)
- Analyze the thermal effects of Ultrasonics, soldering and welding by ultrasonics, Ultrasonic Drying in the industry (L3)

Course Outcome:

- Understand the semi-conductor devices and their switching characteristics.
- Apply the Ultrasonic waves with different applications
- Analyze the thermal effects of Ultrasonics, soldering and welding by ultrasonics, Ultrasonic Drying in the industry, Interpret the characteristics of AC to DC converters,
- Develop the practical applications Electronics in industries.

TEXT BOOKS:

1. G. K. Mithal, “Industrial Electronics”, Khanna Publishers, Delhi, 2000.
2. J.Gnanavadeivel, R.Dhanasekaran, P.Maruthupandi, “Industrial Electronics”, Anuradha Publications, 2011.

REFERENCE BOOKS:

1. F. D. Petruzulla, “Industrial Electronics”, McGraw Hill, Singapore, 1996.
2. M. H. Rashid, “power Electronics Circuits, Devices and Application”, PHI, 3rd edition, 2004.
3. G. M. Chute and R. D. Chute, “Electronics in Industry”, McGraw Hill Ltd, Tokyo, 1995.

(19A04802d) ELECTRONIC INSTRUMENTATION
OPEN ELECTIVE-IV

Course Objectives:

This course will enable students to:

- To introduce various measuring instruments and their functionality
- To teach various measurement metrics for performance analysis
- To explain principles of operation and working of different electronic instruments
- To familiarize the characteristics, operations, calibrations and applications of the different oscilloscopes and signal generators.
- To provide exposure to different types of transducers

UNIT – I

Measurement and Error: Definitions, Accuracy, Precision, Resolution and Significant Figures, Types of Errors, Measurement error combinations. (Text 2)

Ammeters: DC Ammeter, Multi-range Ammeter, The Ayrton Shunt or Universal Shunt, Requirements of Shunt, Extending of Ammeter Ranges, RF Ammeter (Thermocouple), Limitations of Thermocouple. (Text 1)

Voltmeters and Multi-meters: Introduction, Basic Meter as a DC Voltmeter, DC Voltmeter, Multi range Voltmeter, Extending Voltmeter Ranges, Loading, AC Voltmeter using Rectifiers. True RMS Voltmeter, Multi-meter. (Text 1)

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the importance of measurement system (L1)
- Examine the characteristics of different Instruments (L2)
- Illustrate different types of errors that may occur in instruments during measurements (L2)

UNIT – II

Digital Voltmeters: Introduction, RAMP technique, Dual Slope Integrating Type DVM, Integrating Type DVM, Most Commonly used principles of ADC, Successive Approximations, -Digit, Resolution and Sensitivity of Digital Meters, General Specifications of DVM, (Text 1)

Digital Instruments: Introduction, Digital Multi-meters, Digital Frequency Meter, Digital Measurement of Time, Universal Counter, Digital Tachometer, Digital pH Meter, Digital Phase Meter, Digital Capacitance Meter, (Text 1)

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain working of digital measuring Instruments (L2)
- Compare the various measuring techniques for measuring voltage (L4)

UNIT – III

Oscilloscopes: Introduction, Basic principles, CRT features, Block diagram of Oscilloscope, Simple CRO, Vertical Amplifier, Horizontal Deflecting System, Sweep or Time Base Generator, Measurement of Frequency by Lissajous Method, Digital Storage Oscilloscope. (Text 1)

Signal Generators: Introduction, Fixed and Variable AF Oscillator, Standard Signal Generator, Laboratory Type Signal Generator, AF sine and Square Wave Generator, Function Generator, (Text 1)

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe functions of basic building of CRO (L1)
- Measure parameters viz. Amplitude, frequency and time period using CRO (L2)
- Classify signal generators and describe its characteristics (L2)

UNIT – 4

Measuring Instruments: Field Strength Meter, Stroboscope, Phase Meter, Q Meter, Megger. (Text 1)

Bridges: Introduction, Wheatstone's bridge, Kelvin's Bridge; AC bridges, Capacitance Comparison Bridge, Inductance Comparison Bridge, Maxwell's bridge, Wien's bridge. (Text 1)

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe function of various measuring Instruments. (L1)
- Describe how unknown capacitance and inductance can be measured using bridges (L1)
- Select appropriate bridge for measuring R, L and C parameters (L2)

UNIT – 5

Transducers: Introduction, Electrical transducers, Selecting a transducer, Resistive transducer, Resistive position transducer, Strain gauges, Resistance thermometer, Thermistor, Inductive transducer, LVDT, Piezoelectric transducer, Photo cell, Photo voltaic cell, Semiconductor photo diode and transistor. (Text 1)

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the importance of transducer (L1)
- Illustrate different measuring techniques in transducers to measure physical quantities.(L2)
- Select the appropriate transducer for the measurement of physical parameters (L2)

Course outcomes:

- Learn different types of errors in measurement, calibration process and standards, various methods for measurement of non-electrical quantities, Understand the different methods for measurement of various electrical quantities.
- Familiarize the dynamics of instrument systems, various passive and active transducers
- Compare the various measuring techniques for measuring voltage (L4)

TEXT BOOKS:

- H. S. Kalsi, “Electronic Instrumentation”, McGraw Hill, 3rd Edition, 2012, ISBN:9780070702066.
- A. D. Helfrick and W.D. Cooper, “Modern Electronic Instrumentation and Measuring Techniques”, Pearson, 1st Edition, 2015, ISBN: 9789332556065.

REFERENCE BOOKS:

- David A. Bell, “Electronic Instrumentation & Measurements”, Oxford University Press PHI 2nd Edition, 2006 ISBN 81-203-2360-2.
- A. K. Sawhney, “Electronics and Electrical Measurements”, Dhanpat Rai & Sons. ISBN -81-7700-016-0

(19A05802a) BLOCKCHAIN TECHNOLOGY

Course Objectives:

This course is designed to:

- Understand the philosophy of Blockchain and the cutting edge technology behind its functions
- Illustrate how to setup Ethereum tools
- Explain the key vocabulary and concepts used in Blockchain for Business

UNIT-I

Blockchain concepts: Blockchain, Blockchain application example: Escrow, Blockchain stack, from web 2.0 to the next generation decentralized web, domain specific Blockchain application, Blockchain benefits and challenges.

Blockchain application templates: Blockchain application components, design methodology for Blockchain applications, Blockchain applications templates

Learning Outcomes:

After completing this Unit, students will be able to

- Outline the benefits and challenges of Block chain(L2)
- Design the Blockchain applications(L6)

UNIT-II

Setting up Ethereum development tools: Ethereum clients,Ethereum languages, TestRPC, Mist Ethereumwalle, meta mask, web3 JavaScript API, truffle.

Ethereum Accounts: Ethereum Accounts, keypairs, working with EOA Accounts, working with contract accounts.

Learning Outcomes:

After completing this Unit, students will be able to

- Illustrate the use of Ethereum development tools(L2)
- Create Ethereum accounts and work with them (L6)

UNIT-III

Smart contracts: Smart contract, structure of a contract, setting up and interacting with a contract using Geth client, setting up and interacting with a contract using Mist Wallet

Learning Outcomes:

After completing this Unit, students will be able to

- Make use of smart contracts(L3)
- Distinguish setting up and interacting with a contract using Geth client and Mist Wallet.(L4)

UNIT-IV

Smart contracts (continued): Smart contract examples, Smart contract patterns.

Decentralized Applications: implementing Dapps, case studies,

Learning Outcomes:

After completing this Unit, students will be able to

- Illustrate the Smart contract examples and patterns(L2)
- Develop Decentralized applications.(L6)

UNIT-V

Mining: Consensus on Blockchain network, mining, Block validation, state storage in Ethereum.

Learning Outcomes:

After completing this Unit, students will be able to

- Define Consensus on Blockchain network(L1)
- Demonstrate State Storage in Ethereum(L2)

Course outcomes:

Upon completion of the course, the students should be able to:

- Create customized blockchain solutions (L6)
- Make use of the specific mechanics of Ethereum(L3)
- Experiment with Smart contracts (L3)
- Develop Enterprise applications using Blockchain(L6)

Text book:

1. Arshadeepbahga, Vijay madiseti, “Blockchain Applications A hands-on approach”, VPT 2017.

2. Chandramouli Subramanian, Asha A George, Abhilash K A and MeenaKarthikeyan, "Blockchain Technology", Universty Press, 2021

References:

1. Imran Bashir, "Mastering Blockchain" Packt Publishing Ltd, March 2017.
2. Melanie swan, "Blokchain blueprint for a new economy", O'REILLY

(19A05802b) MEAN STACK TECHNOLOGIES

Course Objectives:

This course is designed to:

- Translate user requirements into the overall architecture
- Implement new systems and manage the projects
- Write optimized front end code using HTML and JavaScript
- Monitor the performance of web applications & its infrastructure
- Design and implement Robust and Scalable Front End Applications

UNIT I

Introduction to Web: Internet and World Wide Web, Domain name service, Protocols: HTTP, FTP, SMTP. Html5 concepts, CSS3, Anatomy of a web page. XML: Document type Definition, XML schemas, Document object model, XSLT, DOM and SAX Approaches.

Learning Outcomes:

After completing this Unit, students will be able to

- Summarize the protocols related to Internet & WWW(L2)
- Compare and contrast XML and HTML(L5)

UNIT II

JavaScript: The Basic of JavaScript: Objects, Primitives Operations and Expressions, Control Statements, Arrays, Functions, Constructors, Pattern Matching using Regular Expressions. Angular Java Script Angular JS Expressions: ARRAY, Objects, \$eval, Strings, Angular JS Form Validation & Form Submission, Single Page Application development using Angular JS.

Learning Outcomes:

After completing this Unit, students will be able to

- Illustrate the importance of JavaScript(L2)
- Develop applications using Angular JS(L6)

UNIT III

Node.js: Introduction, Advantages, Node.js Process Model, Node JS Modules. Express.js: Introduction to Express Framework, Introduction to Nodejs , What is

Nodejs, Getting Started with Express, Your firstExpress App, Express Routing, Implementing MVC in Express, Middleware, Using Template Engines, Error Handling , API Handling , Debugging, Developing Template Engines, Using Process Managers, Security & Deployment.

Learning Outcomes:

After completing this Unit, students will be able to

- Explain the Node JS modules(L2)
- Make use of MVC in Express(L3)

UNIT IV

RESTful Web Services: Using the Uniform Interface, Designing URIs, Web Linking, Conditional Requests. React Js: Welcome to React, Obstacles and Roadblocks, React's Future, Keeping Up with the Changes, Working with the Files, Pure React, Page Setup, The Virtual DOM, React Elements, ReactDOM, Children, Constructing Elements with Data, React Components, DOM Rendering, Factories.

Learning Outcomes:

After completing this Unit, students will be able to

- Outline the RESTful Web Services(L2)
- Assess the future of React Js(L5)

UNIT V

Mongo DB: Introduction, Architecture, Features, Examples, Database Creation & Collection in Mongo DB. Deploying Applications: Web hosting & Domains, Deployment Using Cloud Platforms.

Learning Outcomes:

After completing this Unit, students will be able to

- Explain the features and architecture of Mongo DB (L2)
- Create and collect Database in MongoDB(L6)

Course Outcomes

After the completion of the course, student will be able to

- List the Basic Concepts of Web & MarkupLanguages(L1)
- Develop web Applications using Scripting Languages & Frameworks(L6)
- Make use of Express JS and Node JS frameworks(L3)

- Illustrate the uses of web services concepts like restful, reactjs (L2)
- Deploying applications using Cloud Platforms (L6)

Text Books:

- 1) Programming the World Wide Web, Robert W Sebesta, 7ed, Pearson.
- 2) Web Technologies, Uttam K Roy, Oxford
- 3) Pro Mean Stack Development, Elad Elrom, Apress
- 4) Restful Web Services Cookbook, Subbu Allamraju, O'Reilly
- 5) JavaScript & jQuery the missing manual, David Sawyer McFarland, O'Reilly
- 6) Web Hosting for Dummies, Peter Pollock, John Wiley Brand

Reference Books:

- 1) Ruby on Rails up and Running, Lightning fast Web development, Bruce Tate, Curt Hibbs, Oreilly (2006).
- 2) Programming Perl, 4ed, Tom Christiansen, Jonathan Orwant, Oreilly (2012).
- 3) Web Technologies, HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Black book, DreamTech.
- 4) An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning.
- 5) Express.JS Guide, The Comprehensive Book on Express.js, Azat Mardan, Lean Publishing.

e-Resources:

- 1) <http://www.upriss.org.uk/perl/PerlCourse.html>

(19A27802a) FOOD PLANT UTILITIES & SERVICES
OPEN ELECTIVE - IV

PREAMBLE

This subject focuses on different utilities like water, steam, electricity and its properties, production or consumption of these sources in the food plant.

OBJECTIVES

- To give brief idea about the utilities that are required/used in food industry and their sources and importance.

UNIT – I

Introduction Classification of various utilities and services in food industry. Water use in Food Processing Industry Water supply system: Pumps of different types, operational aspects, piping system for fresh water, chilled water etc., fittings and control, water requirement for cleaning and processing, water quality, water purification and softening Unit

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Water use in Food Processing Industry
- Water supply system: Pumps of different types, operational aspects, piping system for fresh water, chilled water etc.,
- fittings and control, water requirement for cleaning and processing,
- water quality, water purification and softening Unit

UNIT – II

Water use in food processing: Different types of water requirements in food processing plants, types of water use, waste water sources, water wastage minimization, water loadings per unit mass of raw material. Water conservation: Water and waste water management, economic use of water, water filtration and recirculation.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Different types of water requirements in food processing plants,
- types of water use, waste water sources, water wastage minimization,
- water loadings per unit mass of raw material
- Water and waste water management, economic use of water,

- water filtration and recirculation

UNIT – III

Steam uses in Food Industry Steam uses in food industry: Food processing operations in which steam is used, temperature, pressure and quantity of steam required in various food processing operations Steam generation system: Components of a boiler system, fuels used in boilers, energy analysis for a steam generation system, heat loss from boiler system, boiler design consideration.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Food processing operations in which steam is used
- Temperature, pressure and quantity of steam required in various food processing operations
- Components of a boiler system, fuels used in boilers, energy analysis for a steam generation system
- Heat loss from boiler system, boiler design consideration.

UNIT – IV

Waste-Heat Recovery in Food Processing Facilities Quantity and quality of waste heat in food processing facilities, waste heat utilization, heat exchangers for waste heat recovery, heat pumps for waste heat recovery. Waste Disposal and its Utilization Industrial waste, sewage, influent, effluent, sludge, dissolved oxygen, biological oxygen demand, chemical oxygen demand.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Waste-heat recovery in food processing facilities
- Quantity and quality of waste heat in food processing facilities,
- Waste heat utilization, heat exchangers for waste heat recovery, heat pumps for waste heat recovery.
- Waste disposal and its utilization industrial waste, sewage, influent, effluent, sludge,
- Dissolved oxygen, biological oxygen demand, chemical oxygen demand

UNIT – V

Planning and Design of Service Facilities in Food Industry Estimation of utilities requirements: Lighting, ventilation, drainage, CIP system, dust removal, fire protection etc.

Maintenance of facilities: Design and installation of piping system, codes for building, electricity, boiler room, plumbing and pipe colouring, maintenance of the service facilities. Services required in offices, laboratories, locker and toilet facilities, canteen, parking lots and roads, loading docks, garage, repair and maintenance shop, ware houses etc.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Planning and Design of Service Facilities in Food Industry Estimation of utilities requirements: Lighting, ventilation, drainage, etc.
- Maintenance of facilities: Design and installation of piping system, codes for building, electricity, plumbing, maintenance of the service facilities.
- Services required in offices, laboratories, locker and toilet facilities, canteen, parking lots and roads, repair and maintenance shop, ware houses etc

Course Outcomes

By end of the course, students will understand the following

- Various utilities and services used in food industry and its applications in food industry namely water, steam, electricity and etc.

TEXT BOOKS

1. Lijun Wang. “Energy Efficiency and Management in Food Processing Facilities”. CRC Press. 2008,
2. M. E. Casper. “Energy-saving Techniques for the Food Industry”. Noyes Data Corporation. 1977,

REFERENCES

1. P.L. Ballaney, “Thermal Engineering in SI Units”, 23rd Edition, Khanna Publishers, Delhi, 2003.
2. C.P. Arora. “Refrigeration and Air Conditioning”. 3rd Edition, Tata McGraw Hill Publishing Co. Ltd. New Delhi. 2008,
3. W. E. Whitman, “A Survey of Water Use in the Food Industry”, S. D. Holdsworth. Published by British Food Manufacturing Industries Research Association.
4. Chilton's Food Engineering. 1979, Chilton Co Publishers.

(19A27802b) NUTRACEUTICALS AND FUNCTIONAL FOODS

OPEN ELECTIVE – IV

PREAMBLE

This course will cover the classification, brief history and the impact of nutraceuticals and functional foods on health and disease prevention. Nutraceuticals to be covered in the course include isoprenoids, isoflavones, flavanoids, carotenoids, lycopene, garlic, omega 3 fatty acids, sphingolipids, vitamin E and antioxidants, herbal products in foods. Also marketing issues related to functional foods and nutraceuticals as well as stability testing will be reviewed.

Course Objectives:

- To understand the interrelationship between nutraceuticals and health maintenance.
- Cite the evidence supporting the efficacy and safety of nutraceutical and functional food products
- To explain the metabolic consequences of nutraceuticals and functional foods.
- Describe the physiologic and biochemical changes associated with consumption of nutraceuticals

UNIT – I

Introduction, definition, Modification in the definition of nutraceuticals. Classification of nutraceuticals, Nutraceuticals market scenario, formulation considerations. Challenges for Nutraceuticals.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Classification of nutraceuticals,
- Nutraceuticals market scenario and formulation considerations.
- Challenges for Nutraceuticals.

UNIT – II

Nutraceuticals value of spices and seasoning – Turmeric, Mustard, Chilli, Cumin, Fenugreek, Black Cumin, Fennel, Asafoetidia, Garlic, Ginger, Onion, Clove, Cardamom etc., Nutraceuticals from Fruits And Vegetables – Mango, Apple, Grapes, Bel, Banana, Broccoli, Tomato, Bitter Melon, Bitter Orange etc.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Nutraceuticals value of spices and seasoning – Turmeric, Mustard, Chilli, Etc.
- Nutraceuticals from Fruits and Vegetables – Mango, Apple, Grapes, Tomato etc.

UNIT – III

Omega -3 fatty acids from fish- Typical properties, structural formula, functional category. CLA- typical properties, structural formula, functional category. Application in Nutraceuticals. Calcium, chromium, copper, iodine, iron, magnesium, Zn- mechanism of action, bioavailability, uses and deficiency, dietary sources.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Properties of Omega -3 fatty acids from fish and structures
- Application in Nutraceuticals. Calcium, iodine, iron, Zn- mechanism of action, bioavailability, uses and deficiency, dietary sources.

UNIT – IV

Definition, classification – Type of classification (Probiotics, probiotics and synbiotics: Taxonomy and important features of probiotic microorganisms. Health effects of probiotics including mechanism of action. Probiotics in various foods: fermented milk products, non-milk products etc. Prebiotics. Definition, chemistry, sources, metabolism and bioavailability, effect of processing, physiological effects, effects on human health and potential applications in risk reduction of diseases, perspective for food applications for the following: Non-digestible carbohydrates/oligosaccharides: Dietary fibre, Resistant starch, Gums.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Probiotics, probiotics and synbiotics: important features of probiotic microorganisms.
- Non-digestible carbohydrates/oligosaccharides: Dietary fibre and etc.

UNIT – V

Phytosterol, Fatty Acids, Carotenoids, Anthocyanins, Carotenoids, Amino Acids, Water Soluble Vitamins, Free radical biology and antioxidant activity of nutraceuticals. Regulations of Nutraceuticals and Functional Foods in India and rest of the world.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Phytosterol, Fatty Acids, Carotenoids, Anthocyanins, Free radical biology and antioxidant activity of nutraceuticals.
- Regulations of Nutraceuticals and Functional Foods in India and rest of the world.

Course Outcomes

- Students will get know the nutraceuticals and its active components in different foods, regulations on nutraceuticals in India.

TEXT BOOKS

1. “Handbook of Nutraceuticals and Functional Foods. Yashwant Pathak, Vol. 1. (Ingredients, formulations, and applications)” CRC Press 2005.
2. “Handbook of Nutraceuticals and Functional Foods”. Robert Wildman, 2nd Edition. CRC Press 2001.

REFERENCES

1. B. Shrilakshmi, “Dietetics”, 5th Edition, New Age International (P) Ltd., New Delhi, 2005.
2. A. E. Bender, “Nutrition and Dietetic Foods”, Chem. Pub. Co. New York, 2nd Edition, 2004.
3. P. S. Howe, “Basic Nutrition in Health and Disease”, 2nd Edition, W. B. Saunders Company, London, 2003.
4. Kramer, “Nutraceuticals in Health and Disease Prevention”, Hoppe and Packer, Marcel Dekker, Inc., NY 2001.
5. Bao and Fenwick, “Phytochemicals in Health and Disease”, Marcel Decker, Inc. NY 2004.

(19A54802a) MATHEMATICAL MODELING & SIMULATION

OPEN ELECTIVE-IV

Course Objective:

This course focuses on what is needed to build simulation software environments, and not just building simulations using preexisting packages.

UNIT-I:

Simulation Basics-Handling Stepped and Event-based Time in Simulations-Discrete versus Continuous Modeling-Numerical Techniques-Sources and Propagation of Error

Learning Outcomes:

Students will be able to

- Understand computer simulation technologies and techniques.

UNIT-II

Dynamical, Finite State, and Complex Model Simulations-Graph or Network Transitions Based Simulations-Actor Based Simulations-Mesh Based Simulations-Hybrid Simulations

Learning Outcomes:

Students will be able to

- implement and test a variety of simulation and data analysis.

UNIT-III

Converting to Parallel and Distributed Simulations-Partitioning the Data-Partitioning the Algorithms-Handling Inter-partition Dependencies

Learning Outcomes:

Students will be able to

- Understand concepts of modeling layers of society's critical infrastructure networks.
- Understand partitioning the data.

UNIT-IV

Probability and Statistics for Simulations and Analysis-Introduction to Queues and Random Noise-Random Variates Generation-Sensitivity Analysis

Learning Outcomes:

Students will be able to

- Understand Queues and Random noise.
- Understand sensitivity analysis.

UNIT-V

Simulations Results Analysis and Viewing Tools-Display Forms: Tables, Graphs, and Multidimensional Visualization-Terminals, X and MS Windows, and Web Interfaces-Validation of Model Results

Learning Outcomes:

Students will be able to

- Build tools to view and control simulations and their results.

Course Outcomes:

After the completion of course, student will be able to

- Understand basic Model Forms.
- Understand basic Simulation Approaches.
- Evaluate handling Stepped and Event-based Time in Simulations.
- Distinguish Discrete versus Continuous Modeling.
- Apply Numerical Techniques.
- Calculate Sources and Propagation of Error.

TEXT BOOKS:

1. JN Kapur, “Mathematical modelling”, Newage publishers
2. Kai Velten, “Mathematical Modeling and Simulation: Introduction for Scientists and Engineers” Wiley Publishers.

(19A51802a) GREEN CHEMISTRY AND CATALYSIS FOR SUSTAINABLE ENVIRONMENT

Course Objectives:

- Learn an interdisciplinary approach to the scientific and societal issues arising from industrial chemical production, including the facets of chemistry and environmental health sciences that can be integrated to promote green chemistry and the redesign of chemicals, industrial processes and products.
- Understand the use of alternatives assessments that combine chemical, environmental health, regulatory, and business considerations to develop safer products.

UNIT 1: PRINCIPLES AND CONCEPTS OF GREEN CHEMISTRY

Introduction, Green chemistry Principles, sustainable development and green chemistry, atom economy, atom economic: Rearrangement and addition reactions and un-economic reactions: Substitution, elimination and Wittig reactions, Reducing Toxicity. Waste - problems and Prevention: Design for degradation, Polymer recycling.

Learning Outcomes:

At the end of this unit, the students will be able to

- Apply the Green chemistry Principles for day to day life as well as synthesis (L3)
- Describe the sustainable development and green chemistry (L2)
- Explain economic and un-economic reactions (L2)
- Demonstrate Polymer recycling (L2)

UNIT 2: CATALYSIS AND GREEN CHEMISTRY

Introduction to catalysis, Heterogeneous catalysts: Basics of Heterogeneous Catalysis, Zeolites and the Bulk Chemical Industry, Heterogeneous Catalysis in the Fine Chemical and Pharmaceutical Industries, Catalytic Converters, Homogeneous catalysis: Transition Metal Catalysts with Phosphine Ligands, Greener Lewis Acids, Asymmetric Catalysis, Heterogenising the Homogenous catalysts, Phase transfer catalysis: Hazard Reduction, C–C Bond Formation, Oxidation Using Hydrogen Peroxide, Bio-catalysis and photo-catalysis with examples.

Learning Outcomes:

At the end of this unit, the students will be able to

- Explain Heterogeneous catalyst and its applications in Chemical and Pharmaceutical Industries (L2)
- Differentiate Homogeneous and Heterogeneous catalysis (L2)
- Identify the importance of Bio and Photo Catalysis (L3)
- Discuss Transition metal and Phase transfer Catalysis (L3)

UNIT 3: ORGANIC SOLVENTS: ENVIRONMENTALLY BENIGN SOLUTIONS

Organic solvents and volatile organic compounds, solvent free systems, supercritical fluids: Super critical carbondioxide, super critical water and water as a reaction solvent: water based coatings, Ionic liquids as catalyst and solvent

Learning Outcomes:

At the end of this unit, the students will be able to

- Demonstrate Organic solvents and importance of solvent free systems (L3)
- Discuss Super critical carbondioxide (L2)
- Explain Super critical water and water as a reaction solvent (L2)
- Interpret Ionic Liquids as Catalyst and Solvent (L2)

UNIT 4: EMERGING GREENER TECHNOLOGIES AND ALTERNATIVE ENERGY SOURCES

Biomass as renewable resource, Energy: Fossil Fuels, Energy from Biomass, Solar Power, Other Forms of Renewable Energy, Fuel Cells, Chemicals from Renewable feedstocks: Chemicals from Renewable Feedstocks: Chemicals from Fatty Acids, Polymers from Renewable Resources, Some Other Chemicals from Natural Resources, Alternative Economies: The Syngas Economy, The Biorefinery, Design for energy efficiency: Photochemical Reactions: Advantages of and Challenges Faced by Photochemical Processes, Examples of Photochemical Reactions, Chemistry Using Microwaves: Microwave Heating, Microwave-assisted Reactions, Sonochemistry: Sonochemistry and Green Chemistry, Electrochemical Synthesis: Examples of Electrochemical Synthesis. Industrial applications of alternative environmentally benign catalytic systems for carrying out the important reactions such as selective oxidation, reduction and C-C bond formations (specific reactions).

Learning Outcomes:

At the end of this unit, the students will be able to

- Describe importance of Biomass and Solar Power (L2)
- Illustrate Sonochemistry and Green Chemistry ((L2)
- Apply Green Chemistry for Sustainable Development (L3)
- Discuss the importance of Renewable resources (L3)

UNIT 5: GREEN PROCESSES FOR GREEN NANOSCIENCE

Introduction and traditional methods in the nanomaterials synthesis, Translating green chemistry principles for practicing Green Nanoscience. Green Synthesis of Nanophase Inorganic Materials and Metal Oxide Nanoparticles: Hydrothermal Synthesis, Reflux Synthesis, Microwave-Assisted Synthesis, Other methods for Green synthesis of metal and metal oxide nanoparticles, Green chemistry applications of Inorganic nanomaterials

Learning Outcomes:

At the end of this unit, the students will be able to

- Discuss green Chemistry Principles for practicing Green nano synthesis (L3)
- Illustrate Microwave Assisted Synthesis (L2)
- Differentiate Hydrothermal and Reflux synthesis (L2)
- Demonstrate Green Chemistry applications of Inorganic nanomaterials (L2)

Course Outcomes:

Upon completion of this course the students should recognize and acquire green chemistry concepts and apply these ideas to develop respect for the inter connectedness of our world and an ethic of environmental care and sustainability.

Text Books :

1. M. Lancaster, Green Chemistry an introductory text, Royal Society of Chemistry, 2002.
2. Paul T. Anastas and John C. Warner, Green Chemistry Theory and Practice, 4th Edition,
Oxford University Press, USA

References :

1. Green Chemistry for Environmental Sustainability, First Edition, Sanjay K. Sharma and Ackmez Mudhoo, CRC Press, 2010.
2. Edited by Alvise Perosa and Maurizio Selva , Hand Book of Green chemistry Volume 8: Green Nanoscience, wiley-VCH, 2013.

HONOURS

(19A04H01) AUTOMOTIVE ELECTRONICS
(Honours)

Course Learning Objectives:

This course will enable students to:

- Understand the basics of automobile dynamics and design electronics to complement those features.
- Design and implement the electronics that attribute the reliability, safety, and smartness to the automobiles, providing add-on comforts.

Module -1

Automotive Fundamentals Overview – Evolution of Automotive Electronics, Automobile

Physical Configuration, Survey of Major Automotive Systems, The Engine – Engine Block,

Cylinder Head, Four Stroke Cycle, Engine Control, Ignition System - Spark plug, High voltage

circuit and distribution, Spark pulse generation, Ignition Timing, Diesel Engine, Drive Train -

Transmission, Drive Shaft, Differential, Suspension, Brakes, Steering System (Text 1: Chapter1),

Starter Battery –Operating principle: **(Text 2: Pg. 407-410)**

The Basics of Electronic Engine Control – Motivation for Electronic Engine Control – Exhaust

Emissions, Fuel Economy, Concept of an Electronic Engine control system, Definition of General

terms, Definition of Engine performance terms, Engine mapping, Effect of Air/Fuel ratio, spark

timing and EGR on performance, Control Strategy, Electronic Fuel control system, Analysis of

intake manifold pressure, Electronic Ignition. **(Text 1: Chapter 5)**

Module -2

Automotive Sensors – Automotive Control System applications of Sensors and Actuators –Variables to be measured, Airflow rate sensor, Strain Gauge MAP sensor, Engine Crankshaft Angular Position Sensor, Magnetic Reluctance Position Sensor, Hall effect Position Sensor, Shielded Field Sensor, Optical Crankshaft Position Sensor, Throttle Angle Sensor (TAS), Engine Coolant Temperature (ECT) Sensor, Exhaust Gas Oxygen (O₂/EGO) Lambda Sensors, Piezoelectric Knock Sensor. **(Text 1: Chapter 6)**

Automotive Engine Control Actuators – Solenoid, Fuel Injector, EGR Actuator, Ignition System **(Text 1: Chapter 6)**

Module -3

Digital Engine Control Systems – Digital Engine control features, Control modes for fuel Control

(Seven Modes), EGR Control, Electronic Ignition Control - Closed loop Ignition timing, Spark

Advance Correction Scheme, Integrated Engine Control System - Secondary Air Management,

Evaporative Emissions Canister Purge, Automatic System Adjustment, System Diagnostics. **(Text**

1: Chapter 7)

Control Units – Operating conditions, Design, Data processing, Programming, Digital modules in

the Control unit, Control unit software. **(Text 2: Pg. 196-207)**

Module -4

Automotive Networking –Bus Systems – Classification, Applications in the vehicle, Coupling of

networks, Examples of networked vehicles

(Text 2: Pg. 85-91),

Buses - CAN Bus, LIN Bus, MOST Bus, Bluetooth, Flex Ray, Diagnostic Interfaces.
 (Text 2: Pg.

92-151)

Vehicle Motion Control – Typical Cruise Control System, Digital Cruise Control System, Digital

Speed Sensor, Throttle Actuator, Digital Cruise Control configuration, Cruise Control Electronics

(Digital only), Antilock Brake System (ABS) **(Text 1: Chapter 8)**

Module -5

Automotive Diagnostics–Timing Light, Engine Analyzer, On-board diagnostics, Off-board

diagnostics, Expert Systems, Occupant Protection Systems – Accelerometer based Air Bag

systems. **(Text 1: Chapter 10)**

Future Automotive Electronic Systems – Alternative Fuel Engines, Electric and Hybrid

vehicles, Fuel cell powered cars, Collision Avoidance Radar warning Systems, Low tire pressure

warning system, Heads Up display, Speech Synthesis, Navigation – Navigation Sensors - Radio Navigation, Signpost navigation, dead reckoning navigation, Voice Recognition Cell Phone dialing, Advanced Cruise Control, Stability Augmentation, Automatic driving Control **(Text 1:Chapter 11)**

Course Outcomes:

At the end of the course, students will be able to:

- Acquire an overview of automotive components, subsystems, and basics of Electronic Engine Control in today's automotive industry.
- Use available automotive sensors and actuators while interfacing with microcontrollers / microprocessors during automotive system design.
- Understand the networking of various modules in automotive systems, communication protocols and diagnostics of the sub systems.

- Design and implement the electronics that attribute the reliability, safety, and smartness to the automobiles, providing add-on comforts and get fair idea on future Automotive Electronic Systems.

Text Books:

1. William B. Ribbens, “Understanding Automotive Electronics”, 6th Edition, Elsevier Publishing.
2. Robert Bosch GmbH (Ed.) Bosch Automotive Electrics and Automotive Electronics System and Components, Networking and Hybrid Drive, 5th edition, John Wiley & Sons Inc., 2007.

(19A04H02) LOW POWER VLSI DESIGN
(Honors)

Course Objectives:

- To impart knowledge on different abstraction levels in VLSI Design and the impact of power reduction methods at higher levels
- To describe leakage control mechanisms to reduce static power consumption in DSM VLSI regime
- To explain technology independent and technology-dependent techniques for Dynamic power reduction in CMOS circuits
- To introduce various software power estimation and optimization techniques for low power VLSI system design
- To demonstrate low power circuit and architectural techniques for reducing power consumption in SRAM designs

Unit 1

Introduction to Low Power design: Why worry about power – at global and SOC levels, Emerging zero-power applications (WSN), 20 nm scenario, Design-productivity challenge, Impact of implementation choices, Motivation for LPD, Basic VLSI Design Flow, Optimization examples at various levels (System, Sub-system, RTL, Gate, Circuit and Device levels)

Sources of power dissipation, MOS transistor leakage components, Static Power dissipation, Active Power dissipation, Circuit Techniques for Low Power Design – Standby leakage control using transistor stacks, Multiple V_{TH} and dynamic V_{TH} techniques, Supply voltage scaling technique.

Unit Outcomes:

- Identify sources of power dissipation in VLSI Circuits (L2)
- Distinguish between static and dynamic power dissipation (L2)
- Distinguish impact of power reduction techniques at various levels of VLSI Design (L2)
- Apply standby leakage reduction techniques for static power reduction in CMOS circuits (L3)

Unit 2

Power Optimization Techniques – I: Dynamic Power Reduction Approaches, Circuit Parallelization, Voltage Scaling Based Circuit Techniques, Circuit Technology – Independent Power Reduction, Circuit Technology Dependent Power Reduction; Leakage Power Reduction – Leakage Components, Design Time Reduction Techniques, Run-time Stand-by

Reduction Techniques, Run-time Active Reduction Techniques Reduction in Cache Memories, LVLP Logic Styles, Current-Mode CMOS Adders using multiple-valued logic.

Unit Outcomes:

- Distinguish between technology - dependent and technology – independent power reduction techniques (L2)
- Analyze different power reduction techniques for VLSI systems at Design time, Run-time and Stand-by modes (L4)
- Compare Current Mode and Voltage Mode CMOS circuits w.r.t power consumption (L5)

Unit 3

Power Optimization Techniques – II: Low Power Very Fast Dynamic Logic Circuits, Low Power Arithmetic Operators, Energy Recovery Circuit Design, Adiabatic – Charging Principle and its implementation issues (Ref-2)

Software Design for Low Power: Sources of Software Power Dissipation, Software Power Estimation, Software Power Optimizations, Automated Low-Power Code Generation, Co-design for Low Power.

Unit Outcomes:

- Identify implementation issues in adiabatic/ energy recovery circuit design (L2)
- Identify sources of software power dissipation (L2)
- Apply simple software estimation and optimization techniques for low power VLSI system design (L3)

Unit 4

Low Voltage Low Power Static Random Access memories:

Basics, Race between 6T and 4T memory cells, LVLP SRAM Cell designs- Shared bit-line SRAM cell configuration, Power efficient 7T SRAM cell with current mode read and write, Loadless CMOS 4T SRAM cell, The 1T SRAM cell, Pre-charge and Equalization Circuit, Dynamic and static decoders, Voltage Sense amplifier, Output Latch,

Low Power SRAM Techniques: Sources of SRAM Power, Low Power Circuit techniques such as capacitance reduction, Leakage current reduction.

Unit Outcomes:

- Compare different SRAM structures for power efficiency (L5)
- Apply capacitance and leakage current reduction techniques for SRAM structures to reduce power dissipation (L3)

Unit 5

Large LP VLSI System design and Applications:

Architecture-driven Voltage Scaling, Power optimization using operation reduction and operation substitution, Pre-computation based optimization, Multiple and Dynamic supply voltage design, Choice of supply voltages, Varying the clock speed, varying the V_{DD} of RAM structures, Gated Clocking. Leakage current reduction in medical devices.

Unit Outcomes:

- Apply simple architectural level power reduction techniques in CMOS VLSI designs (L3)
- Apply low power circuit techniques such as Gated clocking, varying clock speed and V_{DD} for RAM structures (L3)

Contents beyond Syllabus:

Low Power Design for safety Critical applications: safe operation constraints vs low-power techniques, Unsuitable low power design techniques for safety critical applications, Low-power and safe-operating circuits. (4 hours)

Course Outcomes:

- Distinguish impact of various power reduction techniques at different levels of VLSI Design (L2)
- Identify sources of power dissipation and apply leakage reduction techniques to reduce static power consumption in CMOS circuits (L2)
- Analyze different power reduction techniques for VLSI systems at Design time, Run-time and Stand-by modes (L4)
- Apply simple software power estimation and optimization techniques for low power VLSI system design (L3)
- Apply low power circuit and architectural techniques such as capacitance reduction, gated clocking, V_{DD} and V_{th} scaling, DVS etc in digital systems and SRAM designs (L3)

Text Books:

1. Kiat-Seng Yeo and Kaushik Roy, “Low-Voltage, Low-Power VLSI Subsystems, Tata McGrawhill Edition, 2005.
2. Christian Piguet, “Low Power CMOS Circuits Technology, Logic Design and CAD Tools”, 1st Indian Reprint, CRC Press, 2010.

References:

1. Kaushik Roy and Sharat Prasad, “ Low-Power CMOS VLSI Circuit Design” , Wiley Pub., 2000.
2. Dimitrios Soudris, Christian Piguet and Coostas Goutis, “Designing CMOS Circuits for Low Power”, Kluwer Academic Pub, 2002
3. J. Rabaey, Low Power Design Essentials, 1st Edition, Springer Publications, 2010.

(19A04H03) PATTERN RECOGNITION
(Honors)

Course Objectives:

- To convey methods for learning from data, with an emphasis on pattern classification.
- To expose various pattern recognition algorithms.
- To present pattern recognition algorithms to solve the real world problems in various fields.

Unit 1

Introduction - Basic concepts, Applications, Fundamental problems in pattern Recognition system design, Design concepts and methodologies, Examples of Automatic Pattern recognition systems, Simple pattern recognition model.

Unit Outcomes:

- Summarize basic concepts of pattern recognition (L2)
- Formulate simple pattern recognition model (L6)

Unit 2

Statistical Decision Making - Introduction, Baye's theorem, Multiple features, Conditionally independent features, Decision boundaries, Unequal cost of error, estimation of error rates, the leaving-one-out-techniques, characteristic curves, estimating the composition of populations. Baye's classifier for normal patterns.

Unit Outcomes:

- Describe statistical decision-making algorithms (L2)
- Predict different error rates in data analysis of patterns (L3)

Unit 3

Non Parametric Decision Making: Histogram, kernel and window estimation, nearest neighbor classification techniques. Adaptive decision boundaries, adaptive discriminant functions, Minimum squared error discriminant functions, choosing a decision making techniques.

Unit Outcomes:

- Describe non-parametric decision-making algorithms in pattern recognition (L2)
- Compare and contrast different decision-making algorithms (L5)

Unit 4

Clustering and Partitioning: Hierarchical Clustering: Introduction, agglomerative clustering algorithm, the single-linkage, complete-linkage and average-linkage algorithm. Ward's method Partition clustering-Forg's algorithm, K-means's algorithm, Isodata algorithm.

Unit Outcomes:

- Discuss various Hierarchical clustering algorithms (L5)
- Apply Partition clustering techniques in pattern recognition (L3)

Unit 5

Pattern Pre-Processing and Feature Selection: Introduction, distance measures, clustering transformation and feature ordering, clustering in feature selection through entropy minimization, features selection through orthogonal expansion, binary feature selection, Applications of Pattern Recognition in bio-metric, facial recognition, Finger prints, etc.

Unit Outcomes:

- Describe pre-processing and feature selection algorithms in pattern recognition (L2)
- Develop various applications using pattern recognition algorithms (L6)

Course Outcomes:

- Formulate systems and algorithms for pattern recognition, with focus on sequences of patterns (L6)
- Interpret principles of Bayesian parameter estimation (L2)
- Analyze Non-parametric decision-making algorithms in pattern recognition (L4)
- Analyze clustering and partitioning techniques in pattern recognition (L4)
- Apply pre-processing and feature selection methods in pattern recognition (L3)
- Develop various applications using pattern recognition algorithms (L6)

Text Books:

1. Gose. Johnsonbaugh, Jost. "Pattern recognition and Image Analysis", PHI.
2. Tou. Rafael. Gonzalez. "Pattern Recognition Principle", Pearson Education.

References:

1. Richard Duda, Hart., David Stork, "Pattern Classification", John Wiley.
2. Theodoridis, S. and K. Koutroumbas, Pattern recognition. 4th ed. 2009, San Diego, CA: Academic Press.

(19A04H04) MICRO ELECTRO MECHANICAL SYSTEMS

(Honors)

Course Objectives:

- To provide knowledge of semiconductors and solid mechanics to fabricate mems devices.
- To educate on the rudiments of micro fabrication techniques.
- To introduce various sensors and actuators
- To introduce different materials used for mems.
- To educate on the applications of mems to disciplines beyond electrical and mechanical engineering.

Unit 1

INTRODUCTION : Intrinsic Characteristics Of MEMS – Energy Domains And Transducers- Sensors And Actuators – Introduction To Micro Fabrication – Silicon Based MEMS Processes – New Materials – Review Of Electrical And Mechanical Concepts In MEMS – Semiconductor Devices – Stress And Strain Analysis – Flexural Beam Bending- Torsional Deflection.

Unit Outcomes:

- Explain basic principles of MEMS (L2)
- Classify materials used for fabricating MEMS (L4)
- Analyze stress, strain, bending and deflection in semiconductor devices (L4)

Unit 2

SENSORS AND ACTUATORS-I: Electrostatic Sensors – Parallel Plate Capacitors – Applications – Interdigitated Finger Capacitor – Comb Drive Devices – Micro Grippers – Micro Motors – Thermal Sensing And Actuation – Thermal Expansion – Thermal Couples – Thermal Resistors – Thermal Bimorph – Applications – Magnetic Actuators – Micromagnetic Components – Case Studies Of MEMS In Magnetic Actuators- Actuation Using Shape Memory Alloys.

Unit Outcomes:

- Summarize different types of capacitor sensors (L2)
- Understand working of different thermal sensors (L2)
- Demonstrate the application of magnetic actuators (L2)

Unit 3

SENSORS AND ACTUATORS-II: Piezoresistive Sensors – Piezoresistive Sensor Materials – Stress Analysis Of Mechanical Elements – Applications To Inertia, Pressure, Tactile And Flow Sensors – Piezoelectric Sensors And Actuators – Piezoelectric Effects – Piezoelectric Materials – Applications To Inertia , Acoustic, Tactile And Flow Sensors.

Unit Outcomes:

- Analyze piezoelectric effect and related mathematical concepts (L4)
- Demonstrate the applications of PZTs (L2)

Unit 4

MICROMACHINING: Silicon Anisotropic Etching – Anisotropic Wet Etching – Dry Etching Of Silicon – Plasma Etching – Deep Reaction Ion Etching (DRIE) – Isotropic Wet Etching – Gas Phase Etchants – Case Studies – Basic Surface Micro Machining Processes – Structural And Sacrificial Materials – Acceleration Of Sacrificial Etch – Striction And Antistraction Methods – LIGA Process – Assembly Of 3D MEMS – Foundry Process.

Unit Outcomes:

- Classify the types of etching processes applicable to micromachining (L4)
- Understand surface micromachining processes (L2)
- Describe various steps in LIGA process (L2)

Unit 5

POLYMER AND OPTICAL MEMS: Polymers In MEMS– Polimide – SU-8 – Liquid Crystal Polymer (LCP) – PDMS – PMMA – Parylene – Fluorocarbon – Application To Acceleration, Pressure, Flow And Tactile Sensors- Optical MEMS – Lenses And Mirrors – Actuators For Active Optical MEMS.

Unit Outcomes:

- Discuss application of polymer materials in fabricating MEMS (L5)
- Describe operation of lenses, mirrors and actuators for optical MEMS (L2)

Course Outcomes:

- Explain electrical and mechanical principles of MEMS (L2)
- Describe working of electrostatic, thermal and magnetic sensors and actuators (L2)
- Demonstrate piezoelectric effect and its applications (L2)
- Categorize micromachining processes (L4)
- Describe operation of polymer and optical MEMS (L2)

Text Books:

1. Chang Liu, 'Foundations Of MEMS', Pearson Education Inc., 2012.
2. Stephen D Senturia, 'Microsystem Design', Springer Publication, 2000.
3. Tai Ran Hsu, "MEMS & Micro Systems Design And Manufacture" Tata McGraw Hill, New Delhi, 2002.

References:

1. NadimMaluf, "An Introduction To Micro Electro Mechanical System Design", Artech House, 2000.

2. Mohamed Gad-El-Hak, Editor, “ The MEMS Handbook”, CRC Press Baco Raton, 2001.
3. Julian W. Gardner, Vijay K. Varadan, Osama O.Awadelkarim, Micro Sensors MEMS And Smart Devices, John Wiley & Son LTD, 2002.
4. James J.Allen, Micro Electro Mechanical System Design, CRC Press Publisher, 2005.

(19A04H05) VLSI TESTING AND TESTABILITY
(Honors)

Course Objectives:

- To impart knowledge on the basic faults that occur in digital systems
- To describe fault detection techniques in combinational circuits.
- To outline procedures to generate test patterns for detecting single stuck faults in combinational and sequential circuits.
- To explain design for testability techniques with improved fault coverage.
- To introduce BIST concepts and specific architectures.
- To give exposure to approaches for introducing BIST into logic circuits, memories and embedded cores.

Unit 1

Introduction to Test and Design for Testability (DFT) Fundamentals. Modeling: Modeling digital circuits at logic level, register level and structural models. Levels of modeling. Logic Simulation: Types of simulation, Delay models, Element evaluation, Hazard detection, Gate level event driven simulation.

Unit Outcomes:

- Model digital circuit at logic, RTL and structural levels (L3)
- Compare logic and analog simulations with respect to speed and accuracy (L2)
- List various delay models and their importance in circuit simulation (L1)

Unit 2

Fault Modeling – Logic fault models, Fault detection and redundancy, Fault equivalence and fault location. Single stuck and multiple stuck – Fault models. Fault simulation applications, General techniques for Combinational circuits.

Unit Outcomes:

- Model faults as stuck at and multiple stuck at faults (L3)
- List fault detection techniques for combinational circuits (L1)
- Apply redundancy for fault detection in a digital circuit (L3)

Unit 3

Testing for single stuck faults (SSF), Automated test pattern generation (ATPG/ATG) for SSFs in combinational and sequential circuits, Functional testing with specific fault models, Vector simulation – ATPG vectors, formats, Compaction and compression, Selecting ATPG Tool.

Unit Outcomes:

- Generate test patterns for detecting single stuck faults in combinational and sequential circuits (L2)
- Test circuit function with specific fault models (L4)
- Define Vector simulation and ATPG vectors (L1)

Unit 4

Design for testability – testability trade-offs, techniques. Scan architectures and testing – controllability and Observability, generic boundary scan, full integrated scan, storage cells for scan design. Board level and system level DFT approaches. Boundary scan standards. Compression techniques – different techniques, syndrome test and signature analysis.

Unit Outcomes:

- Define controllability and observability for a digital system (L1)
- Identify schemes for introducing testability into digital circuits with improved fault coverage (L3)
- Compare board level and chip level DFT approaches in testing (L2)

Unit 5

Built-in self-test (BIST): BIST Concepts and test pattern generation. Specific BIST Architectures – CSBL, BEST, RTS, LOCST, STUMPS, CBIST, CEBS, RTD, SST, CATS, CSTEP, BILBO. Brief ideas on some advanced BIST concepts and design for self-test at board level. Memory BIST (MBIST): Memory test architectures and techniques – Introduction to memory test, Types of memories and integration, Embedded memory testing model. Memory test requirements for MBIST. Brief ideas on embedded core testing.

Unit Outcomes:

- Compare different BIST architectures (L5)
- Perform memory test for the given memory block (L3)
- Compare different approaches for introducing BIST into logic circuits, memories and embedded cores (L5)

Course Outcomes:

- Model digital circuits at logic and RTL levels (L3)
- Simulate digital ICs in the presence of faults and evaluate the given test set for fault coverage (L4)
- Generate test patterns for detecting single stuck faults in combinational and sequential circuits (L3)
- Identify schemes for introducing testability into digital circuits with improved fault coverage (L3)
- Compare different approaches for introducing BIST into logic circuits, memories and embedded cores (L5)

Text Books:

1. Miron Abramovici, Melvin A. Breur, Arthur D. Friedman, Digital Systems Testing and Testable Design, Jaico Publishing House, 2001.
2. Alfred Crouch., Design for Test for Digital ICs & Embedded Core Systems, Prentice Hall.

References:

1. Robert J. Feugate, Jr., Steven M. Mentyn, Introduction to VLSI Testing, Prentice Hall, Englewood Cliffs, 1998.
2. Bushnell, M., and Agrawal, Vishwani D, Essentials of Electronic Testing for Digital, Memory and Mixed-Signal VLSI Circuits, Kluwer Academic Publishers, 2002

SRI VENKATESWARA COLLEGE OF ENGINEERING (AUTONOMOUS)

Karakambadi Road Tirupati-517 507



Department of Electronics & Communication Engineering

Course Structure R 20 Regulations



SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

Karakambadi Road, TIRUPATI – 517507

Electronics and Communication Engineering

Semester-0 Induction Program (Common for all branches)

S.No	Course Name	Category	L-T-P-C
1	Physical Activities - Sports, Yoga and Meditation, Plantation	MC	0-0-6-0
2	Career Counseling	MC	2-0-2-0
3	Orientation to all branches - career options, tools, etc.	MC	3-0-0-0
4	Orientation on admitted Branch - corresponding labs, tools and platforms	EC	2-0-3-0
5	Proficiency Modules & Productivity Tools	ES	2-1-2-0
6	Assessment on basic aptitude and mathematical skills	MC	2-0-3-0
7	Remedial Training in Foundation Courses	MC	2-1-2-0
8	Human Values & Professional Ethics	MC	3-0-0-0
9	Communication Skills - focus on Listening, Speaking, Reading, Writing skills	BS	2-1-2-0
10	Concepts of Programming	ES	2-0-2-0

Semester - 1 (Theory - 5, Lab 4, MC-1)					
S.No	Course No	Course Name	Category	L-T-P/D	Credits
1.	MA20ABS101	Linear Algebra and Calculus	BS	3-0-0	3
2.	PH20ABS103	Applied Physics	BS	3-0-0	3
3.	EG20AHS101	Communicative English	HS	3-0-0	3
4.	EE20AES103	Fundamentals of Electrical Circuits	ES	3-0-0	3
5.	ME20AES102	Engineering Drawing	ES	1-0-0/2	2
6.	ME20AES103	Engineering Graphics Lab	ES	0-0-2	1
7.	PH20ABS104	Applied Physics Lab	BS	0-0-3	1.5
8.	EG20AHS102	Communicative English Lab	HS	0-0-3	1.5
9.	EE20AES104	Fundamentals of Electrical Circuits Lab	ES	0-0-3	1.5
10.	MA20AMC101	Logical Skills for Professionals-I	MC	2-0-0	0
Total					19.5

Semester - 2 (Theory - 4, Lab -5 , MC-2)					
S.No	Course No	Course Name	Category	L-T-P	Credits
1.	MA20ABS201	Differential Equations and Vector Calculus	BS	3-0-0	3
2.	CH20ABS103	Chemistry	BS	3-0-0	3
3.	CS20AES101	Problem Solving using C	ES	3-0-0	3
4.	EC20AES201	Electronic Devices & Circuits	ES	3-0-0	3
5.	ME20AES101	Engineering Workshop	ES	0-0-3	1.5
6.	CS20AES103	IT Workshop	ES	0-0-3	1.5
7.	CS20AES102	Problem Solving using C Lab	ES	0-0-3	1.5
8.	CH20ABS104	Chemistry Lab	BS	0-0-3	1.5
9.	EC20AES202	Electronic Devices & Circuits Lab	ES	0-0-3	1.5
10.	CH20AMC201	Environmental Science	MC	2-0-0	0
11.	EG20AMC101	Speech & Oral Communication	MC	2-0-0	0
Total					19.5

Semester – 3 (Theory –5 , Lab –3, SC -1, MC-3)					
S.No	Course No	Course Name	Category	L-T-P	Credits
1.	MA20ABS302	Complex Variables & Transforms	BS	3-0-0	3
2.	EC20APC301	Digital Logic Design	PC	3-0-0	3
3.	EC20APC302	Electronic Circuit -Analysis and Design	PC	3-0-0	3
4.	EC20APC303	Signals & Systems	PC	3-0-0	3
5.	BA20AHS301	Managerial Economics and Financial Analysis	HS	3-0-0	3
6.	EC20APC304	Basic Simulation Lab	PC	0-0-3	1.5
7.	EC20APC305	Digital Logic Design Lab	PC	0-0-3	1.5
8.	EC20APC306	Electronic Circuit -Analysis and Design Lab	PC	0-0-3	1.5
9.	IT20ASC301	Skill oriented course-Application Development using Python	SC	1-0-2	2
10.	CH20AMC301	Mandatory course (AICTE suggested): Biology For Engineers	MC	2-0-0	0.0
11.	MA20AMC301	Logical Skills for Professionals -II	MC	2-0-0	0.0
12.	EG20AMC301	Enhancing English Language Skills (Lateral Entry Students only)	MC	2-0-0	0.0
Total					21.5

Semester – 4 (Theory – 5, Lab – 3,SoC-1, AC-1,MC-3)					
S.No	Course No	Course Name	Category	L-T-P	Credits
1.	CS20AES401	Data Structures using C	ES	3-0-0	3
2	MA20ABS402	Probability Theory and Stochastic Processes	BS	3-0-0	3
3	EC20APC401	Analog Communications	PC	3-0-0	3
4	EC20APC402	Electro Magnetic Waves and Transmission Lines	PC	3-0-0	3
5	EC20APC403	Linear & Digital IC Applications	PC	3-0-0	3
6	EC20APC404	Analog Communications Lab	PC	0-0-3	1.5
7	CS20AES402	Data Structures using C Lab	ES	0-0-3	1.5
8	EC20APC405	Linear & Digital IC Applications Lab	PC	0-0-3	1.5
9	EG20ASC301	Skill oriented course-Soft Skills	SC	1-0-2	2
10	SH20AAC401	Extra Academic Activities (NSS/Yoga/Cultural/Games and Sports/ Societal Relationship)	AC	0-0-2	0.0
11	BA20AMC201	Mandatory course (AICTE suggested): Universal Human Values	MC	2-0-0	0.0
11	*BA20AHS201	Mandatory course (AICTE suggested): Universal Human Values	HS	3-0-0	*3
12.	MA20AMC401	Engineering Mathematics (Lateral Entry Students only)	MC	2-0-0	0.0
Total					21.5
13.	Industry/Research Internship minimum of 4 weeks (Mandatory)during summer vacation				
14.	Honors / Minor courses (Hours distribution can be 3-0-2 or 3-1-0 also)			4-0-0	4

*UHV is considered as Credit Based Course from 2021 Batch

Semester – 5 (Theory – 5, Lab –2,Soc-1,MC-2,Ts-1,IP-1)					
S.No	Course No	Course Name	Category	L-T-P	Credits
1.	EC20APC501	Antennas and Wave Propagation	PC	3-0-0	3
2	EC20APC502	Digital Communications	PC	3-0-0	3
3	EC20APC503	Microprocessors & Microcontrollers	PC	3-0-0	3
4	Open Elective Course/ Job oriented elective-1		OE	3-0-0	3
	CE20AOE502	Principles of Waste Management			
	ME20AOE501	Industrial Automation			
	EE20AOE502	Programmable Logic Controllers			
	AM20AOE501	Introduction to Operating Systems			
	CS20AOE502	Computer Architecture & Organization			
	CH20AOE501	Chemistry of Polymers & Applications			
5	Professional Elective courses-1		PE	3-0-0	3
	EE20APE502	Control System Engineering.			
	EC20APE501	Mechatronics			
	EC20APE502	Nanoelectronics			
6	EC20APC504	Digital Communications Lab	PC	0-0-3	1.5
7	EC20APC505	Microprocessors & Microcontrollers Lab	PC	0-0-3	1.5
8.	EC20ASC501	Skill advanced course/ soft skill course* PCB Design and Prototype Development	SC	1-0-2	2
9.	BA20AMC501	Mandatory course (AICTE suggested) Constitution of India	MC	2-0-0	0
10.	IT20AMC501	Problem Solving and Programming (Lateral Entry Students only)	MC	2-0-0	0
11.	EC20ATS501	Technical Seminar Presentation-I	TS	0-0-0	0.5
12.	EC20AIP501	Evaluation of Summer Internship	IP	0-0-0	1.5
Total					22
13.	Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)			4-0-0	4
14.	MOOC/NPTEL Course			0-0-0	2

Semester – 6 (Theory – 5, Lab –3,SoC-1,MC-2,TS-1)					
S.No	Course No	Course Name	Category	L-T-P	Credits
1.	EC20APC601	Digital Signal Processing	PC	3-0-0	3
2.	EC20APC602	Microwave Engineering and Optical Communications	PC	3-0-0	3
3.	EC20APC603	VLSI Design	PC	3-0-0	3
4.	Professional Elective courses-2		PE	3-0-0	3
	EC20APE601	Electronic Measurements and Instrumentation			
	EC20APE602	Information Theory and Coding			
	EC20APE603	Introduction to Digital Signal Processing			
	EC20APE604	RADAR Systems.			
5.	Open Elective Course/Job oriented elective-2		OE	3-0-0	3
	CE20AOE601	Disaster Management			
	ME20AOE601	Fundamentals of Additive Manufacturing			
	EE20AOE603	Optimization Techniques through MATLAB			
	CS20AOE602	JAVA Programming			
	AM20AOE502	Web Technologies			
	EG20AOE601	Technical Communication & Presentation Skills			
6.	EC20APC604	Digital Signal Processing Lab	PC	0-0-3	1.5
7.	EC20APC605	Microwave and Optical Communications Lab	PC	0-0-3	1.5
8.	EC20APC606	VLSI Design Lab	PC	0-0-3	1.5
9.	EC20ASC601	Skill advanced course/ soft skill course* Graphical System Design Using Lab-view / CISCO	SC	1-0-2	2
10.	BA20AMC502	Mandatory course (AICTE) Intellectual Property Rights & Patents.	MC	3-0-0	0.0
11.	EC20ATS601	Technical Seminar Presentation-II	TS	0-0-0	0.5
12.	AM20AMC601	AI Tools Techniques and Applications (Lateral Entry Students only)	MC	2-0-0	0
13.	Industrial/Research Mini Project (Mandatory) 4 weeks during summer vacation.				
Total					22
14.	Honors / Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)		4-0-0		4
15.	MOOC/NPTEL Course		0-0-0		2

Semester – 7 (Theory – 6,Soc-1,TS-1,PW-1,IP-1)					
S.No	Course No	Course Name	Category	L-T-P	Credits
1.	Professional Elective courses-3		PE	3-0-0	3
	EC20APE701	Analog and Digital IC Design			
	EC20APE702	FPGA Design			
	EC20APE703	Low Power VLSI Circuits and Systems			
2.	Professional Elective courses-4		PE	3-0-0	3
	EC20APE704	Digital Image Processing			
	EC20APE705	Electronic Defense Systems			
	EC20APE706	Smart Sensor Networks.			
3.	Professional Elective courses-5		PE	3-0-0	3
	EC20APE707	Data Communication and Networking			
	EC20APE708	Satellite Communications			
	EC20APE709	Wireless Sensor Networks.			
4.	Open Elective Course/Job oriented elective-3		OE	3-0-0	3
	CE20AOE701	Air Pollution and Quality Control			
	ME20AOE703	Introduction to Industrial Engineering			
	EE20AOE701	Embedded Systems			
	AM20AOE601	Machine Learning Tools and Techniques.			
	CS20AOE503	Structured Query Language			
	EE20AOE704	Introduction to Smart Grid & Electric vehicles			
	MA20AOE701	Numerical Methods for Engineers			
5.	Open Elective Course/Job oriented elective-4		OE	3-0-0	3
	CE20AOE704	Environmental Impact Analysis and Management			
	ME20AOE704	Introduction to Product Marketing			
	EE20AOE703	IoT applications in Electrical Engineering			
	AM20AOE701	Cyber Security Techniques			
	CS20AOE601	Data Analysis using 'R'			
	PH20AOE701	Nano Materials			
6.	*Humanities and Social Science Elective		HS	3-0-0	3
	BA20AHS703	Entrepreneurship and Incubation			
	BA20AHS704	Enterprise Resource Planning			
	BA20AHS705	Management Science			
7.	EC20ASC701	Skill advanced course/ soft skill course* IoT and Industrial Automation	SC	1-0-2	2
8.	EC20ATS701	Technical Seminar Presentation-III	TS	0-0-1	0.5
9.	EC20APW701	Project Work Stage-I	PW	0-0-0	2
10.	EC20AIP701	Evaluation of Industrial / Research Mini Project	IP	0-0-0	3
Total					25.5
11.	Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)			4-0-0	4

Semester – 8 (Project)					
S.No	Course No	Course Name	Category	L-T-P	Credits
1	EC20APW801	Project Work Stage-II / Full Internship in Industry	PW	0-0-0	8.5
Total credits					8.5

Open Elective/ Job Oriented Elective:

(Offered by Electronics & Communication Engineering Department to other Department students)

S.No	Course No	Course Name	Category	L-T-P/D	Credits
1	EC20AOE501	Basic VLSI design	OE/JOE	3-0-0	3
2	EC20AOE502	Digital Electronics	OE/JOE	3-0-0	3
3	EC20AOE601	Electronic Instrumentation & Measurements	OE/JOE	3-0-0	3
4	EC20AOE602	Signal Processing	OE/JOE	3-0-0	3
5	EC20AOE701	IC Applications	OE/JOE	3-0-0	3
6	EC20AOE702	Principles of Communication Engineering	OE/JOE	3-0-0	3
7	EC20AOE703	Sensors & Systems	OE/JOE	3-0-0	3
8	EC20AOE704	Internet of Things	OE/JOE	3-0-0	3
9	EC20AOE705	Introduction to Image Processing	OE/JOE	3-0-0	3
10	EC20AOE706	Microcontroller & Applications	OE/JOE	3-0-0	3

Honors/Minors
(Offered by Electronics & Communication Engineering Department)

Note: Eligible and interested students can register either for Honors or for Minors in IV Semester as per the guidelines

B.Tech HONORS

S.No	Course No	Course Name	Category	L-T-P/D	Credits
1	EC20AHO401	Electronics Packaging	HO	4-0-0	4
2	EC20AHO402	Structured Digital System Design	HO	4-0-0	4
3	EC20AHO501	MEMS Technology	HO	4-0-0	4
4	EC20AHO502	Modern Communication Systems	HO	4-0-0	4
5	EC20AHO503	MOOC/NPTEL -I	HO	0-0-0	2
6	EC20AHO601	Advanced Computer Architecture	HO	4-0-0	4
7	EC20AHO602	Digital Speech Processing	HO	4-0-0	4
8	EC20AHO603	MOOC/NPTEL -II	HO	0-0-0	2
9	EC20AHO701	Digital Video Processing	HO	4-0-0	4
10	EC20AHO702	Testing & Testability	HO	4-0-0	4

Minor Degree for Circuit Branches(EEE,CSE,CSM,CSC,CSD,IT)

S.No	Course No	Course Name	Category	L-T-P/D	Credits
1	EC20AMI401	Communication Systems-I	MI	4-0-0	4
2	EC20AMI402	Electronic Instrumentation	MI	4-0-0	4
3	EC20AMI501	Automotive Electronics	MI	4-0-0	4
4	EC20AMI502	Communication Systems-II	MI	4-0-0	4
5	EC20AMI503	MOOC/NPTEL -I	MI	0-0-0	2
6	EC20AMI601	Digital Integrated Circuits	MI	4-0-0	4
7	EC20AMI602	Nanotechnology	MI	4-0-0	4
8	EC20AMI603	MOOC/NPTEL -II	MI	0-0-0	2
9	EC20AMI701	Digital Image & Video Processing	MI	4-0-0	4
10	EC20AMI604	Embedded System Design	MI	4-0-0	4

Minor Degree for Non-Circuit Branches(CIV,MECH)

S.No	Course No	Course Name	Category	L-T-P/D	Credits
1	EC20AMI403	Introduction to Signal Processing	MI	4-0-0	4
2	EC20AMI402	Electronic Instrumentation	MI	4-0-0	4
3	EC20AMI401	Communication Systems-I	MI	4-0-0	4
4	EC20AMI504	MATLAB Programming	MI	4-0-0	4
5	EC20AMI505	MOOC/NPTEL -I	MI	0-0-0	2
6	EC20AMI604	Embedded System Design	MI	4-0-0	4
7	EC20AMI605	Introduction to CMOS VLSI Design	MI	4-0-0	4
8	EC20AMI606	MOOC/NPTEL -II	MI	0-0-0	2
9	EC20AMI501	Automotive Electronics	MI	4-0-0	4
10	EC20AMI702	Introduction to IoT	MI	4-0-0	4

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech-I Sem

L	T	P	C
3	0	0	3

(MA20ABS101) LINEAR ALGEBRA & CALCULUS

(Common to All Branches)

Course Objectives:

- This course will illuminate the students in the concepts of calculus and linear algebra.
- To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real-world problems and their applications.

Unit -1:

Matrices

Rank of a matrix by echelon form, normal form. Solving system of homogeneous and non-homogeneous linear equations. Eigen values and Eigen vectors and their properties, Cayley-

Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, Diagonalisation of a matrix.

Learning Outcomes:

At the end of this unit, the student will be able to

- Solve systems of linear equations, using technology to facilitate row reduction determine the rank, eigen values and eigen vectors. (L3)
- Identify special properties of a matrix, such as positive definite, etc., and use this information to facilitate the calculation of matrix characteristics. (L3)

Unit -2:

Mean Value Theorems

Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof) related problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Translate the given function as series of Taylor's and Maclaurin's with remainders. (L3)
- Analyze the behavior of functions by using mean value theorems. (L3)

Unit -3:

Multivariable Calculus

Partial derivatives, total derivatives, chain rule, change of variables, Jacobian, maxima and minima of functions of two variables, method of Lagrange multipliers.

Learning Outcomes:

At the end of this unit, the student will be able to

- Find partial derivatives numerically and symbolically and use them to analyze and interpret the way a function varies. (L3)
- Acquire the Knowledge maxima and minima of functions of several variables. (L1)

Utilize Jacobian of a coordinate transformation to deal with the problems in change of variables. (L3)

Unit -4:

Multiple Integrals

Double integrals, change of order of integration, change of variables. Evaluation of triple integrals, change of variables between Cartesian, Cylindrical and Spherical polar co-ordinates.

Learning Outcomes:

At the end of this unit, the student will be able to

- Evaluate double integrals of functions of several variables in two dimensions using Cartesian and polar coordinates. (L5)
- Apply double integration techniques in evaluating areas bounded by region. (L4)
- Evaluate multiple integrals in Cartesian, cylindrical and spherical geometries. (L5)

Unit -5:

Beta and Gamma functions

Beta and Gamma functions and their properties, relation between beta and gamma functions,

Evaluation of definite integrals using beta and gamma functions. Evaluation of double and triple integrals using Beta and Gamma functions.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand Beta and Gamma functions and its relations. (L2)
- Conclude the use of Special function in evaluating definite integrals. (L4)

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.

Reference Books:

1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
3. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.
4. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education.
5. H. k Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand.
6. N. Bali, M. Goyal, C. Watkins, Advanced Engineering Mathematics, Infinity Science Press.

Course Outcomes:

At the end of the course, the student will be able to

- Develop the use of matrix algebra techniques that is needed by engineers for practical applications. (L6)
- Utilize mean value theorems to real life problems. (L3)
- Familiarize with functions of several variables which are useful in optimization. (L3)
- Apply multiple integrals to find the area and volumes for different functions. (L3)
- Analyze the concepts of Beta and Gamma special function for different functions. (L4)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech I Sem

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(PH20ABS103) APPLIED PHYSICS

(ECE, EEE, CSE, CSE (AI & ML), IT)

Course Objectives:

- To identify the importance of the optical phenomenon i.e., interference, diffraction and polarization related to its engineering applications.
- To understand the mechanisms of emission of light, the use of lasers as light sources for low and high energy applications, study of propagation of light wave through optical fibers along with engineering applications.
- To explain the significant concepts of dielectric and magnetic materials that leads to potential applications in the emerging microdevices.
- To enlighten the concepts of Quantum Mechanics and to provide fundamentals of de 'Broglie waves, quantum mechanical wave equation and its applications, the importance of free electron theory and band theory of solids.
- Evolution of band theory to distinguish materials, basic concepts and transport phenomenon of charge carriers in semiconductors. To give an impetus on the subtle mechanism of superconductors using the concept of BCS theory and their fascinating applications.

Unit-1:

Wave Optics

Interference- Principle of superposition – Interference of light – Interference by division of wavefront and amplitude -Interference in thin films (Reflection Geometry) – Colors in thin films – Newton's Rings – Determination of wavelength and refractive index–Applications.

Diffraction- Introduction – Fresnel and Fraunhofer diffraction – Fraunhofer diffraction due to single slit, double slit and N-slits (qualitative) – Grating spectrum– Applications.

Polarization- Introduction – Types of polarization – Polarization by reflection, refraction and double refraction - Nicol's Prism - Half wave and Quarter wave plates– Applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the need of coherent sources and the conditions for sustained interference. (L2)
- Identify engineering applications of interference. (L3)
- Analyze the differences between interference and diffraction with applications. (L4)
- Illustrate the concept of polarization of light and its applications. (L2)
- Classify ordinary polarized light and extraordinary polarized light. (L2)

Unit-2:

Lasers and Fiber optics

Lasers- Introduction – Characteristics of laser – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Lasing action – Pumping mechanisms – Nd-YAG laser–He-Ne laser– GaAs Laser – Applications of lasers.

Fiber optics- Introduction – Principle of optical fiber – Acceptance Angle – Numerical Aperture – Classification of optical fibers based on refractive index profile and modes – Propagation of electromagnetic wave through optical fibers – Attenuation – Optical fiber communication system – Applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Demonstrate the basic concepts of LASER light Sources. (L2)
- Apply the concepts to learn the types of lasers. (L3)
- Identifies the Engineering applications of lasers. (L3)
- Explain the working principle of optical fibers. (L2)
- Classify optical fibers based on refractive index profile and mode of propagation. (L2)
- Identify the applications of optical fibers in various fields. (L3)

Unit-3:

Dielectric and Magnetic Materials

Dielectric Materials- Introduction – Dielectric polarization – Dielectric polarizability, Susceptibility and Dielectric constant – Types of polarizations: Electronic, Ionic and Orientational polarizations (Qualitative) – Lorentz internal field – Clausius-Mossotti equation-Ferro electricity- Dielectric Loss-Applications.

Magnetic Materials- Introduction – Magnetic dipole moment – Magnetization – Magnetic susceptibility and Permeability – Origin of permanent magnetic moment – Classification of magnetic materials: (Dia, Para, Ferro Ferri, & Antiferro) - Domain theory of Ferromagnetism (Qualitative), – Hysteresis – Soft and Hard magnetic materials-Applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the concept of dielectric constant and polarization in dielectric materials. (L2)
- Summarize various types of polarization of dielectrics. (L2)
- Interpret Lorentz field and Clausius-Mossotti relation in dielectrics. (L2)
- Classify the magnetic materials based on susceptibility and their temperature dependence. (L2)
- Explain the applications of dielectric and magnetic materials. (L2)
- Apply the concept of magnetism to magnetic devices. (L3)

Unit-4:

Quantum Mechanics, Free Electron Theory and Band theory of Solids

Quantum Mechanics- Dual nature of matter – de-Broglie hypothesis- Heisenberg uncertainty principle (Qualitative) – Significance of wave function- Schrodinger's time independent and dependent wave equation – Particle in a one-dimensional infinite potential well.

Free Electron Theory- Classical free electron theory (Merits and demerits) – Quantum free electron theory – Equation for electrical conductivity based on quantum free electron theory – Density of States-Fermi- Dirac distribution.

Band theory of Solids- Origin of energy bands- Classification of solids – Bloch's Theorem (Qualitative) – Kronig- Penney model (Qualitative) – E vs k diagram.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the concept of dual nature of matter. (L2)
- Explain the significance of wave function. (L2)
- Interpret the concepts of classical and quantum free electron theories. (L2)
- Explain the importance of K-P model. (L2)
- Classify the materials based on band theory. (L2)

Unit-5:

Semiconductors and Superconductors

Semiconductors- Introduction – Intrinsic semiconductors – Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors – Density of charge carriers – Dependence of Fermi energy on carrier concentration and temperature – Drift and diffusion currents – Einstein's equation – Direct and indirect band gap semiconductors – Hall effect – Hall coefficient – Applications of Hall effect.

Superconductors- Introduction – Concept & Properties of superconductors – Meissner effect – Type I and Type II superconductors – BCS theory – Josephson effects (AC and DC) – High T_c superconductors – Applications of superconductors.

Learning Outcomes:

At the end of this unit, the student will be able to

- Interpret the direct and indirect band gap semiconductors. (L2)
- Identify the type of semiconductor using Hall effect. (L2)
- Identify applications of semiconductors in electronic devices. (L2)
- Explain how electrical resistivity of solids changes with temperature. (L2)
- Classify superconductors based on Meissner's effect. (L2)

Text books:

1. A text book of Engineering Physics – Dr. M.N. Avadhanulu & Dr. P.G. Kshirsagar, S. Chand and Company, 11 Edition, 2019
2. Engineering Physics – B.K. Pandey and S. Chaturvedi, Cengage Learning, 2013

Reference Books:

1. Engineering Physics – Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018
2. Engineering Physics – K. Thyagarajan, McGraw Hill Publishers, 2019
3. Engineering Physics – Sanjay D. Jain, D. Sahasrambudhe and Girish, University Press, 2010
4. Semiconductor physics and devices- Basic principle - Donald A, Neamen, McGraw Hill, 2011
5. Solid State Physics, A.J. Dekker, Macmillan Education UK, 1969
6. Kittel's Introduction to Solid State Physics, Charles Kittel, Wiley India Edition Paperback, 2019

Course Outcomes:

- Apply the different realms of physics and their applications in both scientific and technological systems through physical optics. (L3)
- understand the mechanisms of emission of light, the use of lasers as light sources for low and high energy applications. (L2)
- Understands the response of dielectric and magnetic materials to the applied electric and magnetic fields. (L2)
- Apply the quantum mechanical picture of subatomic world along with the discrepancies between the classical estimates and laboratory observations of electron transportation phenomena by free electron theory and band theory. (L3)
- Elaborate the physical properties exhibited by materials through the understanding of properties of semiconductors and superconductors. (L5)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech I Sem

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3	0	0	3

(EG20AHS101) COMMUNICATIVE ENGLISH

(Common to all Branches)

Course Objectives:

- To give inputs to students regarding effective listening skills for better comprehension of academic lectures and English spoken by native speakers.
- To make students aware of reading strategies for comprehension of various academic texts and authentic materials.
- To improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations.
- To impart effective strategies for good writing and demonstrate the same in summarizing, writing well-organized essays, record and report useful information.
- To offer relevant inputs regarding grammatical structures and vocabulary and encourage their appropriate use in speech and writing.

Unit-1:

Lesson: On the Conduct of Life: William Hazlitt

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.

Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.

Reading: Skimming to get the main idea of a text; scanning to look for specific pieces of information. **Reading for Writing:** Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph.

Grammar and Vocabulary: Parts of Speech, Prepositions, Word formation-I: Introduction to Word formation, Clauses and Sentences.

Learning Outcomes:

At the end of the module, the learners will be able to

- Understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information

- Ask and answer general questions on familiar topics and introduce oneself/others
- Employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information
- Recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
- Form sentences using proper grammatical structures and correct word forms

Unit-2:

Lesson: The Brook: Alfred Tennyson

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts.

Speaking: Discussion in pairs/small groups on specific topics followed by short structured talks. **Reading:** Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

Writing: Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters.

Grammar and Vocabulary: Articles, Word formation-II: Root words from other languages, Punctuation.

Learning Outcomes:

At the end of the module, the learners will be able to

- Comprehend short talks on general topics.
- Participate in informal discussions and speak clearly on a specific topic using suitable discourse markers.
- Understand the use of cohesive devices for better reading comprehension.
- Write well-structured paragraphs on specific topics.
- Identify basic errors of grammar/ usage and make necessary corrections in short texts.

Unit-3:

Lesson: The Death Trap: Saki

Listening: Listening for global comprehension and summarizing what is listened to.

Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed.

Reading: Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.

Writing: Summarizing, Paragraph Writing.

Grammar and Vocabulary: Noun-pronoun agreement, Subject-verb agreement, Word formation-III: Prefixes & suffixes from other languages. Principles of Good writing.

Learning Outcomes:

At the end of the module, the learners will be able to

- Comprehend short talks and summarize the content with clarity and precision.
- Participate in informal discussions and report what is discussed.
- Infer meanings of unfamiliar words using contextual clues.
- Write summaries based on global comprehension of reading/listening texts
- Use correct tense forms, appropriate structures and a range of reporting verbs in speech and writing.

Unit -4:

Lesson: Muhammad Yunus

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.

Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.

Reading: Studying use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communication processes or display complicated data.

Writing: Letter writing, Essay writing.

Grammar and Vocabulary: Misplaced Modifiers, Synonyms and Antonyms, Essay writing.

Learning Outcomes:

At the end of the module, the learners will be able to

- Infer and predict content of spoken discourse.
- Understand verbal and non-verbal features of communication and hold formal/informal conversations.
- Interpret graphic elements used in academic texts.
- Produce a coherent paragraph interpreting a figure/graph/chart/table.
- Use appropriate language for description and interpretation of graphical elements.

Unit-5:

Lesson: Politics and the English Language: George Orwell

Listening: Identifying key terms, understanding concepts and answering a series of relevant questions.

Speaking: Formal oral presentations on topics from academic contexts - without the use of PPT slides.

Reading: Reading for comprehension.

Writing: Summary writing, Note making.

Grammar and Vocabulary: Clichés, Redundancies, Common Abbreviations, Writing a summary.

Learning Outcomes:

At the end of the module, the learners will be able to

- Take notes while listening to a talk/lecture and make use of them to answer questions.
- Make formal oral presentations using effective strategies.
- Comprehend, discuss and respond to academic texts orally and in writing.
- Produce a well-organized essay with adequate support and detail.
- Edit short texts by correcting Common Errors.

Web links

1. www.englishclub.com
2. www.easyworldofenglish.com
3. www.languageguide.org/english
4. www.bbc.co.uk/learningenglish
5. www.eslpod.com/index.html
6. www.myenglishpages.com

Text Books:

1. Language and Life: A Skills Approach- I Edition 2019, Orient Black-Swan.

Reference Books:

1. Bailey, Stephen. Academic writing: A Handbook for International Students, Routledge, 2014.
2. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking, Heinley ELT; 2nd Edition, 2018.

3. Raymond Murphy's English Grammar in Use, Fourth Edition (2012)E-book.
4. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.
5. Oxford Learners Dictionary, 12th Edition, 2011.
6. Norman Lewis Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary Goyal Reprint edition 2011.
7. Speed Reading with the Right Brain: Learn to Read Ideas Instead of Just Words by David Butler; 2nd edition 2014.

Course Outcomes:

- Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English. (L2)
- Apply grammatical structures to formulate sentences and correct word forms. (L3)
- Analyze discourse markers to speak clearly on a specific topic in informal discussions. (L4)
- Evaluate reading/listening texts and to write summaries based on global comprehension of these texts. (L5)
- Create a coherent paragraph interpreting a figure/graph/chart/table. (L6)

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B.Tech I/I Sem

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(EE20AES103) FUNDAMENTALS OF ELECTRICAL CIRCUITS

(Common to ECE & EEE)

Course Objectives:

To make the student learn about

- Basic characteristics of R, L, C parameters, their Voltage and Current Relations and Various combinations of these parameters.
- The
- Single-Phase AC circuits and concepts of real power, reactive power, complex power, phase angle and phase difference
- Network theorems and their applications
- Network Topology and concepts like Tree, Cut-set, Tie-set, Loop, Co-Tree.
- To know the analysis of three phase balanced and unbalanced circuits and to measure active and reactive powers in three phase circuits.

Unit- I Introduction to Electrical & Magnetic Circuits

Electrical Circuits: Circuit Concept – Types of elements - Source Transformation- Voltage-Current Relationship for Passive Elements. Kirchhoff's Laws – Network Reduction Techniques-Series, Parallel, Series Parallel, Star-to-Delta or Delta-to-Star Transformation. Examples. Loop and Nodal Methods of Analysis of Networks & Independent Voltage and Current Sources.

Magnetic Circuits: Faraday's Laws of Electromagnetic Induction-Concept of Self and Mutual Inductance-Dot Convention-Coefficient of Coupling-Composite Magnetic Circuit-Analysis of Series and Parallel Magnetic Circuits, MMF Calculations.

Learning Outcomes:

- Know about Kirchhoff's Laws in solving series, parallel, non-series-parallel configurations in DC networks (L2)
- Know about voltage source to current source and vice-versa transformation in their representation (L2)
- Understand Faraday's laws (L1)
- Distinguish analogy between electric and magnetic circuits(L3)
- Understand the analysis of series and parallel magnetic circuits (L1)

Unit- II Single Phase A.C Circuits

R.M.S, Average Values and Form Factor for Different Periodic Wave Forms – Sinusoidal Alternating Quantities – Phase and Phase Difference – Complex and Polar Forms of Representations, j-Notation, Steady State Analysis of R, L and C (In Series, Parallel and Series Parallel Combinations) with Sinusoidal Excitation- Phasor diagrams - Concept of Power Factor-Concept of Reactance, Impedance, Susceptance and Admittance-Apparent Power, Active and Reactive Power, Examples.

Learning Outcomes: The student will be able to

- Understand fundamental definitions of 1- ϕ AC circuits(L2)
- Distinguish between scalar, vector and phasor quantities(L3)
- Understand voltage, current and power relationships in 1- ϕ AC circuits with basic elements R, L, and C. (L2)
- Understand the basic definitions of complex admittances and complex power (L2)
- Solve 1- ϕ AC circuits with series and parallel combinations of electrical circuit elements R, L and C. (L5)

Unit- III Network Theorems

Superposition, Reciprocity, Thevenin's, Norton's, Maximum Power Transfer, Millmann's, Tellegen's, and Compensation Theorems for D.C and Sinusoidal Excitations.

Learning Outcomes: The student will be able to

- Understand that the electrical circuits are 'heart' of electrical engineering subjects and network theorems are main part of it. (L1)
- Distinguish between various theorems and inter-relationship between various theorems(L4)
- know about applications of certain theorems to DC circuit analysis (L2)
- Understands about applications of certain theorems to AC network analysis (L1)
- Know about applications of certain theorems to both DC and AC network analysis(L2)

Unit- IV Network Topology

Definitions – Graph – Tree, Basic Cut set and Basic Tie set Matrices for Planar Networks–Duality & Dual Networks. Nodal Analysis, Mesh Analysis.

Learning Outcomes: The student will be able

- To understand basic graph theory definitions which are required for solving electrical circuits(L1)
- To understand about loop current method(L1)
- To understand about nodal analysis methods(L1)
- To understand about principle of duality and dual networks(L1)
- To identify the solution methodology in solving electrical circuits based on the topology(L4)

Unit- V Three Phase A.C. Circuits

Introduction - Analysis of Balanced Three Phase Circuits – Phase Sequence- Star and Delta Connection - Relation between Line and Phase Voltages and Currents in Balanced Systems - Measurement of Active and Reactive Power in Balanced and Unbalanced Three Phase Systems.

Analysis of Three Phase Unbalanced Circuits - Loop Method - Star Delta Transformation Technique – for balanced and unbalanced circuits - Measurement of Active and reactive Power – Advantages of Three Phase System.

Learning Outcomes:

The student will be able to

- To know about advantages of 3- ϕ circuits over 1- ϕ circuits (L2)
- To distinguish between balanced and unbalanced circuits (L4)
- To know about phasor relationships of voltage, current, power in star and delta connected balanced and unbalanced loads (L2)
- To know about measurement of active, reactive powers in balanced circuits (L2)
- To understand about analysis of unbalanced circuits and power calculations (L2)

Text Books:

1. Circuit Theory (Analysis & Synthesis) A. Chakrabarti, Dhanpat Rai & Sons, 7th Revised Edition, 2018.
2. Fundamentals of Electric Circuits Charles K. Alexander and Matthew. N. O. Sadiku, McGraw Hill, 5th Edition, 2013.

Reference Books:

1. Engineering circuit analysis William Hayt and Jack E. Kemmerly, Mc Graw Hill Company, 7th Edition, 2006.
2. Network Analysis M.E Van Valkenberg, Prentice Hall (India), 3rd Edition, 1999.
3. Electrical Engineering Fundamentals V. Del Toro, Prentice Hall International, 2nd Edition, 2019.

4. Electric Circuits- Schaum's Series, Mc Graw Hill, 5th Edition, 2010.
5. Electrical Circuit Theory and Technology John Bird, Routledge, Taylor & Francis, 5th Edition, 2014.

Course Outcomes:

After completing the course, the student should be able to do the following

- Given a network, able to find equivalent impedance by using network reduction techniques and determine the current through any element and voltage across and power through any element. (L5)
- Given a circuit and the excitation, determine the real power, reactive power, power factor etc, (L5)
- Apply the network theorems suitably to analyze complex circuits and determine the effective voltages and currents in the circuit. (L6)
- Determine the Dual of the Network, develop the Cut Set and Tie-set Matrices for a given Circuit. (L5)
- Analyze the three-phase balanced and unbalanced circuits and to measure active and reactive powers in three phase circuits. (L5)

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B.Tech I/I Sem

L	T	P/D	C
1	0	0/2	2

(ME20AES102) ENGINEERING DRAWING

(Common to all Branches of Engineering)

Engineering drawing being the principal method of communication for engineers

Course Objectives:

To introduce and make the students

- To use drawing instruments and to draw polygons, engineering curves.
- To draw orthographic projections of points, lines & planes.
- To draw the projections of the various types of solids in different positions inclined to one and both the planes.
- To draw the projections of sectional views of various types of right regular solids.
- To draw the development of regular solids.

Unit-1:

Introduction to Engineering Drawing:

Principles of Engineering Drawing and its Significance-Conventions in drawing-lettering – BIS conventions.

- a) Conic sections (General Method only) including Rectangular Hyperbola.
- b) Cycloid, Epicycloid and Hypocycloid.
- c) Involute.

Learning Outcomes:

At the end of this unit the student will be able to

- Understand the significance of engineering drawing. (L2)
- Identify and draw curves obtained in different conic sections. (L3)
- Draw different curves such as cycloids and involutes. (L3)

Unit-2:

Projection of Points, Lines and Planes: Projection of Points in any quadrant, lines inclined to one or both planes, finding true lengths, angle made by line. Projections of regular plane surfaces inclined to one or both the planes.

Learning Outcomes:

At the end of this unit the student will be able to

- Understand the meaning of projection and draw the projections of points & lines. (L2)
- Differentiate between projected length and true length and find the true length of the lines. (L2)
- Draw the projection of regular plane surfaces. (L3)

Unit-3:

Projections of solids: Projections of regular solids inclined to one or both planes by rotational or auxiliary view method.

Learning Outcomes: At the end of this unit the student will be able to

- Understand the procedure to draw projection of solids. (L2)
- Draw the projection of solids inclined to one plane. (L3)
- Draw the projection of solids inclined to both the planes. (L3)

Unit-4:

Sections of solids: Section planes and sectional view of right regular solids- prism, cylinder, pyramid and cone. True shapes of the sections.

Learning Outcomes: At the end of this unit the student will be able to

- Understand different sectional views of regular solids. (L2)
- Obtain the true shapes of the sections of prism, cylinder, pyramid and cone. (L4)
- Draw the sectional views of prism, cylinder, pyramid and cone. (L3)

Unit-5:

Development of surfaces: Development of surfaces of right regular solids-prism, cylinder, pyramid, cone and their sectional parts.

Learning Outcomes:

At the end of this unit the student will be able to

- Understand the meaning of development of surfaces. (L2)
- Draw the development of regular solids such as prism, cylinder, pyramid and cone. (L3)
- Obtain the development of sectional parts of regular shapes. (L4)

Text Books:

1. K.L. Narayana & P. Kannaiah, Engineering Drawing, 3/e, SciTech Publishers, Chennai, 2012.
2. N.D. Bhatt, Engineering Drawing, 53/e, Charotar Publishers, 2016.

Reference Books:

1. Dr K. Prahlada Rao, Dr. S. Krishnaiah, Prof. A.V.S. Prasad, Engineering Graphics, Amaravati publications.
2. Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2009.
3. Venugopal, Engineering Drawing and Graphics, 3/e, New Age Publishers, 2000.
4. Shah and Rana, Engineering Drawing, 2/e, Pearson Education, 2009.
5. K.C. John, Engineering Graphics, 2/e, PHI, 2013.
6. Basant Agarwal & C.M. Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

Course Outcomes:

After completing the course, the student will be able to

- **Draw** basic geometrical constructions, curves used in engineering practices. (L1)
- **Understand** the concept of projection and acquire visualization skills, projection of points, Lines and Planes. (L2)
- **Illustrate** the projections of solids graphically. (L3)
- **Draw** and explore the sectional views of right regular solids.(L3)
Draw the development of surfaces of solids. (L3)

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B.Tech I/I Sem

L	T	P/D	C
0	0	2	1

(ME20AES103) ENGINEERING GRAPHICS LAB

(Common to all Branches of Engineering)

Course Objectives:

- Instruct the utility of drafting & modelling packages in orthographic and isometric drawings.
- Train the usage of 2D and 3D modelling.
- Develop the graphical skills for communication of concepts, ideas and design of engineering products through technical drawings

Introduction to AutoCAD: Basic drawing and editing commands: line, circle, rectangle, erase, view, undo, redo, snap, object editing, moving, copying, rotating, scaling, mirroring, layers, templates, polylines, trimming, extending, fillets, arrays, dimensions.

Exercises:

1. Practice exercise using basic drawing commands (4 No's).
2. Practice exercise using editing commands (4 No's).

Orthographic and Isometric Projections

Orthographic Projections: Systems of projections, conventions and application to orthographic projections.

Isometric Projections: Principles of isometric projection- Isometric scale; Isometric views: lines, planes, simple solids.

Exercises:

1. Practice exercises on Orthographic Projections (4 No's).
2. Practice exercises on Isometric Projections (4 No's).

Text Books:

1. K. Venugopal, V. Prabhu Raja, Engineering Drawing + Auto Cad, New Age International Publishers.
2. Engineering Drawing, ND Bhatt, Charotar Publishing House.
3. Engineering Drawing, K.L Narayana, SciTech Publishers.
4. D. M. Kulkarni, A. P. Rastogi, A. K. Sarkar, Engineering Graphics with AutoCAD, PHI Learning Private Limited, New Delhi, Revised edition, 2010.

Course Outcomes:

After completing the course using CAD package, the student will be able to

- **Draw** the basic views related to projections of Lines, Planes. (L1)
- **Draw** the basic views related to projections of Planes. (L1)
- **Illustrate** orthographic views of simple objects. (L3)
- **Illustrate** isometric projections of simple solids. (L3)
- **Interpret** and comprehend with drafting packages for engineering practice. (L2)

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B.Tech I/I Sem

L	T	P	C
0	0	3	1.5

(PH20ABS104) APPLIED PHYSICS LAB

(ECE, EEE, CSE, CSE (AI & ML), IT)

Course Objectives:

- Understands the concepts of interference, diffraction and their applications.
- Understand the role of optical fiber parameters in communication.
- Recognize the importance of energy gap in the study of conductivity and Hall Effect in a semiconductor.
- Illustrates the magnetic and dielectric materials applications.
- Apply the principles of semiconductors in various electronic devices.

Note: In the following list, out of 12 experiments, any 10 experiments must be performed in a semester.

List of Applied Physics Experiments:

1. Determine the thickness of the wire using wedge shape method.
2. Determination of the radius of curvature of the lens by Newton's ring method.
3. Determination of wavelength by plane diffraction grating method.
4. Determination of dispersive power of prism.
5. Determination of wavelength of LASER light using diffraction grating.
6. Determination of particle size using LASER.
7. To determine the numerical aperture of a given optical fiber its acceptance angle.
8. Determination of dielectric constant by charging and discharging method.
9. Magnetic field along the axis of a circular coil carrying current- StewartGee's method.
10. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
11. To determine the energy gap of a semiconductor by temperature by Four-Probe Method.
12. Determination of thermistor negative temperature coefficient of resistance.

References:

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.

2. <http://vlab.amrita.edu/index.php> -Virtual Labs, Amrita University.

Course Outcomes:

At the end of the course, the student will be able to

- Utilize optical instruments like microscope and spectrometer. (L3)
- Determine thickness of a hair/paper with the concept of interference. (L5)
- Estimate the wavelength of different colors using diffraction grating and resolving power. (L5)
- Organize the intensity of the magnetic field of circular coil carrying current with distance. (L3)
- Evaluate the acceptance angle of an optical fiber and numerical aperture. (L5)
- Determine the resistivity of the given semiconductor using four probe method. (L5)
- Identify the type of semiconductor i.e., n-type or p-type using hall effect. (L3)
- Determine the band gap of a given semiconductor. (L5)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech I/I Sem

L	T	P	C
0	0	3	1.5

(EG20AHS102) COMMUNICATIVE ENGLISH LAB

(Common to all Branches)

Course Objectives:

- To expose students to a variety of self-instructional, learner-friendly modes of language learning.
- To give inputs on better pronunciation through stress, intonation and rhythm.
- To make students aware of the impact of mother tongue on their use of English.
- To make students aware of the skills of using effective language in Interviews, Group Discussions and Public speaking.
- To equip students with knowledge of the use of computers in resume preparation, report writing, and format making etc.

Unit-1:

1. Phonetics (sounds symbols, transcription and Received Pronunciation (R.P), stress and intonation).
2. Describing objects/places/persons.

Unit-2:

1. Role Play/ Conversational Practice.
2. JAM.

Unit-3:

1. **Group Discussion:** Types, process, language and body language.
2. **Debate:** Arguing in favor of and against a topic- logical questioning.

Unit-4:

1. **Oral/ Poster Presentations:** Structure, preparation, visual aids and delivery.
2. **Resume Writing:** Definition, formats and practice.

Unit-5:

1. **Interview Skills:** Basics of interviews -kinds of interviews- preparation – and performance.
2. **Film/book review:** Structure, language and practice.

Suggested Software

Orel, Walden InfoTech, Young India Films.

Reference Books

1. Bailey, Stephen. Academic writing: A Handbook for International Students,

Routledge, 2014.

2. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational. 2016.
4. Hewings, Martin. Cambridge Academic English (B2). Cambridge University Press, 2012.
5. T. Balasubramaniyan, A Textbook of English Phonetics for Indian Students, 3rd edition; Laxmi publications 2017.

Web Links

1. www.esllab.com
2. www.englishmedialab.com
3. www.englishinteractive.net

Course Outcomes:

After completing the course, the students will be:

1. Develop to handle and excel in a variety of self-instructional, learner-friendly modes of language learning. (L6)
2. Develop to employ better stress and intonation patterns and utter English sounds correctly. (L6)
3. Develop to avoid the impact of mother tongue in English and neutralize their accent. (L6)
4. Develop to participate with skill and confidence in Group Discussions, Interviews and Public Speaking. (L6)
5. Utilize the technical skills to prepare resume, report-writing, and format-making etc. (L3)

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B.Tech I/I Sem

L	T	P	C
0	0	3	1.5

(EE20AES104) FUNDAMENTALS OF ELECTRICAL CIRCUITS LAB

(ECE & EEE)

Course Objectives:

- Remember, understand and apply various theorems and verify practically.
- Understand and analyze active, reactive power measurements in three phase balanced & unbalanced circuits.

List of Experiments:

1. Verification of KCL and KVL for DC circuits
2. Determination of Self, Mutual Inductances and Coefficient of Coupling
3. Verification of Superposition Theorem for DC Circuits
4. Maximum Power Transfer Theorem for DC and AC circuits
5. Verification of Compensation Theorem for DC circuits
6. Verification of Reciprocity, Millmann's Theorems for DC circuits
7. Measurement of Active Power for Star Connected Balanced Loads
8. Measurement of Reactive Power for Star Connected Balanced Loads
9. Measurement of Active Power for Delta Connected Balanced Loads
10. Measurement of Reactive Power for Delta Connected Balanced Loads
11. Measurement of 3-Phase Power by Two Wattmeter Method for Unbalanced Loads

Note: Minimum 10 experiments to be performed

Course Outcomes:

At the end of the course, students should be able to

- Distinguish analogy between electric and magnetic circuits and apply the principles to determine circuit parameters. (L5)
- Remember, understand and apply various theorems and verify practically. (L5)
- Understand and analyze active, reactive power measurements in three phase balanced & unbalanced circuit (L5)

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2	0	0	0

(MA20AMC101) LOGICAL SKILLS FOR PROFESSIONALS-I (Mandatory Course)

Course Objectives:

- To learn the basic methods to find averages, percentages, Time and Distance and Time and Work concepts extended to problems on trains, Boats and Streams and different shortcut techniques to find the solution in a stipulated time.
- To understand the logic behind the series, coding- decoding, Directions, Problems on ages, Analogy concepts.

Unit-1:

Averages:

- Find the averages on some quantities.
- Find the averages on speed and distance.

Ratio and Proportions:

- Ratio between quantities of the same kind.
- Comparison of two ratios and convert into equal fractions.
- Find the 4th, 3rd terms of proportions and mean proportions.

Profit and Loss:

- Find the Profit or Loss on Selling price, cost price and market price.

Unit-2:

Partnership:

- Ratio of division of gains.
- Working and sleeping partners.

Simple Interest and Compound Interest:

- Find the Principal, Rate of interest and time.
- Find the amount of compound interest when the compound interest is Annually or half-year or quarterly or daily.
- Find the difference between the simple and compound interests

Time and Distance:

- Find the time, speed and distance by using direct formula.
- Find the time, speed and distance by using ratios and averages.

Unit-3:

Time and Work:

- The relation between days taken by individuals to complete a given work independently and to complete while working simultaneously or alternately.
- Teams of men, women, children and time taken by the teams to complete work independently or while working simultaneously.

Problems on Trains:

- Time Taken by Train to Cross any stationary Body or Platform.
- Time Taken by 2 trains to cross each other.
- Distance covered when two trains are moving in the same/opposite directions.

Boats and streams:

- Find the speed of boat in upstream and downstream.
- Find the speed of boat in still water and **average speed of**

boat. Unit-4:

Series:

- Alphabet series
- Number series
- Alpha-Numeric series

Coding and Decoding:

- Letter coding
- Number/symbol coding
- Substitution coding

Blood relation:

- Based dialogue or conversation
- Based on puzzles

Unit-5:

Directions:

- The right and left directional movement
- The directional reference point
- The directions of sun rays and shadow

Problems on ages:

- Find the ages at present
- Find the ages in future
- Find the ages in past

Analogy:

- Alphabet analogy
- Number analogy

Text Books:

1. Quantitative Aptitude, 2012, Dr. R.S. Agarwal, S. Chand and Company Ltd, New Delhi.
2. A Modern Approach to Verbal and Non-Verbal Reasoning, 2012, Dr. R.S. Aggarwal, S. Chand and Company Ltd, New Delhi.

Reference Books:

1. Quantitative Aptitude for Competitive Examinations, 14/e, 2010, Abhijit Guha, Tata McGraw Hill Publishers, New Delhi.
2. Course in Mental Ability & Quantitative Aptitude, 3/e, 2012, Edgar Thorpe, Tata McGraw Hill Publishers, New Delhi.
3. Fast Track Objective Arithmetic, 2012, Rajesh Verma, Arihant Publications, Meerut.
4. Reasoning and Aptitude, 2013, Nem Singh, Made Easy Publications, New Delhi

Course Outcomes:

- Demonstrate knowledge basic mathematics to develop analytical skills to solving problems of Averages - Percentages - Ratio. (L2)
- Demonstrate knowledge basic mathematics to develop analytical skills to solving problems of Partnership - Simple Interest and Compound Interest and time and distance. (L2)
- Demonstrate knowledge basic mathematics to develop analytical skills to solving problems of time and work, problems on trains and Boats and streams. (L2)
- Analyze the techniques in series, coding and decoding and blood relations. (L3)
- Analyze the techniques in directions, problems on ages and analogy. (L3)

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3	0	0	3

(MA20ABS201) DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

(Common to All Branches)

Course Objectives:

- To enlighten the learners in the concept of differential equations and multivariable calculus.
- To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.

Unit -1:

Differential equations

Exact, Non-Exact Linear and Bernoulli equations. Applications to Newton's law of cooling and law of natural growth and decay.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify the essential characteristics of linear differential equations with constant coefficients. (L3)
- Solve the linear differential equations with constant coefficients by appropriate method. (L3)
- Classify and interpret the solutions of linear differential equations. (L3)

Unit -2:

Linear differential equations of higher order

Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral, method of variation of parameters, Cauchy's and Legendre's linear equations. Applications to L-C-R Circuit.

Learning Outcomes:

At the end of this unit, the student will be able to

- Solve the linear differential equations with variable coefficients by appropriate method. (L3)
- Classify and interpret the solutions of linear differential equations of higher order. (L3)

- Formulate and solve the higher order differential equation by analyzing physical situations. (L3)

Unit 3:

Partial differential equations

Formation of a PDE, Linear partial differential equations of first order, non-linear PDEs of first order (standard forms). Solutions to homogenous linear partial differential equations with constant coefficients, rules for finding the complementary function and the particular integral.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply a range of techniques to find solutions of standard PDEs. (L3)
- Outline the basic properties of standard PDEs. (L2)

Unit-4:

Vector differentiation

Scalar and vector point functions, vector operator ∇ , ∇ applies to scalar point functions-Gradient, ∇ applied to vector point functions-Divergence, Curl and their related properties.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply ∇ to Scalar and vector point functions. (L3)
- Illustrate the physical interpretation of Gradient, Divergence and Curl. (L3)

Unit -5:

Vector integration

Line integral-circulation-work done by force, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof).

Learning Outcomes:

At the end of this unit, the student will be able to

- Find the work done in moving a particle along the path over a force field. (L4)
- Evaluate the rates of fluid flow along and across curves. (L4)

- Apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals. (L3)

Text Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.

Reference Books:

1. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2011.
2. Michael Greenberg, Advanced Engineering Mathematics, 2/e, Pearson, 2018
3. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
4. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
5. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education.
6. H. K. Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand.
7. N. Bali, M. Goyal, C. Watkins, Advanced Engineering Mathematics, Infinity Science Press.

Course Outcomes:

At the end of the course, the student will be able to

- Solve the differential equations related to various engineering fields. (L6)
 - Solve the linear differential equations of higher order related to various engineering fields. (L6)
 - Identify solution methods for partial differential equations that model physical processes. (L3)
 - Interpret the physical meaning of different operators such as gradient, curl and divergence. (L5)
- Estimate the work done against a field, circulation and flux using vector calculus. (L5)

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L	T	P	C
3	0	0	3

(CH20ABS103) CHEMISTRY (ECE, EEE, CSE, CSE (AI & ML), IT)

Course Objectives:

- To impart the concept of soft and hard waters, softening methods of hard water.
- To familiarize engineering chemistry and its applications.
- To train the students on the principles and applications of electrochemistry.
- To determine the polymer molecular weights and various applications of polymers.
- To introduce instrumental methods.

Unit 1: Water Technology

Introduction –Soft Water and hardness of water, Estimation of hardness of water by EDTA Method, Estimation of Dissolved Oxygen by Winkler's method -Boiler troubles– Priming, foaming, scale and sludge, Caustic embrittlement, Domestic treatment of water, specifications for drinking water, Bureau of Indian Standards (BIS) and World Health Organization (WHO) standards, Industrial water treatment, ion-exchange processes - desalination of brackish water, reverse osmosis.

Learning Outcomes:

At the end of this unit, the students will be able to

- List the differences between temporary and permanent hardness of water. (L1)
- Explain the principles of reverse osmosis and electrodialysis. (L2)
- Compare quality of drinking water with BIS and WHO standards. (L2)
- Illustrate problems associated with hard water - scale and sludge. (L2)
- Explain the working principles of different Industrial water treatment processes. (L2)

Unit 2: Modern Engineering materials

Understanding of materials: Crystal field theory – salient features – splitting in octahedral and tetrahedral geometry. Properties of coordination compounds- Oxidation state, coordination, magnetic and colour.

Semiconductor materials, super conductors- basic concept, band diagrams for conductors, semiconductors and insulators, Effect of doping on band structures. Super capacitors: Introduction, Basic Concept-Classification – Applications.

Nano chemistry: Introduction, classification of nanomaterials, properties and applications of Fullerenes, carbon nano tubes and Graphene's nanoparticles.

Learning Outcomes:

At the end of this unit, the students will be able to

- Explain splitting in octahedral and tetrahedral geometry of complexes. (L2)
- Discuss the magnetic behavior and colour of coordination compounds. (L3)
- Explain the band theory of solids for conductors, semiconductors and insulators. (L2)
- Demonstrate the application of Fullerenes, carbon nano tubes and Graphines nanoparticles. (L2)

Unit 3: Electrochemistry and Applications

Introduction to Electrochemistry: Electrodes – concepts, reference electrodes (Calomel electrode, Ag/AgCl electrode and glass electrode); Electrochemical cell, Nernst equation, cell potential calculations and numerical problems, P^H metry, Potentiometry - potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations). Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples.

Primary cells – Zinc-air battery, Secondary cells – Nickel-Cadmium (NiCad), and lithium ion batteries- working of the batteries including cell reactions; Principles and applications of Fuel cells: hydrogen-oxygen, methanol fuel cells

Learning Outcomes:

At the end of this unit, the students will be able to

- Apply Nernst equation for calculating electrode and cell potentials. (L3)
- Differentiate between P^H metry, potentiometric and conductometric titrations. (L2)
- Explain the theory of construction of battery and fuel cells. (L2)
- Solve problems based on cell potential. (L3)

Unit 4: Polymer Chemistry

Introduction to polymers, functionality of monomers, types of polymerization, chain growth and step growth polymerization, coordination polymerization, copolymerization (stereospecific polymerization) with specific examples and mechanisms of polymer formation. Calculation of weight average molecular mass of polymers, polydispersity index (PDI).

Plastics - Thermoplastics and Thermosettings, Preparation, properties and applications of - PVC, Teflon, Bakelite, Nylon-6,6, carbon fibres.

Elastomers-Buna-S, Buna-N-preparation, properties and applications.

Conducting polymers-polyacetylene, polyaniline, polypyrroles-mechanism of conduction and applications.

Learning Outcomes:

At the end of this unit, the students will be able to

- Explain the different types of polymers and their applications. (L2)
- Explain the preparation, properties and applications of Bakelite, Nylon-6,6, and carbon fibres. (L2)
- Describe the mechanism of conduction in conducting polymers. (L2)
- Discuss Buna-S and Buna-N elastomers and their applications. (L2)

Unit 5: Instrumental Methods and Applications

Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. Principle, instrumentation and applications of UV-Visible, IR Spectroscopies.

Learning outcomes:

After completion of Unit IV, students will be able to:

- Explain the different types of spectral series in electromagnetic spectrum. (L2)
- Understand the principles of different analytical instruments. (L2)
- Explain the different applications of analytical instruments. (L2)

Text Books:

1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

Reference Books:

1. G.V.Subba Reddy, K.N.Jayaveera and C. Ramachandraiah, Engineering Chemistry, Mc Graw Hill, 2020.

2. D. Lee, Concise Inorganic Chemistry, 5/e, Oxford University Press, 2008.
3. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.

Course Outcomes:

At the end of the course, the students will be able to:

- Estimate the amount of hardness and DO present in water. (L2)
- Compare the materials of construction for battery and electrochemical sensors. (L2)
- Explain the preparation, properties, and applications of thermoplastics & thermosetting, elastomers & conducting polymers. (L2)
- Explain the principles of spectrometry. (L2)
- Apply the principle of Band diagrams in application of conductors and semiconductors. (L3)

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(CS20AES101) PROBLEM SOLVING USING C (Common to All Branches of Engineering)

Course Objectives:

- To learn how to solve a given problem.
- To illustrate the basic concepts of C programming language.
- To discuss the concepts of Functions, Arrays, Pointers and Structures.
- To familiar with Dynamic memory allocation concepts.
- To apply concepts of structures and files to solve real word problems.

UNIT-1:

Introduction to Problem Solving: Problem Solving Aspect, Problem Identification, Problem Understanding, Algorithm Development, Solution Planning, Flowcharts, flowgorithm.

Overview of C: History Of C, C Language Elements, Basic Structure of C Program, C Tokens-Variables and Data Types, Operators, Expressions and Type Conversions.

Learning Outcomes:

The students will be able to

- Develop solution through problem understanding and decomposition (L6).
- Develop basic flowcharts for performing input and output and computations (L3).
- Solve Numerical Problems using Flowgorithm (L3).
- Use C basic concepts to write simple C programs (L3).

UNIT-2:

Control Statements: Selection Statements- if and switch statements.

Iterative Statements: for, while and do-while statements.

Jump Statements: break and continue statements.

Learning Outcomes:

The students will be able to

- Implement C program using Conditional statements (L2).
- Implement C program using Iterative statements (L2).

UNIT-3:

Arrays: Declaration, accessing array elements, Storing values, Operations on arrays, Multi-dimensional arrays.

Functions: Introduction, Using Functions, Function declaration, Function definition and Function call, Parameter passing, Passing arrays to functions, Recursion, Storage classes.

Learning Outcomes: The students will be able to

- Writing Structured programs using Functions (L5).
- Apply arrays concepts on real time applications (L6).

UNIT-4:

Pointers: Declaration and Initialization of pointer variables, Pointer arithmetic, Pointers and arrays, Pointer to pointer, Array of pointers, Pointers and functions, Dynamic Memory Allocation.

Strings: Introduction to Strings, String handling functions, Preprocessor Directives.

Learning Outcomes: The students will be able to

- Use pointers to write c Programs (L3).
- Understand the concepts of preprocessors (L2).
- Apply Dynamic Memory Allocation concepts on real time applications (L6).

UNIT-5:

Structures: Introduction, Nested Structures, Array of Structures, Structures and Functions, Unions.

Files in C: Using Files in C, Read data from Files, Writing data to Files, Random access to files, Command-line Arguments

Learning Outcomes:

The students will be able to

- Use the concepts of Structures and Unions to write C programs (L3).
- Apply various operations on Files (L6).

Text Books:

1. Reema Thareja, Programming in C, Oxford University Press, AICTE Edition, 2018.
2. R.G. Dromey, "How to Solve it by Computer". 2014, Pearson.

Reference Books:

1. Jeri R. Hanly, Elliot B. Koffman, Problem Solving and Program Design in C, 5/e, Pearson
2. B. A. Forouzan and R. F. Gilberg, Computer Science: A Structured Programming Approach Using C, 3/e, Cengage Learning, 2007.
3. Brian W Kernighan and Dennis M Ritchie, The C Programming Language, Second Edition, Prentice Hall Publication.
4. Paul Deitel, Harvey Deitel -C How to Program with an introduction to C++, Eighth Edition

Course Outcomes:

At the end of the course, the students will be able to:

- Solve computational problems (L3).
 - Select the features of C language appropriate for solving a problem (L4)
 - Design computer programs for real world problems (L6)
- Organize the data which is more appropriated for solving a problem

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(EC20AES201) ELECTRONIC DEVICES AND CIRCUITS

(ECE)

Course Objectives:

- To understand the basic principles of all semiconductor devices.
- To be able to solve problems related to diode circuits, and amplifier circuits.
- To analyze diode circuits, various biasing and small signal equivalent circuits of amplifiers.
- To be able to compare the performance of BJTs and MOSFETs.
- To design rectifier circuits and various amplifier circuits using BJTs and MOSFETs.

Unit 1

Diodes: Review of Semiconductors, the ideal diode- current voltage characteristics, Applications of diodes, Terminal characteristic of junction diodes- forward-bias, Reverse-bias and breakdown regions, Modeling the diode forward characteristics- The exponential model, Graphical analysis and Iterative analysis using the exponential model, The Piecewise-Linear model, Constant-voltage-drop model, Ideal-Diode model and Small signal model.

Learning outcomes:

- Remember and understand the basic characteristics of semiconductor diode. (L1)
- Understand iterative and graphical analysis of simple diode circuits. (L1)

Unit 2

Other Diodes and Bipolar Junction Transistors (BJTs):

Specifying and Modeling the Zener diode, Use of the Zener as a Shunt regulator, Temperature effects. Rectifier circuits- The Half-wave rectifier, The Full-Wave rectifier, The Bridge Rectifier without and with a Filter capacitor, Voltage doubler, The Schottky- barrier diode, Varactor diode, Photodiodes and Light-Emitting Diodes.

Bipolar Junction Transistors (BJTs): Device Structure and Physical operation- circuit symbol and conventions, Simplified structure and Modes of operation, Operation of NPN transistor in the Active mode, Structure of actual transistor, Ebers-Moll model, Operation in the Saturation mode, The PNP transistor, Graphical representation of transistor characteristics and Early effect.

Learning outcomes:

- Understand principle of operation of Zener diode and other special semiconductor diodes. (L1)
- Understand the V-I characteristics of BJT and its different configurations. (L1)
- Analyze various applications of diode and special purpose diodes. (L3)
- Design rectifier and voltage regulator circuits. (L4)

Unit 3

Bipolar Junction Transistors:

BJT circuits at DC, Biasing in BJT amplifier circuits- The classical discrete-circuit bias arrangement, A two power supply version, Biasing using a Collector-to-Base feedback resistor, The Hybrid- π model and T model, Performing small-signal analysis directly on the circuit diagram.

Basic BJT amplifier configurations: Three basic configurations- The Common Emitter amplifier without and with emitter resistance, Common Base amplifier and Common collector amplifier, Comparison of three configurations.

Learning outcomes:

- Solve problems on various biasing circuits using BJT. (L2)
- Analyze BJT based biasing circuits. (L3)
- Design an amplifier using BJT based on the given specifications. (L4)

Unit 4

JFET & MOS Field-Effect Transistors:

Operation of both N-channel and P-channel JFET-Drain characteristics and Transfer characteristics. Device structure and Physical Operation (both N-channel and P-channel MOSFET), Current – Voltage characteristics, MOSFET circuits at DC, Biasing in MOS amplifiers circuits: Biasing by fixing V_{GS} , Biasing by fixing V_G and connecting a resistance in the source and Biasing using a drain to gate feedback resistor. **Learning outcomes:**

- Understand the principle of operation of various types of JFET and MOSFET devices (L1)

- Understand the V-I characteristics of JFET and MOSFET devices and their configurations (L1)

Unit 5

MOSFET Small signal operation and Models:

The DC bias point, voltage gain, separating the DC analysis and the signal analysis, small signal equivalent circuit models, the trans conductance and T-equivalent circuit model. Basic MOSFET amplifier configurations-Three basic configurations, Characterizing amplifiers, Common source amplifier without and with source resistance, Common Gate amplifier, and Common Drain amplifier and Comparison of three configurations.

Learning outcomes:

- Solve problems on small signal equivalent of MOSFET devices. (L2)
- Analyze various biasing circuits based on different types of MOSFETs. (L3)
- Design an amplifier using MOSFET based on the given specifications. (L4)

Text Books:

1. Adel S. Sedra and Kenneth C. Smith, "Microelectronic Circuits – Theory and Applications", 6th Edition, Oxford Press, 2013.
2. Donald A Neamen, "Electronic Circuits–analysis and design", 3rd McGrawHill (India), 2019.

References:

1. J. Millman and Chalkias, "Integrated electronics", 2nd Edition, Tata McGrawHill, 1991.
2. Behzad Razavi, "Microelectronics", Second edition, Wiley, 2013.
3. R.L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuits", 9th Edition, Pearson, 2006.

Course Outcomes:

After the completion of the course, students will be able to

- Understand principle of operation, characteristics and applications of Semiconductor diodes, Bipolar Junction Transistor and MOSFETs.
- Apply the basic principles for solving the problems related to Semiconductor diodes, BJTs, and MOSFETs.
- Analyze diode circuits for different applications such as rectifiers, clippers and clampers also analyze biasing circuits of BJTs, and MOSFETs.
- Design diode circuits and amplifiers using BJTs, and MOSFETs.
- Compare the performance of various semiconductor devices.

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(ME20AES101) ENGINEERING WORKSHOP

(Common to all Branches)

Course Description:

This course will provide students with a hands-on experience on various basic engineering practices. This course will also provide an opportunity to the students to experience the various steps involved in the industrial product fabrication.

Course Objectives:

- To familiarize students with basic engineering applications in day-to-day life.

Wood Working: (Any 2)

To familiarize with different types of wood and tools used in wood working and make following joints;

1. Planning and Sawing of Wood
2. Half – Lap Joint
3. Mortise and Tenon Joint
4. Dovetail Joint or Bridle Joint

Sheet Metal Working: (Any 2)

To familiarize with different types of tools used in sheet metal working, developments of following sheet metal job from GI sheets;

- 1) Rectangular tray
- 2) Conical funnel
- 3) Open scoop

Fitting: (Any 1)

To familiarize with different types of tools used in fitting and do the following fitting exercises;

- 1) V-fit
- 2) Square fit
- 3) Dovetail fit

Electrical Wiring: (Any 2)

To familiarize with different types of basic electrical circuits and make the following connections;

- 1) Parallel and series
- 2) Two-way switch
- 3) Godown lighting
- 4) Soldering of wires.

Foundry Practice: (Any 1)

To familiarize with different types of tools used in Foundry and do the following exercises;

1. Preparation of a green sand mould using single piece pattern
2. Preparation of a green sand mould using split piece pattern with core and demonstration of casting.

Welding Practice: (Any 1)

To familiarize with different types of tools used in Welding and do the following exercises;

1. Lap joint, butt joint and T joint using arc welding.
2. Lap joint using resistance spot welding
3. Lap and butt joints using gas welding

Assembling/Disassembling Practice: (Any 1)

To familiarize with different types of tools used in Assembling/Disassembling and do the following exercises;

1. Bicycle
2. Clutch and carburetor
3. Two-wheeler engine parts

Manufacture of a Plastic Component (Any 1)

To familiarize with different types of tools used in Manufacture of a Plastic Component and do the following exercises;

1. Use of injection moulding machine
2. FRP composite preparation using hand layup method
3. Joining of plastic components

Reference Books/Laboratory Manuals:

1. P. Kannaiah and K. L. Narayana, Workshop Manual, SciTech Publishers, 2009.
2. K. Venkata Reddy, Workshop Practice Manual, BS Publications, 2008.
3. V. Ramesh Babu, Engineering Workshop Practice, V R B Publishers Private Limited, 2009.

Additional Learning Resources:

1. R. K. Jain, Production Technology, Khanna Publishers, 17th edition, 2012.
2. Kalpakjian, Serope, Manufacturing Engineering and Technology, Pearson Education, 7th edition, 2014.

Course Outcomes:

After completion of this lab the student will be able to

1. Identify tools, work material, measuring instruments useful for domestic applications (L3).
2. Apply wood working skills in real world applications. (L3)
3. Build different parts with metal sheets in real world applications. (L3)
4. Apply fitting operations in various applications for good strength. (L3)
5. Analyze different types of basic electric circuit connections. (L4)
6. Demonstrate soldering and brazing in joining circuits. (L2)

7. Make moulds for sand casting using standard equipment. (L3)
8. Develop different weld joints for various metals. (L3)
9. Inspect various parts of machine components. (L4)
10. Make plastic components using proper raw material. (L3)

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(CS20AES103) IT Workshop (Common to All Branches of Engineering)

Course Objectives:

- To make the students to know about the internal parts of computer, Generation of Computers
- To make the students to know how to assemble and disassemble a computer from its parts
- To make the students to install Operating system for a computer.
- To provide technical training to the students on productivity tool like Word Processor, Spread Sheets, Presentations and LaTeX
- To learn about networking of computers and use Internet facility for browsing and searching

Task 1:

Learn about Computer Hardware -1: Identifying the internal parts of computer with its peripherals, Block diagram of Computer, Generations of Computers. Write specifications for each part of a computer including peripherals and specifications of a system. Submit it in the form of report.

Task 2:

Learn about Computer Hardware-2: Assemble and disassemble the Personal Computer, Internal and external connections of the computer, Troubleshoot the computer by identifying working and non-working parts. Submit a report about the working and non-working parts in a computer.

Task 3:

Installation of Operating System: Linux, Windows 7/8/10 Installation, install both the operating system in a computer and make the system as Dual boot. Student should record the entire installation process.

Task 4:

Installation of Device drivers: install supported device drivers for the system-printer drivers, audio and video drivers, Graphic card drivers, USB drivers, install new application software and record the process of installations.

Task 5:

Networking: Connecting computers directly using a cable or wireless connectivity and share information, connecting computers using switch/hub or Local Area Network connection and share information, Wide Area Network Connection, crimping activity, logical configuration. The entire process has to be documented.

Task 6:

Introduction to Web Design: Introduction to Web Design, Introduction to HTML tags, Cascading Style sheets and Applications using HTML and CSS.

Task 7:

Introduction to Virus and Antivirus: Types of Virus, virus engine, Antivirus-download freely available Anti-virus software, install it and use it to check for the threats to the computer being used. Student should submit information about the features of the installation process and antivirus used.

Task 8:

Introduction to Microsoft Office-1: Microsoft word, Operations on text data in word- inserting, deleting, Aligning, header, footer, font style, font type, bulleting and numbering, hyperlinking, inserting images, page setup, inserting images, writing equations, formatting Paragraphs, spell checking etc. Student should submit a user manual of the word processor

Task 9:

Introduction to Microsoft Office-2: Microsoft Excel, Operation on data in Excel-creating, opening, saving the document as per the requirement, inserting, deleting the cell data, format the cell, creation of pivot table, applying the formulas and functions, preparing charts, converting .xls to csv, etc., Student should submit a user manual of the Spreadsheet.

Task 10:

Introduction to Microsoft Office-3: Microsoft PowerPoint Presentation, creating, opening, saving the presentations, inserting and deleting the slides, styles for slides, formatting the slides with different fonts, colours, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyper linking, running the slideshow, Setting the timing for slide show. Student should submit a user manual of the PowerPoint presentation.

Task 11:

Introduction to LaTeX: LaTeX and its installation and different IDEs, Creating the document using Latex, content into sections using article and book class of Latex.

Styling Pages: Reviewing and customizing different paper sizes and formats. Formatting text, creating basic table, adding simple and dashed border, merging rows

and columns, referencing and indexing. Student should submit a user manual of the LaTeX.

References:

1. Introduction to Computers, Peter Norton, McGraw Hill
2. PC Hardware, Maintenance & Troubleshooting In-Depth, Reddy N.S.
3. MOS study guide for Word, Excel, PowerPoint & Outlook Exams, Joan Lambert, Joyce Cox, PHI
4. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
5. Networking your computers and devices, Rusen, PHI
6. Lamport L. LaTeX: a document preparation system: user's guide and reference manual. Addison-Wesley: 1994

Course Outcomes:

- Identify the Internal parts of computers and Generation of Computers. (L1)
- Assemble and disassemble a computer from its parts and prepare the computer ready to use.(L3)
- Installation process of different types Operating system for a computer by their own.(L3)
- Interconnect two or more computers for information sharing.(L4)
- Access the Internet and browse it for required information.(L1)
- Prepare the documents using Word Processor, prepare spread sheets for calculations using Excel, and documents for LaTeX.(L3)
- Prepare slide presentation using the presentation tool.(L4)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech I/II Sem

L	T	P	C
0	0	3	1.5

(CS20AES102) PROBLEM SOLVING USING C LAB (Common to All Branches of Engineering)

Course Objectives:

- To learn how to solve a given problem.
- To illustrate the basic concepts of C programming language.
- To discuss the concepts of Functions, Arrays, Pointers and Dynamic Memory Allocation.
- To understand and implement Structures and Unions.
- To familiarize with Files and File Operations.

Week-1: Draw flowcharts for fundamental algorithms.

Week-2: C Programs to demonstrate C-tokens.

Week-3: C Programs on usage of operators.

Week-4: C Programs to demonstrate Decision making and branching (Selection).

Week-5: C Programs to demonstrate different loops.

Week-6: C Programs to demonstrate 1-D arrays.

Week-7: C Programs to demonstrate multi-dimensional arrays.

Week-8: C Programs to demonstrate functions.

Week-9: C Programs on pointers.

Week-10: C Programs to perform operations on Strings with String handling functions and without String handling functions.

Week-11: C Programs on Structures and Unions.

Week-12: C Programs to demonstrate Files.

Text Books:

1. R.G. Dromey, How to Solve it by Computer, 1/e, Pearson Education, 2006.
2. Reema Thareja, Programming in C, Oxford University Press, AICTE Edition, 2018.

Reference Books:

1. B. A. Forouzan and R. F. Gilberg, Computer Science: A Structured Programming Approach Using C, 3/e, Cengage Learning, 2007.
2. Pradip Dey, Manas Ghosh, Programming in C, Oxford University Press, AICTE Edition,
3. B. Gottfried, Programming with C, 3/e, Schaum's outlines, McGraw Hill (India), 2017.
4. Jeri R. Hanly, Elliot B. Koffman, Problem Solving and Program Design in C, 5/e, Pearson.

Course Outcomes:

Upon successful completion of the course, the student will be able to

- Build algorithm and flowchart for simple problems.
- Use suitable control structures to solve problems.
- Use suitable iterative statements, arrays and modular programming to solve the problems.
- Implement Programs using pointers and String handling Functions.
- Develop code for complex applications using structures, unions and file handling features.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech I/II Sem

L	T	P	C
0	0	3	1.5

(CH20ABS104) CHEMISTRY LAB (ECE, EEE, CSE, CSE (AI & ML), IT)

Course Objectives:

- Verify the fundamental concepts with experiments

Note: In the following list, out of 12 experiments, any 10 experiments must be performed in a semester

List of Chemistry Experiments:

1. Determination of Hardness of a groundwater sample.
2. Estimation of Dissolved Oxygen by Winkler's method.
3. Conductometric titration of (i) strong acid vs. strong base, (ii) weak acid vs. strong base.
4. Determination of cell constant and conductance of solutions.
5. Potentiometry - determination of redox potentials and emfs.
6. Determination of Strength of an acid in Pb-Acid battery.
7. Preparation of Bakelite
8. Verify Lambert-Beer's law.
9. Thin layer chromatography.
10. Identification of simple organic compounds by IR.
11. Preparation of nano material's by precipitation.
12. Estimation of Ferrous Iron by Dichro metry.
13. P^H metric titration of (i) strong acid vs. strong base, (ii) weak acid vs. strong base

Reference Books:

1. Vogel's Text book of Quantitative Chemical Analysis, Sixth Edition – Mendham J et al, Pearson Education, 2012.
2. Chemistry Practical- Lab Manual, First edition, Chandra Sekhar KB, Subba Reddy GV and Jayaveera KN, SM Enterprises, Hyderabad, 2014.
3. Chemistry Laboratory Manual, Sri Krishna Hitech Publishing Company Pvt.Ltd, 2nd Edition, A Ravi Krishanan, B Tirumalarao, 2020-2021.

Course Outcomes:

At the end of the course, the students will be able to

- Determine the cell constant and conductance of solutions.(L3)
- Prepare advanced polymer- Bakelite. (L2)
- Measure the strength of an acid present in secondary batteries.(L3)
- Analyse the IR of some organic compounds.(L3)
- Estimate the amount of dissolved oxygen in water.(L3)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech I/II Sem

L	T	P	C
0	0	3	1.5

(EC20AES202) ELECTRONIC DEVICES & CIRCUITS LAB

(ECE)

Course Objectives:

- To verify the theoretical concepts practically from all the experiments.
- To analyse the characteristics of Diodes, BJT and MOSFET
- To design the amplifier circuits from the given specifications.
- To Model the electronic circuits using tools such as PSPICE / Multisim.

PART A: Electronic Workshop Practice

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of active devices, Diodes, BJTs, JFETs, LEDs, LCDs, SCR, UJT.
3. Soldering Practice- Simple circuits using active and passive components.
4. Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multimeter, Function Generator, Regulated Power Supply and CRO.

PART B: List of Experiments: (Execute any 8 experiments).

Note: All the experiments shall be implemented using both Hardware and Software.

1. Verification of Volt- Ampere characteristics of a PN junction diode and find static, dynamic resistances under forward bias and reverse bias of the diode from the graphs obtained.
2. Verification of Volt- Ampere characteristics of a Zener diode and find Breakdown voltage, static and dynamic resistances of the diode from the graphs obtained.
3. Design a full wave rectifier for the given specifications with and without filters, and verify the given specifications experimentally. Vary the load and find ripple factor. Draw suitable graphs.
4. Design a Zener diode-based voltage regulator against variations of supply and load. Verify the same from the experiment.

5. Verification of the input and output characteristics of BJT in Common Emitter configuration experimentally and find required h – parameters from the graphs.
6. Verification of the input and output characteristics of BJT in Common Base configuration experimentally, and determine required h – parameters from the graphs.
7. Verification of the output and transfer characteristics of MOSFET (Enhancement mode) in Common Source Configuration experimentally. Find Threshold voltage V_T , g_m , μ & r_d .
8. Verification of the output and transfer characteristics of MOSFET (Depletion mode) in Common Source Configuration experimentally. Find Threshold voltage V_T , g_m , μ & r_d .
9. Design and analysis of self-bias circuit using BJT.
10. Design and analysis of self-bias circuit using MOSFET.
11. Design a BJT switch.
12. Design a small signal amplifier using BJT (common emitter) for the given Specifications. Draw the frequency response and find the bandwidth.
13. Design a small signal amplifier using MOSFET (common source) for the given specification. Draw the frequency response and find the bandwidth.

Tools/Equipment Required: Software Tools like Multisim/P Spice or Equivalent, DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices.

Course Outcomes:

After the completion of the course students will able to:

- Understand the basic characteristics and applications of basic electronic devices. (L1)
- Observe the characteristics of electronic devices by plotting graphs.(L2)
- Analyze the Characteristics of UJT, BJT, MOSFET (L3).
- Design MOSFET/ BJT based amplifiers for the given specifications. (L4)
- Simulate all circuits in PSPICE/Multisim. (L5).

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech I/II Sem

L T P C

2 0 0 0

(CH20AMC201) ENVIRONMENTAL SCIENCE

(Common to All Branches)

Course Objectives:

- To make the students to get awareness on environment.
- To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day-to-day activities of human life.
- To save earth from the inventions by the engineers.

UNIT – I

Multidisciplinary Nature of Environmental Studies: – Definition, Scope and Importance – Need for Public Awareness.

Natural Resources:

Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. Energy resources.

Learning outcomes:

At the end of this unit, the students will be able to

- Understanding the importance of public awareness. (L2)
- Understanding about the various resources. (L2)

UNIT – II

Ecosystems:

Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession

– Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

- a. Forest ecosystem.
- b. Grassland ecosystem.
- c. Desert ecosystem.
- d. Aquatic ecosystems. (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and Its Conservation:

Introduction: Definition, genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-spots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Learning outcomes:

At the end of this unit, the students will be able to

- Understanding about various ecosystems and their characteristics. (L2)
- Understanding the biodiversity and its conservation. (L2)

UNIT – III

Environmental Pollution: Definition, Causes, effects and control measures of

- a. Air Pollution
- b. Water pollution
- c. Soil pollution
- d. Marine pollution
- e. Noise pollution
- f. Thermal pollution
- g. Nuclear hazards

Solid Waste Management: Causes, effects and control measures of urban and industrial wastes –Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

Learning outcomes:

At the end of this unit, the students will be able to

- Understanding about the various sources of pollution. (L2)
- Understanding about the various sources of solid waste and preventive measures. (L2)
- Understanding about the different types of disasters and their managerial measures. (L2)

UNIT – IV**Social Issues and the Environment:**

From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management –Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products Environment Protection Act. – Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act –Issues involved in enforcement of environmental legislation – Public awareness.

Learning outcomes:

At the end of this unit, the students will be able to

- Understanding about the social issues related to environment and their protection acts. (L2)
- Understanding about the various sources of conservation of natural resources. (L2)
- Understanding about the wild life protection and forest conservation acts. (L2)

UNIT – V**Human Population and The Environment:**

Population growth, variation among nations. Population explosion – Family Welfare Programmes. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

Field Work: Visit to a local area to document environmental assets River/ forest/ grass/ hill/ mountain–Visit to a local polluted site- Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes.

Learning outcomes:

At the end of this unit, the students will be able to

- Understanding about the population explosion and family welfare programmes. (L2)
- To identify the natural assets and related case studies. (L3)

Text Books:

1. Text book of Environmental Studies for Undergraduate Courses ErachBharucha for University Grants Commission, Universities Press.
2. Palaniswamy, "Environmental Studies", Pearson education.
3. S.AzeemUnnisa, "Environmental Studies" Academic Publishing Company.
4. K.Raghavan Nambiar, "Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus", Scitech Publications (India), Pvt. Ltd.

References:

1. Deeksha Dave and E.Sai Baba Reddy, "Textbook of Environmental Science", Cengage Publications.
2. M.Anji Reddy, "Text book of Environmental Sciences and Technology", BS Publication.
3. J.P.Sharma, Comprehensive Environmental studies, Laxmi publications.
4. J. Glynn Henry and Gary W. Heinke, "Environmental Sciences and Engineering", Prentice hall of India Private limited.
5. G.R.Chatwal, "A Text Book of Environmental Studies" Himalaya Publishing House.
6. Gilbert M. Masters and Wendell P. Ela, "Introduction to Environmental Engineering and Science, Prentice hall of India Private limited.

Course Outcomes:

At the end of the course, the student will be able to

- Understanding multidisciplinary nature of environmental studies and various renewable and nonrenewable resources. (L2)
- Understand flow and bio-geo- chemical cycles and ecological pyramids. (L2)
- Understand various causes of pollution and solid waste management and related preventive measures. (L2)
- Apply the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation. (L3)
- Apply the concepts of population explosion, value education and welfare programmes in society. (L3)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech II Sem

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(EG20AMC101) SPEECH AND ORAL COMMUNICATION (Mandatory Course)
(Common to All Branches)

Course Objectives:

- To improve the language proficiency of the students in English by practicing with his/her peers.
- To impart creative skills for professional development.
- To develop the communication skills of the students in both formal and informal situations.
- To develop extensive speaking skills and comprehension for career growth.

Detailed Syllabus:

Unit-1:

Story Telling (Narrate a story)

1. Biography description (Describe a freedom fighter/politician/athlete/celebrity etc.)
2. Speech sounds
3. Formal Conversation (Enact official Telephone conversation/Telephone interview etc.)
Verb forms, Subject -Verb agreement, Vocabulary).

Unit-2:

1. Stress in Speech
2. English Puzzle solving (Finding cross words from table)
3. Fun with English (Speech through grammar-changing tense, voice of the sentences)
4. Open Talk with CM (Funny interview with class mates) Voice, Speech.

Unit-3:

1. Intonation
2. If I'm a..... What would I do? (Students enact as... and describe their choices what they would do?)
3. Language Translation (Dialogues/jokes/proverbs/quotations-Regional language to English)

4. Mock Assembly (Students enact as speaker, MLA, CM and opposition leaders in Assembly) Wh- Questions, Question tags.

Unit-4:

1. Tongue twisters / pronounce it.....
2. Humorous Play (Playing jokes/Telling funny dialogues in English)
3. Celebrity Interview (Enact Play), Spotting Errors, Etiquettes

Unit-5:

News Reader (Prepare funny news and read on Dias)

1. Film Review (A critique on regional language films by students)
2. Movie Script Narration (Subject -Verb agreement, Tenses)

Reference books:

1. K.R Lakshmi Narayanan, A Course book on English, SCITECH publications Pvt. Ltd,Hyd, 2009.
2. Sanjay Kumar & Pushp Lata, Communication skills, Oxford university press, New Delhi, 2019.
3. M Ashraf Rizvi, Effective Technical Communication, Tata McGraw- Hill, New Delhi, 2017.

Additional Learning Resources:

1. <https://www.bbc.co.uk/skillswise/english>
2. <https://www.nonstopenglish.com>
3. <https://www.grammarly.com/blog/>

Course Outcomes:

- Improve the neutral accent and be free from mother tongue influence. (L6)
- Hypothesizing small talks on general topics and learn critiquing skills by participating in Conversations. (L6)
- Applying Vocabulary and using it in their day-to-day life. (L4)
- Understanding and mastering in verbal and non-verbal communication. (L2)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech -III SEM

L T P C

3 0 0 3

(MA20ABS302) COMPLEX VARIABLES AND TRANSFORMS (EEE & ECE)

Course Objectives:

- To understand the knowledge on functions of complex variables. (L2)
- To evaluate improper integrals of complex functions using Residue theorem. (L5)
- To apply the knowledge on Laplace transforms and its applications in solving ordinary differential equations. (L3)
- To determine Fourier series of given function in a given interval. (L5)
- To analyze the concepts of Z-transforms in solving Difference equations. (L4)

UNIT – I: Functions of complex variables – Differentiation

Introduction to functions of complex variables - concept of limit & continuity- Differentiation, Cauchy-Riemann equations in Cartesian and Polar coordinates (without proof), analytic functions, harmonic functions, finding harmonic conjugate - construction of analytic function by Milne- Thomson method.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand functions of complex variable and its properties.(L2)
- Find derivatives of complex functions.(L1)
- Understand the analyticity of complex functions.(L2)

UNIT – II: Functions of complex variables – Integration

Line Integral - Contour integration, Cauchy's integral theorem, Cauchy Integral formula, Cauchy Integral formula for derivatives (All theorems without Proof).

Power Series Expansions: Taylor's series and Laurent's series (without proof); zeros of analytic functions, singularities.

Residues: Evaluation of residue by formula and by Laurent's series, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the integration of complex functions.(L2)

- Apply Cauchy's integral theorem and Cauchy's integral formula to solve complex integrals.(L3)
- Understand singularities of complex functions.(L2)
- Evaluate improper integrals of complex functions using Residue theorem.(L5)

UNIT – III: Laplace Transforms

Definition - Laplace transform of standard functions - existence of Laplace Transform – Inverse transform – First shifting theorem, Transforms of derivatives and integrals – Unit step function – Second shifting theorem – Dirac's delta function – Convolution theorem – Laplace transform of Periodic function. Differentiation and integration of transform – solving Initial value problems to ordinary differential equations with constant coefficients using Laplace transforms.

Learning Outcomes

At the end of this unit, the student will be able to

- Understand the concept of Laplace transforms and find the Laplace transforms of elementary functions.(L2)
- Find the Laplace transforms of general functions using its properties.(L3)
- Understand Laplace transforms of special functions (Unit step function, Unit Impulse & Periodic).(L2)
- Apply Laplace transforms to solve differential equations.(L3)

UNIT – IV: Fourier series

Fourier coefficients (Euler's formulae) – Dirichlet conditions for the existence of Fourier series – functions having discontinuity - Fourier series of even and odd functions – Fourier series in an arbitrary interval – Half-range Fourier sine and cosine expansions.

Learning Outcomes

At the end of this unit, the student will be able to

- Understand the Fourier series expansion of the given function.(L2)
- Determine Fourier coefficients (Euler's) and identify existence of Fourier series of the given function.(L5)
- Determine the Fourier series of given function in Half range interval.(L5)

UNIT – V: Fourier transforms & Z Transforms

Fourier Transforms: Fourier transform – Fourier sine and cosine transforms – Properties – Inverse transforms – convolution theorem – Finite Fourier Sine and Cosine transforms.

Z-transform –Z-transforms, Inverse Z-transform – Properties – Damping rule – Shifting rule – Initial and final value theorems. Convolution theorem – Solution of Difference equations by Z - transforms.

Learning Outcomes:

At the end of this unit, the student will be able to

- Find Fourier transforms of given functions.(L1)
- Apply properties of Fourier transforms to different functions.(L3)
- Apply Z transforms to solve difference equations.(L3)

Text Books:

1. B.S. Grewal, "Higher Engineering Mathematics", Khanna publishers, 44th edition.
2. Advanced Engineering Mathematics, R K Jain and S R K Iyengar, Narosa Publishing House, New Delhi.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India

Reference Books:

1. B.V. Ramana, Higher, "Engineering Mathematics", McGraw Hill publishers.
2. Alan Jeffrey, "Advanced Engineering Mathematics", Elsevier.
3. Dr. S. Sreenadh, Dr. V. Ramesh Babu, S Ranganadham, Fourier Series and Transforms, S Chand Publications, 2014

Course Outcomes:

At the end of this Course the student will be able to

CO1:Apply Cauchy-Riemann equations to find the analyticity of complex functions.(L3)

CO2:Apply Cauchy's integral formula and Cauchy's integral theorem to evaluate

CO3:improper integrals along contours.(L3)

CO4:Analyze the concepts of Laplace Transforms to solve ordinary differential equations. (L4)

CO5:Examine the Fourier series for different functions in half and full range.(L4)

CO6:Analyze the concepts of Z transforms to solve Difference equations.(L4)

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B.Tech -III SEM

L T P C

3 0 0 3

(EC20APC301) DIGITAL LOGIC DESIGN

(ECE)

Course Objectives:

- To familiarize with the concepts of different number systems and Boolean algebra.
- To understand the design techniques of combinational, sequential logic circuits.
- To understand and analyze the concepts of FSM and PLD's
- To impart knowledge on operation, characteristics and various configurations of TTL and CMOS logic families.
- To outline procedures for the analysis and design of combinational and sequential logic circuits.
- To introduce programmable logic devices.

Unit I

Number Systems, Boolean algebra and Logic Gates: Number systems - binary numbers, octal, hexadecimal, other binary codes; complements, signed binary numbers, digital logic operations and gates, basic theorems and properties of Boolean algebra, Boolean functions, canonical and standard forms, complements of Boolean functions, two-level NAND and NOR Implementation of Boolean functions.

Learning Outcomes:

- Summarize advantages of using different number systems. (L2)
- Explain usefulness of different coding schemes and functionality of logic gates. (L2)
- Apply basic laws and De Morgan's theorems to simplify Boolean expressions. (L3)

Unit II

Minimization of Boolean functions and Combinational Logic Circuits: The

Karnaugh map method (up to five variables), product of sums simplifications, don't care conditions, Tabular method, Introduction, Combinational circuits, design procedure, adders, subtractors, 4-bit binary adder/ subtractor circuit, BCD adder, carry look-ahead adder, binary multiplier, magnitude comparator, decoders and encoders, multiplexers, demultiplexers.

Learning Outcomes:

- Apply Boolean algebra for describing combinational digital circuits. (L2)
- Compare K- Map and Q-M methods of minimizing logic functions. (L5)

Unit III

Sequential Circuits: Latches, flip-flops, truth tables and excitation tables, timing and triggering consideration, conversion of flip-flops, design of counters, ripple counters, synchronous counters, Modulus-n Counter, Ring counter, Johnson counter, Up-Down counter, registers, shift registers, universal shift register.

Learning Outcomes:

- Describe behavior of Flip-Flops and Latches.(L2)
- Design synchronous sequential circuits using flip flops and construct digital systems using components such as registers and counters (L4)

Unit IV

Finite State Machine: Types of FSM, capabilities and limitations of FSM, state assignment, realization of FSM using flip-flops, Mealy to Moore conversion and vice-versa, reduction of state tables using partition technique, Design of sequence detector.

Memory and Programmable Logic: RAM, Types of Memories, Memory decoding, ROM, Types of ROM, Programmable Logic Devices (PLDs): Basic concepts, PROM as PLD, Programmable Array Logic (PAL) and Programmable Logic Array (PLA).

Learning Outcomes:

- Utilize concepts of state and state transition for analysis and design of sequential circuits(L3)
- Compare Moore and Mealy machine models.(L5)
- Define RAM, ROM, PROM, EPROM and PLDs. (L1)
- Describe functional differences between different types of RAM & ROM. (L2)

Unit V

CMOS Logic:

Introduction to logic families, CMOS logic, CMOS logic families; Bipolar Logic and Interfacing: Bipolar logic, Transistor logic, TTL families, CMOS/TTL interfacing, low voltage CMOS logic and interfacing, Emitter coupled logic, Comparison of logic families, Familiarity with standard 74-series and CMOS 40- series-ICs – Specifications.

Learning Outcomes:

- Analyze various logic families like CMOS, TTL, ECL
- familiar with interfacing between CMOS and TTL

Text Books:

1. M. Morris Mano, "Digital Design", 3rd Edition, PHI.
2. Charles H.Roth,Jr., "Fundamentals of Logic Design" 5th edition , CENGAGE Learning 2012.

References:

1. ZviKohavi and Niraj K.Jha, "Switching and Finite Automata Theory, 3rd Edition, Cambridge University Press, 2010.
2. D.P. Leach, A.P. Malvino, "Digital Principles and Applications", TMH, 7th Edition.

Course Outcomes:

After completion of the course, student will be able to

- Understand the properties of Boolean algebra, other logic operations, and minimization of Boolean functions using Karnaugh map.
- Make use of the concepts to solve the problems related to the logic circuits.
- Analyze the combinational and sequential logic circuits.
- Compare various Programmable logic devices.
- Compare the concepts of RAM and ROM.
- Understand the operation CMOS, TTL logic families, ECL logic families and interfacing between them.

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B.Tech -III SEM

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(EC20APC302) ELECTRONIC CIRCUIT ANALYSIS & DESIGN (ECE)

Course Objectives:

- To design and analyze multi-stage amplifiers using BJT at low and high frequencies.
- To analyze the effect of negative feedback on amplifier characteristics.
- To understand the basic principles of oscillators and analyze RC & LC oscillator circuits.
- To understand different types of large signal amplifiers and tuned amplifiers.

Unit I

Multistage Amplifiers and Frequency response: Classification of amplifiers, Methods of coupling, Cascading transistor amplifiers: CE-CC connection, Miller's theorem, CE short circuit current gain obtained with hybrid-pi model, parameter f_T , Cascode transistor configuration, High input resistance transistor circuits, Bootstrapped Darlington circuit and Emitter coupled difference amplifier.

Learning outcomes:

- Understand basic concepts, need of multistage amplifiers, and various inter-stage coupling in multi-stage amplifiers. (L2)
- Analyze low frequency and high frequency models of BJT. (L4)

Unit II

Feedback Amplifiers: Classification of feedback amplifiers, Feedback concept, General characteristics of negative feedback amplifiers, Generalized analysis of feedback amplifiers using block diagram approach, Performance comparison of feedback amplifiers, Method of Analysis of Feedback Amplifiers.

Learning outcomes:

- Understand concept of different feedback topologies. (L2)
- Determine the effect of feedback on amplifier characteristics. (L2)
- Analyze characteristics of various types of feedback configurations. (L4)

Unit III

Oscillators: Oscillator principle, condition for oscillations, types of oscillators, RC phase shift and Wein bridge oscillators using BJT with the relevant analysis, Generalized analysis of LC Oscillators, Hartley and Colpitt's oscillators using BJT with relevant analysis, Crystal oscillators, Frequency and amplitude stability of oscillators.

Learning outcomes:

- Understand the working principle of oscillator and stability constraints. (L2)
- Analyze different types of RC and LC oscillators, with detailed mathematical analysis and illustrations. (L4)

Unit IV

Power Amplifiers: Classes of power amplifiers, Class A large signal Amplifiers, Transformer Coupled Audio power amplifier, Efficiency of Class A Amplifier, Class B Amplifiers-Push-pull amplifiers and Complementary Symmetry push pull amplifier, Efficiency of Class B Amplifier, Operation of Class AB, Class C and Class D power amplifiers, Thermal stability and Heat sink.

Learning outcomes:

- Understand the operation and characteristics of power amplifiers under different classes of operation. (L2)
- Analyze the efficiency of power amplifiers under different classes of operation. (L4)
- Understand the concept of heat sink.(L2)

Unit V

Tuned Amplifiers: Introduction, Q-Factor, Capacitance Coupled Single tuned amplifiers, Double Tuned Amplifiers, Effect of Cascading tuned amplifiers on Band width, Staggered tuned amplifiers, comparison of single tuned, double tuned and stagger tuned amplifiers.

Learning outcomes:

- Evaluate the resonant frequency of tuned amplifiers. (L5)
- Understand the operation and characteristics of different tuned amplifiers. (L4)

Text Books:

1. J. Millman, C.C.Halkias and S. Jit, "Millman's Electronic Devices and Circuits",
Tata McGraw Hill, 4th edition, 2019.

2. S. Salivahanan and N. Suresh Kumar, "Electronic Devices and Circuits", McGraw Hill India Pvt. Ltd., 4th Edition, 2020.

References:

1. Robert L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuits Theory", Pearson/Prentice Hall, 9th Edition, 2006.
2. Sedra A.S. and K.C. Smith, "Micro Electronic Circuits", Oxford University Press, 5th Edition.
3. Donald A. Neaman, "Electronic Circuit Analysis and Design", McGraw Hill Education, 3rd edition.

Course Outcomes:

After the completion of the course, students will able to

- C01:** Understand the working principle of multistage amplifiers, Feedback amplifiers, power amplifiers and tuned amplifiers. (L2)
- C02:** Analyze multistage amplifiers, feedback amplifiers, power amplifiers, and tuned amplifiers. (L4)
- C03:** Design multistage amplifiers, feedback amplifiers, oscillators, power amplifiers and tuned amplifiers for the given specification.(L6)
- C04:** Evaluate the efficiency of large signal (power) amplifiers. (L5)
- C05:** Compare the frequency response of Single-stage, Double-stage amplifiers with Single tuned, double tuned and Stagger tuned amplifiers. (L2)

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(EC20APC303) SIGNALS & SYSTEMS (ECE)

Course Objectives:

- To introduce students to the basic idea of signal and system analysis and its characterization in time and frequency domains.
- To present Fourier tools through the analogy between vectors and signals.
- To teach concept of sampling and reconstruction of signals.
- To analyze characteristics of linear systems in time and frequency domains.
- To understand Laplace and z-transforms as mathematical tool to analyze continuous and discrete-time signals and systems.

Unit 1

Signals & Systems: Basic definitions and classification of Signals and Systems (Continuous time and discrete time), operations on signals, Concepts of Convolution and Correlation of signals, Analogy between vectors and signals-Orthogonality, mean square error

Fourier Series: Trigonometric & Exponential, Properties of Fourier series, concept of discrete spectrum, Illustrative Problems.

Learning outcomes:

- Understand different types of signals and systems. (L2)
- State principles of vector spaces and concept of Orthogonality. (L1)
- Analyze the periodic signals by applying Fourier series. (L4)

Unit II

Continuous Time Fourier Transform: Definition, Computation and properties of Fourier transform for different types of signals and systems, Inverse Fourier transform.

Sampling Theory: Statement and proof of sampling theorem of low pass signals, Illustrative Problems.

Learning outcomes:

- Identify system properties based on impulse response and Fourier analysis. (L1)
- Analyze the spectral characteristics of signals using Fourier transform. (L3)
- Illustrate signal sampling and its reconstruction. (L4)

Unit III

Laplace Transform: Definition, ROC, Properties, Inverse Laplace transforms, the S-plane and BIBO stability, Transfer functions, System Response to standard signals, Solution of differential equations with initial conditions.

Learning outcomes:

- Understand the limitations of Fourier transform and need for Laplace transform and develop. (L1)
- Evaluate response of linear systems to known inputs by using Laplace transforms. (L2)

Unit IV

Signal Transmission through Linear Systems: Linear system, impulse response, Response of a linear system for different input signals, linear time-invariant (LTI) system, linear time variant (LTV) system, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, System bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Paley-Wiener criterion for physical realization, Relationship between bandwidth and rise time, Energy and Power spectral densities, Illustrative Problems.

Learning outcomes:

- Understand the impulse response, transfer characteristics of LTI system and various filters. (L1)
- Analyze filter characteristics and physical realization of LTI system. (L4)
- Apply the relation between bandwidth and rise time & energy and power spectral densities in various applications. (L3)

Unit V

Discrete Time Fourier Transform: Definition, Computation and properties of Discrete Time Fourier transform for different types of signals and systems, Illustrative Problems.

Z-Transform: Definition, ROC, Properties, Poles and Zeros in Z-plane, The inverse Z-Transform, System analysis, Transfer function, BIBO stability, System Response to standard signals, Solution of difference equations with initial conditions, Illustrative Problems.

Learning outcomes:

- Apply Discrete Time Fourier transform techniques to analyze discrete-time signals and systems. (L2)
- Analyze the spectral characteristics of signals using Fourier transform. (L4)
- Evaluate the Fourier transform of Discrete-time signals. (L5)
- Apply transform techniques to analyze discrete-time signals and systems using Z transforms. (L2)

Text Books:

1. A.V. Oppenheim, A.S. Willsky and S.H. Nawab, "Signals and Systems", 2nd Edition, PHI, 2009.
2. Kumar, A. Anand. Signals and systems. PHI Learning Pvt. Ltd., 2012.

References:

1. BP Lathi, "Principles of Linear Systems and Signals", 2nd Edition, Oxford University Press, 015.
2. Simon Haykin and Van Veen, "Signals & Systems", 2nd Edition, Wiley, 2005.
3. Hwei Hsu, "Schaum's Outline of Signals and Systems", 4th Edition, TMH, 2019

Course Outcomes:

After completion of the course, student will be able to

- CO1:** Understand the mathematical description and representation of continuous- time and discrete-time signals and systems. Also understand the concepts of various transform techniques. (L2)
- CO2:** Apply sampling theorem to convert continuous-time signals to discrete-time signals and reconstruct back, different transform techniques to solve signals and system related problems. (L3)
- CO3:** Analyze the frequency spectra of various continuous-time signals using different transform methods. (L4)
- CO4:** Analyze the systems based on their properties and determine the response of them. (L4)
- CO5:** Analyze the frequency spectra of various discrete-time signals using different transform methods. (L4)

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(BA20AHS301) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS (ECE)

Course Objectives:

- To inculcate the basic knowledge of managerial economics and demand analysis.
- To make the students learn input-output relationship for optimizing production and cost analysis.
- To Know the Various types of market structure and pricing methods and strategy.
- To provide fundamental skills on accounting and to explain the process of preparing financial statements.
- To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.

UNIT I

INTRODUCTION TO MANAGERIAL ECONOMICS

Managerial Economics – Definition- Nature- Scope - Contemporary importance of Managerial Economics - Relationship of Managerial Economics with Financial Accounting and Management. Demand Analysis: Concept of Demand-Demand Function - Law of Demand - Elasticity of Demand- Significance - Types of Elasticity - Measurement of elasticity of demand - Demand Forecasting- factors governing demand forecasting- methods of demand forecasting.

Learning Outcomes:

- Students can understand the basic terms and concepts related to economics and managerial economics.
- It describes decision making process of a firm.
- Students are able to understand the relationship between price and demand.
- Students can understand the techniques involved in forecasting the Demand.

UNIT II

THEORY OF PRODUCTION AND COST ANALYSIS

Production Function- Least cost combination- Short-run and Long- run production function- Isoquants and Isocosts, MRTS - Cobb-Douglas production function - Laws of returns - Internal and External economies of scale - Cost Analysis: Cost concepts and cost behavior- Break-Even Analysis (BEA) - Determination of Break Even Point (Simple Problems)-Managerial significance and limitations of Break- Even Point.

Learning Outcomes:

- Students can understand the various levels of production function.
- It demonstrates the methods of costing a product.
- Students are able to understand the Breakeven point of an organization.
- It explains the merits and demerits of increase in the scale of production.

UNIT III

INTRODUCTION TO MARKETS AND NEW ECONOMIC ENVIRONMENT

Market structures: Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition- Monopoly-Monopolistic Competition-Oligopoly-Price-Output Determination - Pricing Methods and Strategies-Forms of Business Organizations- Sole Proprietorship- Partnership – Joint Stock Companies - Public Sector Enterprises – New Economic Environment- Economic Liberalization – Privatization - Globalization. GST and Demonetization.

Learning Outcomes:

- Students can understand about different types of Market structures.
- They are able to find what are the determinants of different markets.
- Able to get information about various Pricing strategies.
- Students can understand about various business structures in India.

UNIT IV

INTRODUCTION TO FINANCIAL ACCOUNTING AND ANALYSIS

Financial Accounting – Concept - Emerging need and Importance - Double-Entry Book Keeping- Journal- Ledger – Trial Balance - Financial Statements - Trading Account – Profit & Loss Account – Balance Sheet (with simple adjustments). Financial Analysis – Ratios – Liquidity, Leverage, Profitability, and Activity Ratios (simple problems).

Learning Outcomes:

- It explains basic concepts of Accounting.

- Students can understand preparation of Final Accounts.
- It describes the cycle of Accounting.
- Students can understand the importance of Ratios in measuring the financial position of a company.

UNIT V

CAPITAL AND CAPITAL BUDGETING

Concept of Capital - Over and Undercapitalization – Remedial Measures - Sources of Short term and Long term Capital - Estimating Working Capital Requirements – Capital Budgeting – Features of Capital Budgeting Proposals – Methods and Evaluation of Capital Budgeting Projects – Pay Back Method – Accounting Rate of Return (ARR) – Net Present Value (NPV) – Internal Rate Return (IRR) Method (simple problems)

Learning Outcomes:

- Students are able to understand the procurement of funds and its effective utilisation.
- It describes the Time value of money.
- Students are able to understand the difference between working capital and capital budgeting.
- Students can understand the various types of finance.

TEXT BOOKS:

- Managerial Economics 3/e, Ahuja H.L, S.Chand, 2013.
- Financial Management, I.M.Pandey, Vikas Publications, 2013.

REFERENCES:

1. Managerial Economics and Financial Analysis, 1/e, Aryasri, TMH, 2013.
2. Managerial Economics and Financial Analysis, S.A. Siddiqui and A.S. Siddiqui, New Age International, 2013.
3. Accounting and Financial Management, T.S.Reddy & Y. Hariprasad Reddy, Margham

COURSE OUTCOMES:

- CO1:** Should be able to understand managerial economics and demand analysis.
- CO2:** Should be able to analyze decisions relating to production and cost analysis.
- CO3:** Should be able to evaluate market structures and forms of business.

CO4: Should be able to assess financial statements and ratios.

CO5: Should be able to apply capital budgeting methods.

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(EC20APC304) BASIC SIMULATION LAB (ECE)

Course Objectives:

- To simulate various Signals and Systems through MATLAB
- To apply the concepts of signals to determine their energy, power, PSD etc.
- To teach analyzing signals and sequences using Fourier, Laplace and Z-transforms.
- To enable to write programs for signal processing applications.

List of Experiments:

1. Write a program to generate various Signals and Sequences: Periodic and Aperiodic, Unit Impulse, Unit Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc function.
2. Perform operations on Signals and Sequences: Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
3. Write a program to find the trigonometric & exponential Fourier series coefficients of a rectangular periodic signal. Reconstruct the signal by combining the Fourier series coefficients with appropriate weightages- Plot the discrete spectrum of the signal.
4. Write a program to find Fourier transform of a given signal. Plot its amplitude and phase spectrum.
5. Write a program to convolve two discrete time sequences. Plot all the sequences.
6. Write a program to find autocorrelation and cross correlation of given sequences.
7. Write a program to verify Linearity and Time Invariance properties of a given Continuous/Discrete System.

8. Write a program to generate discrete time sequence by sampling a continuous time signal. Show that with sampling rates less than Nyquist rate, aliasing occurs while reconstructing the signal.
9. Write a program to find magnitude and phase response of first order low pass and high pass filter. Plot the responses in logarithmic scale.
10. Write a program to find response of a low pass filter and high pass filter, when a speech signal is passed through these filters.
11. Write a program to generate Complex Gaussian noise and find its mean, variance, Probability Density Function (PDF) and Power Spectral Density (PSD).
12. Generate a Random data (with bipolar) for a given data rate (say 10kbps). Plot the same for a time period of 0.2 sec.
13. To plot pole-zero diagram in S-plane/Z-plane of given signal/sequence and verify its stability.

NOTE: All Experiments are to be simulated using MATLAB or equivalent software.

Course Outcomes:

After completion of the course, student will be able to

- CO1:** Learn how to use the MATLAB software and know syntax of MATLAB programming (L1)
- CO2:** Understand how to simulate different types of signals and system response.(L2)
- CO3:** Analyze signals using Fourier, Laplace and Z-transforms. (L4)
- CO4:** Compute Fourier transform of a given signal and plot its magnitude and phase spectrum.(L2)
- CO5:** Verify Sampling theorem, Determine Convolution and Correlation between signals and sequences. (L5)

Equipment Required:

1. MATLAB.
2. Personal computer with necessary peripherals.

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(EC20APC305) DIGITAL LOGIC DESIGN LAB (ECE)

Course Objectives:

- To understand various pin configurations of the Digital ICs used in the laboratory
- To conduct the experiments and verify the truth tables of various logic circuits.
- To analyze the logic circuits
- To design sequential and combinational logic circuits and verify their properties.

List of Experiments:

Part A: Combinational Logic Circuits (*any 6 experiments can be performed*)

1. Verification of truth tables of the following Logic gates
Two input (i) OR (ii) AND (iii) NOR (iv) NAND (v) Exclusive-OR (vi) NOT
2. Implementation of the given Boolean function using logic gates in both SOP and POS forms.
3. Design half adder and full adder circuit and verify its functional table.
4. Design half subtractor and full subtractor circuit and verify its functional table.
5. Implementation and verification of Binary to Gray and Gray to Binary code converters.
6. Implementation and verification of BCD to Excess-3 and Excess-3 to BCD code converters.
7. Implementation and verification of BCD to 7 segment decoder.
8. Implementation of 4x1 Multiplexer using logic gates.

Part B: Sequential Logic Circuits (*any 6 experiments can be performed*)

1. Verification of functional tables of (i) RS Flip-Flop (ii) JK Flip-Flop (iii) D Flip-Flop.
2. Design a four-bit comparator and verify output.
3. Design and implementation of 8-bit odd/even parity checker.

4. Verify the operation of 4-bit Universal Shift Register for different Modes of operation.
5. Design and implementation of a decade counter.
6. Design and implementation of a binary counter.
7. Design a four-bit ring counter using D Flip-Flops/JK Flip Flop and verify output
8. Design a four bit Johnson's counter using D Flip-Flops/JK Flip Flops and verify output

Equipment Required:

1. Digital Trainer kits.

References:

1. M. Morris Mano, "Digital Design", 3rd Edition, PHI
2. Online learning resources/virtual labs: <https://www.vlab.co.in/>

Course Outcomes

On completion of this course, the students will be able to

C01: Understand the pin configuration of various digital ICs used in the lab.

C02: Conduct the experiment and verify the properties of various logic circuits.

C03: Design sequential circuits.

C04: Design combinational circuits.

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(EC20APC306) ELECTRONIC CIRCUIT ANALYSIS & DESIGN LAB (ECE)

Course Objectives:

- To design and analyze the multistage amplifiers and verify the frequency response.
- To verify the effect of negative feedback on amplifier parameters.
- To understand the application of positive feedback circuits & generation of signals.
- To understand the concept of design and analysis of Power amplifiers and tuned amplifiers

LIST OF EXPERIMENTS:

1. Two stage RC coupled amplifier
2. Darlington pair amplifier
3. Cascade amplifier
4. Voltage series feedback amplifier
5. Current shunt feedback amplifier
6. RC Phase Shift / Wien Bridge oscillator
7. Hartley / Colpitt's oscillator
8. Class A power amplifier
9. Class B power amplifier
10. Single tuned amplifier

NOTE: Design & Simulate any **8** experiments with MULTISIM software and verify the results in hardware lab with discrete components using BJT/JFET/MOSFET.

Course Outcomes:

After completion of the course, student will be able to

- CO1:** Understand the characteristics and frequency response of various amplifiers and determine its gain and bandwidth. (L2)
- CO2:** Simulate and analyze the performance of negative feedback amplifier circuits, oscillators and Power amplifiers and single tuned amplifiers. (L4)
- CO3:** Design a RC and LC oscillator circuits for a given frequency. (L2)
- CO4:** Calculate the efficiency of the power amplifier circuits. (L2)

CO5: Distinguish the operating modes of various Power amplifier circuits.(L6)

Software:

1. MULTISIM/ PSPICE/Equivalent Licensed simulation software tool
2. Computer Systems with required specifications

Hardware:

1. Regulated Power supplies ,
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators
4. Digital Multimeters, Decade Résistance Boxes/Rheostats, Decade Capacitance Boxes,
5. Ammeters & Voltmeters (Analog or Digital)
6. Active & Passive Electronic Components
7. Bread Boards, Connecting Wires & CRO Probes etc.

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(IT20ASC301) Application Development using Python

Course Objectives:

The aim of Python Programming Lab is

- To acquire programming skills in core Python.
- To acquire Object Oriented Skills in Python
- To develop the skill of designing Graphics in Python
- To implement various graph using mathematical libraries.

Tasks:

1. Write a program to demonstrate different number datatypes in python
2. Write a program to perform arithmetic operations on numbers
3. Write a program to add two numbers.
4. Write a program to find largest number among three.
5. Write a program to find the given number is even or odd.
6. Write a python program to print a number is positive/negative using if-else.
7. Write a program to find sum of individual digits.
8. Write a program to check the given string is palindrome or not.
9. Write a program to find GCD of two numbers.
10. Use a for loop to print a triangle like the one below. Allow the user to specify how high the triangle should be

*

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11. Write a program takes in the the number of terms and finds the sum of series:

$$1 + x^2/2 + x^3/3 + \dots x^n/n.$$

12. Write a program to create, concatenate and print a string and accessing sub-string from a given string.

13. Write a program to construct the following pattern using nested for loop

*

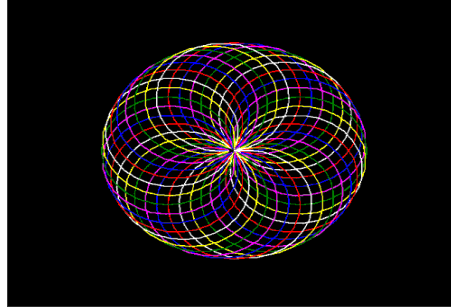
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14. Write a program to print prim numbers less than 20.
15. Write a program to find factorial of a number using recursion.
16. Write a program to define a module to find fibonaaci numbers and import the module to another program.
17. Create a list and perform the following methods
 - 1) insert() 2) remove() 3) append() 4) len()
 - 5) pop() 6)clear() meters, or kilometres
18. Write a program to find the cumulative sum of a list where the ith element is the sum of the first i+1 elements from the original list.
19. Create a dictionary and apply the following methods
 - 1) Print the dictionary items 2) access items 3) useget()
 - 4)change values 5) use len()
20. Write a program to count the frequency of words appearing in a string using a dictionary
21. Create a tuple and perform the following methods
 - 1) Add items 2) len() 3) check for item in tuple 4)Access iems
22. Write a program to count the number of vowels present in a string using sets
23. Write a program which accepts the radius of circle from user and compute area (use math module).
24. Write a program to count the number of words in a text file.
25. Write a program to read a file and capitalize the first letter of every word in the file.
26. Write a program to find the area of a rectangle using classes.

27. Write a program using NumPy, implement different matrix operations in python.
28. First we import the turtle module. Then create a window, next we create turtle object and using turtle method we can draw in the drawing board.
29. Write program to draw the following image



30. Write a program using Matplotlib library, plot the graph with all different plot types. (Pie Chart, Area Plot, Scatter Plot, Histogram and Bar Graph)

Course Outcomes:

By the end of this lab, the student is able to

- CO1:** Write, Test and Debug Python Programs. (L1)
- CO2:** Use Conditionals and Loops for Python Programs. (L3)
- CO3:** Construct custom modules and functions to handle different operations. (L3)
- CO4:** Implement Object oriented concepts through real time scenarios and handle errors. (L3)
- CO5:** Design different shapes and objects using turtle graphics. (L4)

Reference Books:

1. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd edition, O'Reilly, 2016. Or <http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf>
2. Paul Barry, "Head First Python a Brain Friendly Guide" 2nd Edition, O'Reilly, 2016
3. Dainel Y.Chen "Pandas for Everyone Python Data Analysis" Pearson Education, 2019

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(CH20AMC301) BIOLOGY FOR ENGINEERS (ECE)

Course Objectives:

- To provide basic understanding about life and life Process. Animal and plant systems.
- To understand what biomolecules are, their structures and functions. Application of certain biomolecules in Industry. Brief introduction about human physiology and bioengineering.
- To understand hereditary units, i.e. DNA (genes) and RNA and their synthesis in living organism.
- How biology Principles can be applied in our daily life using different technologies.
- Brief introduction to the production of transgenic microbes, Plants and animals.

Unit I: Introduction to Basic Biology

Cell as Basic unit of life, cell theory, Cell shapes, Cell structure, Cell cycle. Chromosomes, Prokaryotic and eukaryotic Cell. Plant Cell, Animal Cell, Plant tissues and Animal tissues, Brief introduction to five kingdoms of classification.

Learning Outcomes:

After completing this unit, the student will be able to

- Summarize the basis of life. (L1)
- Understand the difference between lower organisms (prokaryotes) from higher organisms (eukaryotes). (L2)
- Understand how organisms are classified. (L3)

Unit II: Introduction to Biomolecules:

Carbohydrates, lipids, proteins, Vitamins and minerals, Nucleic acids (DNA and RNA) and their types. Enzymes, Enzyme application in Industry. Large scale production of enzymes by Fermentation.

Learning Outcomes:

After completing this unit, the student will be able to

- Understand what are biomolecules, their role in living cells, structure, function and how they are produced. (L2)
- Analyze the relationship between the structure and function of nucleic acids. (L4)
- Summarize the applications of enzymes in industry. (L2)
- Understand what is fermentation and its applications of fermentation in industry. (L2)

Unit III: Human Physiology

Nutrition: Nutrients or food substances. Digestive system, Respiratory system, (aerobic and anaerobic Respiration). Respiratory organs, respiratory cycle. Excretory system.

Learning Outcomes:

After completing this unit, the student will be able to

- Understand nutrients are present in our body (L2)
- Understand the mechanism and process of important human functions (L2)

Unit IV:

Introduction to Molecular Biology and recombinant DNA Technology:

Prokaryotic gene and Eukaryotic gene structure. DNA replication, Transcription and Translation. rDNA technology. Introduction to gene cloning.

Learning Outcomes:

After completing this unit, the student will be able to

- Understand and Explain about gene structure and replication in prokaryotes and Eukaryotes (L2)
- Understand genetic material is replicated, RNA and proteins are synthesized. (L2)
- Understand about recombinant DNA technology and its application in different fields.(L2)
- Understand the gene cloning. (L2)

Unit V:

Application of Biology:Brief introduction to industrial Production of Enzymes,

Pharmaceutical and therapeutic Proteins, Vaccines and antibodies. Basics of biosensors, biochips, Bio fuels, and Bio Engineering. Basics of Production of Transgenic plants and animals.

Learning Outcomes:

After completing this unit, the student will be able to Understand.

- Understand biology is applied for production of useful products for mankind.(L2)
- Understand the biosensors, biochips etc. (L2)
- Understand transgenic plants and animals and their production (L2)

Course Outcomes:

After studying the course, the student will be able to:

- CO1:** Analyze about cells and their structure and function. Different types of cells and basics for classification of living Organisms.
- CO2:** Analyze about biomolecules, their structure and function and their role in the living organisms. How biomolecules are useful in Industry.
- CO3:** Analyze about human physiology.
- CO4:** Analyze about genetic material, DNA, genes and RNA how they replicate, pass and preserve vital information in living Organisms.
- CO5:** Apply biological Principles in different technologies for the production of medicines and Pharmaceutical molecules through transgenic microbes, plants and animals.

Text books:

1. P.K.Gupta, Cell and Molecular Biology, 5th Edition, Rastogi Publications -
2. U. Satyanarayana. Biotechnology, Books & Allied Ltd 2017

Reference Books:

1. N. A. Campbell, J. B. Reece, L. Urry, M. L. Cain and S. A. Wasserman, "Biology: A Global Approach", Pearson Education Ltd, 2018.
2. T Johnson, Biology for Engineers, CRC press, 2011
3. J.M. Walker and E.B. Gingold, Molecular Biology and Biotechnology 2nd ed.. Panima Publications. PP 434.
4. David Hames, Instant Notes in Biochemistry –2016
5. Phil Tunner, A. Mctennan, A. Bates & M. White, Instant Notes – Molecular Biology –2014

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(MA20AMC301) LOGICAL SKILLS FOR PROFESSIONALS-II

(Mandatory Course)

Course Objectives:

- To learn the basic methods to find HCF, LCM Factors, Simplification, Pipes, Alligation or Mixture, Table, Bar Graphs and Pie Chart concepts.
- To understand the logic behind the Syllogism, Calender, Clocks and Number Series Analogy concepts.

UNIT I

HCF, LCM Factors:

Find the HCF and LCM of the given numbers by using Factorization method.

Find the HCF and LCM of the given numbers by using Division method.

Simplification:

Using BODAMS rule to find out the value of a given expression.

Using Vernacular rule to find out the value of a given expression.

UNIT II

Pipes

Find the how much time taken to fill the tank by opening one pipe, two pipe and one after another.

Alligation or Mixture

Using Ratio and proportion to solve the mixture problems.

To find quickly calculate the price of a mixture, given that it is a mix of two elements having different prices.

UNIT III

Data Interpretation :

Table, Bar Graphs

Find the Average sales of all branches for the respective years.

Find the ratio of the total sales of respective branches.

Pie Charts

Study the Pie chart and the table answer the questions based on them.

Find the central angle of the components.

UNIT IV: Syllogism

Type-I: Different types of Venn diagrams with their implications.

Type-II: Analyse the figure carefully and then answer certain questions regarding the given data.

UNIT V:

Calendars

Find the day of the week on a given date, Find the ordinary year and Leap year

Clocks

Find the angle between the hour hand and minute hand of a clock, when the hands are at right angles.

Number Series Analogy

Choosing a similarly related pair as the given number pair on the basis of the relation between the numbers in each pair.

Choosing a number similar to a group of numbers on the basis of certain common properties that they possess.

Text Books:

1. Quantitative Aptitude, 2012, Dr. R.S. Aggarwal, S. Chand and Company Ltd, New Delhi.
2. A Modern Approach to Verbal and Non-Verbal Reasoning, 2012, Dr. R.S. Aggarwal, S. Chand and Company Ltd, New Delhi.

Reference Books:

1. Quantitative Aptitude for Competitive Examinations, 14/e, 2010, Abhijit Guha, Tata McGraw Hill Publishers, New Delhi.
2. Course in Mental Ability & Quantitative Aptitude, 3/e, 2012, Edgar Thorpe, Tata McGraw Hill Publishers, New Delhi.
3. Fast Track Objective Arithmetic, 2012, Rajesh Verma, Arihant Publications, Meerut.
4. Reasoning and Aptitude, 2013, Nem Singh, Made Easy Publications, New Delhi.

Course Outcomes:

- CO1:** Demonstrate knowledge basic mathematics to develop analytical skills to solving problems of HCF, LCM Factors and Simplification.
- CO2:** Demonstrate knowledge basic mathematics to develop analytical skills to solving problems of Pipes, Alligation or Mixture.
- CO3:** Demonstrate knowledge basic mathematics to develop analytical skills to solving problems of Table, Bar Graphs and Pie Chart.
- CO4:** Analyze the techniques in Syllogism.
- CO5:** Analyze the techniques in Calender, Clocks and Number Series Analogyconcepts

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech- III Sem.

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(EG20AMC301)ENHANCING ENGLISH LANGUAGE SKILLS

COURSE OBJECTIVES

- To enhance communication skills through listening, speaking, reading, and writing.
- To improve language proficiency of the students for career development.
- To train students to use language appropriately for interview skills, group discussion and public speaking.
- To develop confidence in the students to use English in everyday situations.
- To provide training and opportunities to participate in formal and informal communication.

UNIT- I

1. Greetings-Introducing oneself and others
2. Just A Minute (JAM) & Role play
3. Prepositions, Word formation

Learning Outcomes

At the end of the module, the learners will be able to
Respond general questions on familiar topics by introducing one self and others
Comprehend short talks on general topics.
Use grammatical structures effectively and meaningfully.

UNIT- II

1. Oral Presentations – Technical presentations
2. Letter Writing- Formal and Informal, Email Writing
3. Articles, Punctuation.

Learning Outcomes

At the end of the module, the learners will be able to Make formal oral presentations using effective strategies
Write formal letters and e-mail writing appropriately in formal contexts without any mistakes
Use articles and use punctuation contextually.

UNIT – III

1. Communication – Verbal and Non- verbal communication
2. Telephone Etiquettes
3. Tenses, Subject-verb agreement, Prefixes & suffixes

Learning Outcomes

At the end of the module, the learners will be able to

Understand non-verbal features of communication and hold Formal & informal conversations

Use correct tense forms and structures in speech and writing

Use grammatical structures aptly.

UNIT – IV

1. Resume Writing and Technical Report writing
2. Book/Film review
3. Synonyms and Antonyms, Vocabulary building

Learning Outcomes

At the end of the module, the learners will be able to

Write Resume appropriately and ready for an interview.

Review a book/film

Edit short texts by correcting errors

UNIT – V

1. Group Discussions
2. Debate
3. Interview Skills

Learning Outcomes

At the end of the module, the learners will be able to

Participate in formal & informal discussions and speak clearly on a specific topic

Understand how to face interviews effectively.

Comprehend, discuss and respond to academic texts orally and in writing

COURSE OUTCOMES

Use English language, both written and spoken, competently and correctly.

Improve comprehension and fluency of speech.

Hone the communication skills to meet the challenges of their careers successfully.
Gain confidence in using English in verbal situations.
Strengthen communication skills in different contexts like formal and informal.

REFERENCE BOOKS:

1. Krishna Mohan & NP Singh, Speaking English Effectively, 2nd Edition, 2011.
2. MAshrafRizvi, Effective Technical Communication, Tata McGraw-Hill, New Delhi, 2017.
3. Francis Soundararaj, Basics of Communication in English: Soft Skills for Listening, Speaking, Reading and Writing, New Delhi: Macmillan-2012.
4. Chase R. Tarver & Kristin L. Johannsen, Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
5. Meenakshi Raman, Technical Communication, Oxford University Press, 2008
6. Raymond Murphy, English Grammar in Use, Cambridge University Press, 4th Edition, 2012.

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B.Tech -IV SEM

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(CS20AES401) DATA STRUCTURES USING C (ECE, EEE, ME, CE)

Course Objectives:

- To familiarize with basic techniques of algorithm analysis.
- To familiarize Stacks, Queues using Arrays and Linked List.
- To Understand Searching and Sorting techniques.
- To learn the concepts of different types of trees and its operations.
- To familiarize with graph algorithms.

Unit I

Data Structures: Introduction to Data Structures, Time and Space Complexity, Asymptotic Notations. Stack, Stack operations, Implementation using arrays, Applications of stack, Queue, Queue operations, Implementation using arrays, various Queue Structures, Applications of queue.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyze the given algorithm to find the time and space complexities.(L4)
- Develop the applications of stack and queue using arrays.(L3)

Unit II

Linked lists: Single linked list, double linked list, Circular linked list, operations on linked lists, Applications of Linked List. Implementation of Stack using Pointers, Implementation of Queue using Pointers.

Learning Outcomes:

At the end of this unit, the student will be able to

- Implement Stack and Queues using Pointers.(L3)
- Construct the linked lists for various applications.(L4)

Unit III

Searching Techniques: Linear Search and Binary Search.

Sorting Techniques: Selection Sort, Insertion sort, Merge Sort, Quick Sort, Heap sort.

Learning Outcomes:

At the end of this unit, the student will be able to

- Select sorting technique for a given sorting.(L3)
- Construct Heap and its implementation.(L4)

Unit IV

Trees: Vocabulary and Definitions, Binary Tree, Implementation, Binary Tree Traversal, Binary Search Tree, Implementation, Heap Trees.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the concept of a tree.(L2)
- Compare different tree structures.(L4)
- Apply Trees for indexing.(L3)

Unit V

Graph Theory: Graphs Terminology, Graph Traversals, Shortest Paths, Minimum Spanning Trees- Prim's Algorithm, Kruskal's Algorithm.

Learning Outcomes:

At the end of this unit, the student will be able to

- Recognize the importance of Graphs in solving real world problems.(L2)
- Apply various graph traversal methods to applications.(L3)
- Design a minimum cost solution for a problem using spanning trees.(L4)

Text Books:

1. Data Structures and Algorithm Analysis in C, Mark Allen Weiss, Second Edition, 2002, Pearson.
2. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, Third Edition, 2010, PHI.
3. Data Structures and Algorithms Made Easy by Narasimha Karumanchi, 2020, Career Monk Publications.

Reference Books:

1. Fundamental of Data Structures in C, Horowitz, Sahani, Anderson-Freed, Second Edition, 2008, Universities Press.
2. Classic Data Structures, Debasis Samanta, Second Edition, 2009, PHI

Course Outcomes:

- CO1:** Analyze the problems using asymptotic notations.(L4)
- CO2:** Apply Stack, Queues and linked list to solve different applications.(L3)
- CO3:** Demonstrate suitable sorting techniques for the real world problem.(L4)
- CO4:** Implement tree structures in different patterns of representation of data.(L3)
- CO5:** Analyze the given problem using graph traversal techniques.(L4)

**(MA20ABS402) PROBABILITY THEORY AND STOCHASTIC PROCESSES
(ECE)**

Course Objectives:

- To gain the knowledge of the basic probability concepts and acquire skills in handling situations involving more than one random variable and functions of random variables.
- To understand the principles of random signals and random processes.
- To know the Spectral and temporal characteristics of Random Process.
- To be acquainted with systems involving random signals.
- To gain knowledge of standard distributions that can describe real life phenomena.

Unit I

Probability Introduced Through Sets and Relative Frequency: Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Probability as a Relative Frequency, Joint Probability, Conditional Probability, Total Probability, Bayes' Theorem, Independent Events.

Learning Outcomes:

- Understand the fundamental concepts of probability (L1).

Unit II

Random Variable: Definition of a Random Variable, Conditions for a Function to be a Random Variable, Classifications of Random Variable, Distribution and Density functions and its properties, Distribution & Density functions: Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh, Conditional Distribution & Density functions.

Operations on Single Random Variable: Introduction, Expectation of a random variable and its Properties, Moments-moments about the origin, Central moments, Variance and Skewness, Moment generating function, characteristic function, Inequalities- Chebyshev's inequality, Markov's inequality.

Learning Outcomes:

- Understand the fundamental concepts of random variables, and conditional probability. (L1)

- Evaluate the different probability distribution and density functions. (L2)
- Apply the knowledge to the sum of random variables, central limit theorem in communication system (L2).
- Evaluate the single and multiple random variable concepts to expectation, variance and moments (L4).

Unit III

Multiple Random Variables: Vector Random Variables, Joint Distribution Function and its properties, Joint Density Function and its Properties, Marginal Distribution Functions, Conditional Distribution and Density – Point Conditioning, Interval conditioning, Central Limit Theorem, (Without Proof)-Unequal & Equal Distributions.

Operations on Multiple Random Variables: Expected Value of a Function of Random Variables, Joint Moments about the Origin, Joint Central Moments, Joint Moment Generating Function, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case.

Learning Outcomes:

- Understand the fundamental concepts of multiple random variables, and conditional probability. (L1)
- Evaluate the Joint probability distribution and Joint density functions. (L2)
- Evaluate the multiple random variable concepts to expectation, variance and moments (L4).

Unit IV

Random Processes-Temporal Characteristics: The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, joint Distribution and Joint Density Function, Independent Random Process, Stationary Random Processes, Wide-Sense Stationary, Strict-Sense Stationary.

Time Averages of a Random Process, Ergodic Theorem and Ergodic Processes, Autocorrelation Function and Its Properties, Cross-Correlation Function and its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process.

Learning Outcomes:

- Understand and analyze continuous and discrete-time random processes (L1).
- Analyze the concepts and its properties of auto correlation, cross correlation functions (L3).

Unit V

Random Processes-Spectral Characteristics: The Power Density Spectrum and its Properties, Relationship between Power Spectrum and Autocorrelation Function, The Cross-Power Density Spectrum and its Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function.

Learning Outcomes:

- Analyze the concepts and its properties power spectral density (L3).

Course Outcomes:

After completion of the course, student will be able to

CO1: Analyze and understand the concepts of Probability.

CO2: Analyze the concept of Single Random Variable and evaluate the operations that may be performed on a single Random variable.

CO3: Analyze the concepts of Multiple Random Variable and evaluate the operations that may be performed on a multiple Random variable.

CO4: Analyze the concepts of Random Process and evaluate the Temporal characteristics of Random Processes.

CO5: Analyze the concepts of Random Process and evaluate the Spectral characteristics of Random Processes.

TEXT BOOKS:

- Peyton Z. Peebles, "Probability, Random Variables & Random Signal Principles", 4th Edition, TMH,2002.
- Probability Theory and Stochastic Processes-Mallikarjuna Reddy,cengage Learning.

REFERENCES:

- Simon Haykin, "Communication Systems", 3rd Edition, Wiley,2010.
- Athanasios Papoulis and S. Unnikrishna Pillai, "Probability, Random Variables and Stochastic Processes", 4th Edition, PHI,2002
- Henry Stark and John W.Woods, "Probability and Random Processes with Application to Signal Processing," 3rd Edition, Pearson Education,2002.
- George R. Cooper, Clave D. MC Gillem, "Probability Methods of Signal and System Analysis," 3rd Edition, Oxford,1999.
- Dr. A. Singaravelu, Probability and Statistics, Meenakshi Agency, 2017

SRI VENKATESWARA COLLEGE OF ENGINEERING
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B.Tech -IV SEM

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(EC20APC401) ANALOG COMMUNICATIONS
(ECE)

Course Objectives

- To introduce various modulation and demodulation techniques of Analog communication system.
- To analyze different parameters of Analog communication techniques.
- Know Noise Figure in AM & FM receiver systems.
- Understand Function of various stages of AM, FM transmitters and Know Characteristics of AM & FM receivers.
- Understand the concepts of information theory.

Unit I

Introduction: Elements of communication systems, Information, Messages and Signals, Modulation, Modulation Methods, Modulation Benefits and Applications.

Amplitude Modulation & Demodulation: Baseband and carrier communication, Amplitude Modulation (AM), Rectifier detector, Envelope detector, Double sideband suppressed carrier (DSB-SC) modulation & its demodulation, Switching modulators, Ring modulator, Balanced modulator, Frequency mixer, sideband and carrier power of AM, Generation of AM signals, Single sideband (SSB) transmission, Time domain representation of SSB signals & their demodulation schemes (with carrier, and suppressed carrier), Generation of SSB signals, Vestigial sideband (VSB) modulator & demodulator, Frequency division multiplexing (FDM).

Learning Outcomes:

- Understand the concepts of Amplitude Modulation and demodulation techniques. (L1)
- Apply the concepts to solve problems in Amplitude modulation Schemes. (L2)
- Analyse frequency spectra of modulated signals used in various amplitude modulation (L3)
- Compare the Performance of different amplitude modulation techniques. (L4)

Unit II

Angle Modulation & Demodulation: Concept of instantaneous frequency, Generalized concept of angle modulation, Bandwidth of angle modulated waves – Narrow band frequency modulation (NBFM) and Wide band FM (WBFM), Phase modulation, Verification of Frequency modulation bandwidth relationship, Features of angle modulation, Generation of FM waves-Indirect method, Direct generation; Demodulation of FM, Band pass limiter, Practical frequency demodulators, Small error analysis, Pre-emphasis, & De-emphasis filters, FM Capture Effect.

Learning Outcomes:

- Understand the concepts of Angle modulation and demodulation techniques. (L1)
- Understand importance Pre-emphasis & de-emphasis circuit in FM modulation. (L1)
- Apply the concepts to solve problems in Angle modulation Schemes. (L2)
- Analyse frequency spectra of modulated signals used in various angle modulation (L3)

Unit III

Noise in Communication Systems: Thermal noise, Time domain representation of narrowband noise, filtered white noise, Signal to noise ratio & probability of error, Noise equivalent bandwidth, Effective noise temperature, and Noise figure, Baseband systems with channel noise, Performance analysis (i.e. finding SNR expression) of AM, DSB-SC, SSB-SC, FM, PM in the presence of noise.

Learning Outcomes:

- Understand different types of noise and sources that effect the performance of the communication system. [L1]
- Analyse performance of Analog communication system in the presence of noise. [L3]
- Compare the performance of communication system by evaluating figure of merit for different schemes of modulation. [L4]

Unit IV

Analog Pulse Modulation Schemes: Pulse amplitude modulation – Natural sampling, flat top sampling and Pulse amplitude modulation (PAM) & demodulation, Pulse-Time Modulation – Pulse Duration and Pulse Position modulations, and demodulation schemes, Illustrative Problems.

Radio Receiver: Working principle of Super heterodyne AM and FM Receivers along

with suitable block diagrams, Sensitivity, Selectivity and fidelity.

Learning Outcomes:

- Understand the concepts of Analog Pulse Modulation and Demodulation techniques. [L1]
- Understand the concepts of AM and FM receivers. [L1]
- Apply the concepts to solve problems in Analog pulse modulation schemes. [L2]
- Analyse the performance of AM and FM receivers.[L3]
- Compare the Performance of different Analog Pulse Modulation techniques.[L4]

Unit V

Information Theory: Introduction, Information and Entropy, and its properties, source coding Theorem, Huffman coding, Discrete Memoryless channels, Mutual Information, and its properties, Channel capacity, Channel coding Theorem, differential entropy and mutual information, Information capacity theorem, implication of information capacity theorem, Rate Distortion, Illustrative problems.

Learning Outcomes:

- Understand the concepts of information theory and different coding techniques.[L1]
- Analyse Binary symmetric channel. [L3]
- Design the channel performance using information theory. [L4]
- Derive equation for Entropy, Mutual information and channel capacity for all types of channels. [L2]

Course Outcomes

After completion of the course, student will be able to

- CO1:** Understand the concepts of various Amplitude, Angle and Pulse Modulation schemes.
- CO2:** Apply the concepts to solve problems in Analog and pulse modulation schemes. (L2)
- CO3:** Analysis of Analog communication system in the presence of noise. (L3)
- CO4:** Compare and contrast design issues, advantages, disadvantages and limitations of various modulation schemes in Analog communication systems.(L4)
- CO5:** Solve basic communication problems & calculate information rate and channel capacity of a discrete communication channel (L5)

TEXT BOOKS:

1. John Wiley & Sons Simon Haykin, "Communication Systems," 3rd Edition, 2010.

2. Dr.Sanjay Sharma, Communication systems, S.K.Katari & Sons 6th Edition, 2013.

REFERENCES:

1. Bruce Carlson, & Paul B. Crilly, "Communication Systems – An Introduction to Signals & Noise in Electrical Communication", McGraw-Hill International Edition, 5th Edition, 2010
2. J. G. Proakis, M Salehi, Gerhard Bauch, "Modern Communication SystemsUsingMATLAB," CENGAGE, 3rd Edition, 2013.
3. P.Lathi, "Modern Digital and Analog Communication Systems," 3rd Edition, Oxford Univ. press, 2006

**(EC20APC402)ELECTROMAGNETIC WAVES AND TRANSMISSION LINES
(ECE)****Course Objectives:**

The main objectives of this course are to understand

- To introduce fundamentals of static and time varying electromagnetic fields.
- To teach problem solving in Electromagnetic fields using vector calculus.
- To demonstrate the concepts of Static and time varying Maxwell equations.
- To demonstrate Wave equations in different media for normal and oblique incidence.
- To introduce various concepts of transmission lines and their practical applications.

Unit I

Electrostatics: Review of Co-ordinate Systems & Vector Calculus , Coulomb's Law, Electric Field Intensity – Fields due to Different Charge Distributions, Electric Flux Density, Gauss Law and Applications, Electric Potential, Relations Between E and V, Maxwell's Two Equations for Electrostatic Fields, Electric Dipole, Energy Density, Convection and Conduction Currents, Dielectric Constant, Linear, Isotropic and Homogeneous Dielectrics, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations, Capacitance – Parallel Plate, Coaxial, Spherical Capacitors.

Learning Outcomes:

- Understand basic laws of static electric field. (L1)
- Derive the Maxwell's equations for electrostatic fields. (L3)
- Solve problems applying laws of electrostatics. (L3)

Unit II

Magneto Statics: Biot-Savart Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magneto static Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law, Inductances and Magnetic Energy.

Learning Outcomes:

- Understand basic laws of static magnetic field. (L1)
- Derive the Maxwell's equations for magnetic fields. (L3)
- Solve problems applying laws of magneto statics. (L3)

Unit III

Maxwell's Equations (Time Varying Fields): Faraday's Law and Transformer E.M.F, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's equations for time varying fields, Maxwell's Equations in Different Final Forms and Word Statements, Boundary Conditions of Electromagnetic fields: Dielectric-Dielectric and Dielectric-Conductor Interfaces.

Learning Outcomes:

- Derive the Maxwell's equations for electromagnetic fields. (L3)
- Apply the boundary conditions of electromagnetic fields at the interface of different media. (L2).

Unit IV

EM Wave Characteristics: Waves – Definition, Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane, All Relation between E & H Sinusoidal variations, Wave Propagation in Lossless and Conducting Media, Conductors & Dielectrics – Characterization, Wave Propagation in Good Conductors and Good Dielectrics.

Reflection and Refraction of Plane Waves – Normal and Oblique Incidences, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance, Poynting Vector, and Poynting Theorem.

Learning Outcomes:

- Understand concept of wave propagation through the Maxwell's equations. (L1)
- Derive wave equations for different media (L3)
- Understand principles of reflections and refraction for different incidences. (L1)
- State concept of power flow using Poynting vector. (L2)

Unit V

Transmission Lines: Types, Transmission line parameters, Transmission line equivalent circuit, Transmission line equations, input impedance, standing wave ratio, Phase and Group Velocities, Infinite Line, Lossless lines, distortion less lines, Transmission of finite length - half wave, quarter wave transmission line, Smith chart, graphical analysis of transmission lines using Smith chart, Illustrative Problems.

Learning Outcomes:

- Understand the principles of transmission lines and concept of smith chart.(L1)
- Derive the input impedance of transmission line.(L3)
- Finding the line parameters through problem solving.(L4)
- Study the applications of different lengths of transmission lines.(L2)

Course Outcomes:

At the end of this course the student can able to

- CO1:** Understanding the basic laws and applications of electromagnetic fields (L2)
- CO2:** Evaluate the problems related to electromagnetic fields (L3)
- CO3:** Analyze Maxwell equations for static and time varying fields (L3)
- CO4:** Analyze electric and magnetic fields at the interface of different media (L3)
- CO5:** Evaluate electric and magnetic fields and calculates different angles (L5)
- CO6:** Evaluate transmission lines with equivalent circuit and their characteristics with various lengths (L2)

TEXT BOOKS:

- 1. Matthew N.O. Sadiku, "Elements of Electromagnetics", 4th edition. Oxford Univ. Press, 2008.
- 2. E.C. Jordan and K.G. Balmain, "Electromagnetic Waves and Radiating Systems", 2nd Edition, PHI, 2000

REFERENCES:

- 1. John D. Krauss, "Electromagnetics", 4th Edition, McGraw-Hill publication 1999.
- 2. William H. Hayt Jr. and John A. Buck, "Engineering Electromagnetics", 7th edition., TMH, 2006.
- 3. Electromagnetics, Schaum's outline series, 2nd Edition, Tata McGraw-Hill publications, 2006.

**(EC20APC403) LINEAR & DIGITAL INTEGRATED CIRCUITS AND APPLICATIONS
(ECE)**

Course Objectives:

- To introduce the basic building blocks of linear integrated circuits.
- To teach the linear and non-linear applications of operational amplifiers.
- To introduce the theory and applications of PLL.
- To introduce the concepts of waveform generation and introduce some special function ICs.
- Exposure to digital IC's
- To create combinational circuits & sequential circuits using HDLs.

Unit I

OPERATIONAL AMPLIFIER: Introduction, Classification of IC's, basic information and features of Op-Amp IC741, the ideal Operational amplifier, Op-Amp internal circuit, characteristics - DC and AC.

LINEAR APPLICATIONS OF OP-AMP: Inverting and non-inverting amplifiers, adder, subtractor, Instrumentation amplifier, AC amplifier, V to I and I to V converters, Integrator and differentiator.

Learning Outcomes:

- Understand the basic building blocks of Op-Amps & specialized ICs. (L2)
- Understand the DC and AC performance characteristics of Op-Amps. (L2)
- Apply knowledge on linear applications of Op-Amps. (L3)

Unit II

NON-LINEAR APPLICATIONS OF OP-AMP: Sample and Hold circuit, Log and Antilog amplifier, multiplier and divider, Comparators, Schmitt trigger, Multivibrators, Triangular and Square waveform generators, Oscillators

TIMER AND PHASE LOCKED LOOPS: Introduction to IC 555 timer, monostable and astable operations and applications, Schmitt trigger, PLL - introduction, basic principle, phase detector/comparator, voltage controlled oscillator (IC 566), applications of PLL.

Learning Outcomes:

- Understand the specialized ICs such as VCO and PLL. (L2)
- Apply knowledge on non-linear applications of Op-Amps. (L3)
- Analyze and create various circuits using Op-Amps and 555 timer. (L5)

UNIT III

VOLTAGE REGULATOR: Introduction, Series Op-Amp regulator, IC Voltage Regulators, IC 723 general purpose regulators, Switching Regulator.

D to A & A to D CONVERTERS: Introduction, basic DAC techniques - weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, A to D converters - parallel comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC, DAC and ADC Specifications.

Learning Outcomes:

- Apply the specialized ICs of Voltage Regulator. (L3)
- Analyze the operation & characteristics of data converters. (L4)

Unit IV

HARDWARE DESCRIPTION LANGUAGE: Introduction to Verilog - structural Specification of logic circuits, behavioural specification of logic circuits, hierarchical Verilog Code, Verilog for combinational circuits - conditional operator, if-else statement, case statement, for loop; using storage elements with CAD tools-using Verilog constructs for storage elements, flip-flop with clear capability, using Verilog constructs for registers and counters.

Learning Outcomes:

- Understand the concepts of Verilog Language. (L1)
- Understand and analyze the syntax of HDL. (L3)

Unit V

COMBINATIONAL LOGIC CIRCUITS: Logic gates using 74XX ICs, Adders, Subtractors, Four-bit parallel adder, Comparator, Encoder, Priority Encoder, Decoder, BCD-to-7- segment decoder, Multiplexer, Demultiplexer. Verilog/VHDL models for the above standard building block ICs.

SEQUENTIAL CIRCUITS USING ICs: Latches, Flip Flops, Review of design of State machines; Standard building block ICs for Shift registers, parallel / serial conversion, shift register counters, Ring counters; Johnson counters, LFSR counter; Verilog/VHDL models for the above standard building block ICs.

Learning Outcomes:

- Design of Combinational logic circuits using Verilog. (L4)
- Design of Sequential logic circuits using Verilog. (L4)

Course Outcomes:

- CO1:** List out the characteristics of Linear and Digital ICs.
- CO2:** Discuss the various applications of linear & Digital ICs.
- CO3:** Solve the application based problems related to linear and digital ICs.
- CO4:** Analyze various applications based circuits of linear and digital ICs.
- CO5:** Design the circuits using either linear ICs or Digital ICs from the given specifications.
- CO6:** Develop digital circuits using HDL.

TEXT BOOKS:

1. D. Roy Choudhury, Shail B. Jain, "Linear Integrated Circuit", 4th edition (2012), New Age International Pvt.Ltd., New Delhi, India.
2. Ramakant A. Gayakwad, "OP-AMP and Linear Integrated Circuits", 4th edition (2012), Prentice Hall / Pearson Education, New Delhi.
3. John F.Wakerly, " Digital Design Principles and Practices" 4th edition, Pearson Education., 2009.

REFERENCE BOOKS:

1. Sergio Franco (1997), Design with operational amplifiers and analog integrated circuits, McGraw Hill, New Delhi.
2. Gray, Meyer (1995), Analysis and Design of Analog Integrated Circuits, Wiley International, New Delhi.
3. M.Morris Mano and Michael D. Ciletti., "Digital Logic Design" 4th edition Pearson Education., 2013
4. J. Bhasker, "A VHDL PRIMER" 3rd edition Eastern Economy Edition, PHI Learning, 2010.

**(EC20APC404) ANALOG COMMUNICATIONS LABORATORY
(ECE)****Course Objectives:**

- To familiarize the students with basic analog communication systems. Integrate theory with experiments so that the students appreciate the knowledge gained from the theory course.
- Understand all types of analog modulation / demodulation principles.
- Substantiate pulse modulation techniques.
- To design and implement different modulation and demodulation techniques.

LIST OF EXPERIMENTS (All experiments are to be conducted)

1. Amplitude Modulation and Demodulation
2. Frequency Modulation and Demodulation
3. (a).Characteristics of Mixer
(b).Pre-emphasis & De-emphasis.
4. Pulse Amplitude Modulation & Demodulation.
5. Pulse Width Modulation &Demodulation.
6. Pulse Position Modulation & Demodulation
7. Measurement of Half power Beam width and gain of half wave dipole antenna.
8. Simulate AM and FM signals and find power spectrum of each signal. Plot the graphs.
9. Simulate PAM and PWM signals and find power spectrum of each signal. Plot the graphs.
10. Generate a complex Gaussian noise (with zero mean unit variance). And pass through an LTI system. Find the power spectrum density of the noise signal available at the output of LTI system.
11. Make use of AM signal from experiment no. 9 add Gaussian noise (with zero mean and unity variance) to the signal. Extract the information bearing signal using suitable system.
12. Simulate Huffman coding.

Course Outcomes:

After the completion of the course students able to

- CO1:** Understand different analog modulation techniques & Radio receiver characteristics. (L1)
- CO2:** Analyze different analog modulation techniques. (L3)
- CO3:** Design and implement different modulation and demodulation techniques. (L4)
- CO4:** Observe the performance of system by plotting graphs & Measure radio receiver characteristics. (L2)
- CO5:** Simulate all digital modulation and demodulation techniques. (L5)

Equipment & Software Required:

1. Computer Systems with latest specifications
2. Connected in LAN (Optional)
3. Operating system (Windows XP)
4. Simulations software (MATLAB)

Equipment:

1. Regulated Power Supply (0-30) V.
2. CROs (0-20) MHz.
3. Function Generators (0-3) MHz.
4. RF Signal Generators (0-1000) MHz.
5. Multimeters.
6. Required Electronic components (active and passive) for the design of experiments from 1 -7.
7. RF power meter frequency range 0 – 1000MHz
8. Spectrum Analyzer.

Note: Conduct experiments (8-12) using **MATLAB** software.

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B.Tech -IV SEM

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(CS20AES402) DATA STRUCTURES USING C LAB

(ECE, EEE, ME, CE)

Course Objectives:

- To strengthen the ability to identify and apply the suitable data structure for the given real-world problem.

Tasks:

1. Demonstrate recursive algorithms with examples.
2. Develop a program to perform operations of a Stack and Queue using arrays.
3. Implement and perform different operations on Single, Double and Circular Linked Lists.
4. Develop a program to perform operations of Stack and Queue using Linked Lists.
5. Develop a program to implement Stack applications.
6. Implement Circular Queues.
7. Implement various Searching techniques.
8. Develop programs for different Sorting techniques.
9. Develop a program to represent a Tree Data Structure.
10. Develop a program to demonstrate operations on Binary Search Tree.
11. Demonstrate Graph Traversal Techniques.

Text Books:

1. Data Structures and Algorithm Analysis in C, Mark Allen Weiss, Second Edition, 2002, Pearson.
2. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, Third Edition, 2010, PHI.
3. Data Structures and Algorithms Made Easy by Narasimha Karumanchi, 2020, Career Monk Publications.

Course Outcomes:

- CO1:** Demonstrate the concept of Recursion for solving a problem. (L4)
- CO2:** Choose and implement linear data structure to solve problems. (L3)
- CO3:** Develop programs for searching and sorting algorithms. (L3)
- CO4:** Select and implement suitable non linear data structure for solving a problem. (L3)

**(EC20APC405) LINEAR & DIGITAL INTEGRATED CIRCUITS AND APPLICATIONS LAB
(ECE)**

Course Objectives:

- The objective of the course is to learn design, testing and characterizing of circuit behavior with digital and analog ICs.

List of Experiments:

Part A: Hardware

Linear IC Experiments: (Students has to perform atleast 6 experiments.)

1. OP AMP Applications – Adder, Subtractor, Comparators.
2. Integrator and Differentiator Circuits using IC 741.
3. IC 741 Waveform Generators – Sine, Square wave and Triangular waves.
4. IC 555 Timer – Monostable and Astable Multivibrator Circuits.
5. Data converters
 - i. DAC circuits – R-2R and ladder type.
 - ii. Successive approximation type ADC.
6. Schmitt Trigger Circuits – using IC 741
7. IC 565 – PLL Applications.
8. Voltage Regulator using IC 723, Three Terminal Voltage Regulators – 7805, 7809, 7912.

PART B: Software

Digital IC Applications: (Students has to perform atleast 6 experiments.)

1. 3-8 line decoder.
2. 4-bit comparator.
3. 8x1 Multiplexer and 2 to 4 Demultiplexer.
4. BCD to 7-segment decoder.
5. D Flip Flop, JK Flip Flops.
6. Decade counter.
7. Up/Down Counter.
8. Universal shift registers.

Equipment required for Laboratory:**Software:**

1. Xilinx ISE
2. Computer Systems with required specifications

Hardware:

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators
4. Digital Multimeters
5. Decade Resistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)
9. Active & Passive Electronic Components
10. Bread Boards
11. Connecting Wires
12. CRO Probes

Course Outcomes:

- CO1:** Understand the pin configuration of each linear/ digital IC and its functional diagram.
- CO2:** Conduct the experiment and obtain the expected results.
- CO3:** Analyze the given circuit/designed circuit and verify the practical observations with the analyzed results.
- CO4:** Design the circuits for the given specifications using linear and digital ICs.
- CO5:** Acquaintance with lab equipment about the operation and its use.

**(EG20ASC301) SOFT SKILLS
(ECE)**

Course Objectives:

- To encourage all round development of the students by focusing on soft skills
- To make the students aware of critical thinking and problem-solving skills
- To develop leadership skills and organizational skills through group activities
- To function effectively with heterogeneous teams

UNIT I

Communication Skills:

Introduction, meaning, significance of soft skills – definition, significance, types of communication skills - Intra-personal & Inter-personal skills - Verbal and Non-verbal Communication

Activities:

Intrapersonal Skills- Narration about self- strengths and weaknesses- clarity of thought – self- expression – articulating with felicity

(The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes and literary sources)

Interpersonal Skills- Group Discussion – Debate – Team Tasks - Book and film Reviews by groups - Group leader presenting views (non- controversial and secular) on contemporary issues or on a given topic.

Verbal Communication- Oral Presentations- Extempore- brief addresses and speeches- convincing- negotiating- agreeing and disagreeing with professional grace.

Non-verbal communication – Public speaking – Mock interviews – presentations with an objective to identify non- verbal clues and remedy the lapses on observation

Learning Outcomes

At the end of the module, the learners will be able to

- Acquire attributes regarding communication skills
- Enhance their intrapersonal and interpersonal skills
- Improve LSRW Skills

UNIT II

Critical Thinking

Active Listening – Observation – Curiosity – Introspection – Analytical Thinking – Open-mindedness – Creative Thinking

Activities:

Gathering information and statistics on a topic - sequencing - assorting - reasoning - critiquing issues - facing the problem - finding the root cause - seeking viable solution - judging with rationale - evaluating the views of others - Case Study, Story Analysis

Learning Outcomes

At the end of the module, the learners will be able to

- Enhance their LSRW skills
- Be able to get innovative and creative skills
- Acquire logical and analytical thinking capability
- Develop their cognitive level

UNIT III**Problem Solving & Decision Making**

Meaning & features of Problem Solving - Managing Conflict - Conflict resolution - Methods of decision making - Effective decision making in teams - Methods & Styles

Activities:

Facing problem which involves conflict of interests, choice and views - formulating the problem - exploring solutions by proper reasoning - Discussion on important professional, career and organizational decisions and initiate debate on the appropriateness of the decision.

Case Study & Group Discussion

Learning Outcomes

At the end of the module, the learners will be able to

- Solve the problems logically
- Make decisions effectively
- Face the problems positively with confidence

UNIT IV**Emotional Intelligence & Stress Management**

Managing Emotions - Thinking before Reacting - Empathy for Others - Self-awareness - SWOC analysis - Stress factors - Controlling Stress - Tips

Activities:

Providing situations for the participants to express emotions such as happiness, enthusiasm, gratitude, sympathy, and confidence, compassion in the form of written or oral presentations.

Providing opportunities for the participants to narrate certain crisis and stress -ridden situations caused by failure, anger, jealousy, resentment and frustration in the form of

written and oral presentation, Organizing Debates

Learning Outcomes

At the end of the module, the learners will be able to

Control their emotions and stress levels

Be emotionally balanced

Respond instead of reacting in their professional and academic life

UNIT – V

Leadership Skills

Team-Building – Decision-Making – Accountability – Planning – Public Speaking –
Motivation – Risk-Taking – Time Management

Activities:

Forming group with a consensus among the participants- choosing a leader- encouraging the group members to express views on leadership- democratic attitude- sense of sacrifice – sense of adjustment – vision – accommodating nature- eliciting views on successes and failures of leadership using the past knowledge and experience of the participants, Public Speaking, Activities on Time Management, Motivation, Decision Making, Group discussion etc.

Learning Outcomes

At the end of the module, the learners will be able to

- Learn the aspects of team building
- Understand the characteristics of effective leadership skills
- Improve spontaneous communication

Course Outcomes:

By the end of the program students should be able to

- CO1:** Memorize various elements of effective communicative skills
- CO2:** Interpret people at the emotional level through emotional intelligence
- CO3:** Apply critical thinking skills in problem solving
- CO4:** Analyze the needs of an organization for team building
- CO5:** Judge the situation and take necessary decisions as a leader
- CO6:** Develop social and work-life skills as well as personal and emotional well being

Textbooks:

1. Barun Mitra, Personality Development and Soft Skills, English, Oxford University Press, 2012
2. Dr Shikha Kapoor, Personality Development and Soft Skills: Preparing for Tomorrow, International Publishing House; 0 edition (February 28, 2018)

Reference Books:

1. Prashant Sharma ,Soft skills: Personality Development for Life Success, BPB publications, 2018.
2. DR.K.Alex ,Soft Skills, S.Chand Publications.
3. Gajendra Singh Chauhan &Sangeetha Sharma, Soft Skills: An Integrated Approach to Maximise Personality, Published by Wiley
4. Avni. Sharma ,Communication Skills and Soft Skills Hardcover, ,Publisher: Yking books
5. Renu Shorey,SOFT SKILLS for a BIG IMPACT, Publisher: Notion Press
6. Dr. Rajiv Kumar Jain & Dr. UshaLife Skills(a guide to steer life),Publisher: Vayu Education of India
7. Raymond.L.Gorden,Basic Interviewing Skills, Waveland publications

Online Learning Resources:

1. https://youtu.be/DUlsNJtg2L8?list=PLLy_2iUCG87CQhELCytvXh0E_y-b001_q
2. https://youtu.be/xBaLgJZ0t6A?list=PLzf4HHlsQFwJZel_j2PUy0pwjVUgj7KlJ
3. <https://youtu.be/-Y-R9hDI7IU>
4. <https://youtu.be/gkLsn4ddmTs>
5. <https://youtu.be/2bf9K2rRWwo>
6. <https://youtu.be/FchfE3c2jzc>

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech -IV SEM

L T P C

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(BA20AMC201/ BA20AHS201) UNIVERSAL HUMAN VALUES

Course Objectives:

The objective of the course is four fold:

- Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
- Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence.
- Strengthening of self-reflection.
- Development of commitment and courage to act.

Unit I:

Course Introduction-Need, Basic Guidelines, Content and Process for Value Education

- Purpose and motivation for the course, recapitulation from Universal Human Values-I.
- Self-Exploration-what is it? Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration.
- Continuous Happiness and Prosperity- A look at basic Human Aspirations.
- Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority.
- Understanding Happiness and Prosperity correctly-A critical appraisal of the current scenario.
- Methods to fulfil the above human aspirations: understanding and living in harmony at various levels.
- Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co- existence) rather than as arbitrariness in choice based on liking-disliking.

Unit -II: Understanding Harmony in the Human Being - Harmony in Myself!

- Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
- Understanding the needs of Self ('I') and 'Body' - happiness and physical facility.
- Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer).
- Understanding the characteristics and activities of 'I' and harmony in 'I'.

- Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail.
- programs to ensure Sanyam and Health.
- Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease.

Unit III:

Understanding Harmony in the Family and Society- Harmony in Human - Human Relationship

- Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship.
- Understanding the meaning of Trust; Difference between intention and competence.
- Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship.
- Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.
- Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios, elicit examples from students' lives.

Unit IV:

Understanding Harmony in the Nature and Existence -Whole existence as Co-existence

- Understanding the harmony in the Nature.
- Interconnectedness and mutual fulfilment among the four orders of nature recyclability and self-regulation in nature.
- Understanding Existence as Co-existence of mutually interacting units in all pervasive Space.
- Holistic perception of harmony at all levels of existence. Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

Unit V:

Implications of the above Holistic Understanding of Harmony on Professional Ethics

Natural acceptance of human values.

- Definitiveness of Ethical Human Conduct.
- Basis for Humanistic Education, Humanistic Constitution and Humanistic universal order
- Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems.
- Case studies of typical holistic technologies, management models and production systems
- Strategy for transition from the present state to Universal Human Order:
 - At the level of individual: as socially and ecologically responsible engineers, technologists and managers.
 - At the level of society: as mutually enriching institutions and organizations
- Sum up: Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions
E.g., To discuss the conduct as an engineer or scientist etc.

Text Books:

1. R R Gaur, R Asthana, G P Bagaria, "A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1.
2. R R Gaur, R Asthana, G P Bagaria, "Teachers' Manual for A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2.

Reference Books:

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantik, 1999.
2. A. N. Tripathi, "Human Values", New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. Mohandas Karamchand Gandhi "The Story of My Experiments with Truth"
5. E. F. Schumacher. "Small is Beautiful".
6. Slow is Beautiful –Cecile Andrews.
7. J C Kumarappa "Economy of Permanence".
8. Pandit Sunderlal "Bharat Mein Angreji Raj".
9. Dharampal, "Rediscovering India".
10. Mohandas K. Gandhi, "Hind Swaraj or Indian Home Rule".
11. India Wins Freedom - Maulana Abdul Kalam Azad.
12. Vivekananda - Romain Rolland (English).
13. Gandhi - Romain Rolland (English).

Course Outcomes:

By the end of the course,

- CO1:** Understanding the value of education to become more aware of themselves, and their surroundings (family, society, nature). (L2)
- CO2:** Utilize the concepts of human being-harmony in myself become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind. (L3)
- CO3:** Understanding the concepts of society-harmony in human for better critical ability. (L2)
- CO4:** Understanding the human values, human relationship and human society to become sensitive to their commitment. (L2)
- CO5:** Apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction. (L3)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

Karakambadi Road, TIRUPATI – 517507

B.Tech- IV SEM

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(MA20AMC401)ENGINEERING MATHEMATICS

(Common to All Branches of LE Students)

Course Objectives:

- This course will illuminate the students in the concepts of calculus and linear algebra.
- To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various realworld problems and their applications.

UNIT -1

Matrices

Solving system of homogeneous and non homogeneous linear equations. Eigen values and Eigenvectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem,

Learning Outcomes:

At the end of this unit, the student will be able to

- Solving systems of linear equations, using technology to facilitate row reduction determine the rank, eigen values and eigenvectors (L3).
- Identify special properties of a matrix, such as positive definite, etc., and use this information to facilitate the calculation of matrix characteristics (L3).

UNIT -2

Mean Value Theorems

Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof) related problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Translate the given function as series of Taylor's and Maclaurin's with remainders (L3)

Analyze the behaviour of functions by using mean value theorems (L3)

UNIT 3

Linear differential equations of higher order

Definitions, complete solution, operator D , rules for finding complimentary function, inverse operator, rules for finding particular integral, method of variation of parameters, Applications to L-C-R Circuit problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify the essential characteristics of linear differential equations with constant coefficients (L3)
- Solve the linear differential equations with constant coefficients by appropriate method (L3)

UNIT 4

Multivariable Calculus

Partial derivatives, total derivatives, chain rule, change of variables, Jacobian, maxima and minima of functions of two variables, method of Lagrange multipliers.

Learning Outcomes:

At the end of this unit, the student will be able to

- Find partial derivatives numerically and symbolically and use them to analyze and interpret the way a function varies. (L3)
- Acquire the Knowledge maxima and minima of functions of several variable (L1)
- Utilize Jacobian of a coordinate transformation to deal with the problems in change of variables (L3)

UNIT -5

Vector Calculus

Vector differentiation

Scalar and vector point functions, vector operator ∇ , ∇ applies to scalar point functions-Gradient, ∇ applied to vector point functions-Divergence, Curl and their related properties.

Vector integration

Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and applications of these theorems.

Learning Outcomes:

At the end of this unit, the student will be able to □

- Find the work done in moving a particle along the path over a force field (L4)

- Evaluate the rates of fluid flow along and across curves (L4) □
- Apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals (L3)

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.

Reference Books:

1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
3. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.
4. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education
5. H. k Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand.
6. N. Bali, M. Goyal, C. Watkins, Advanced Engineering Mathematics, Infinity Science Press.

Course Outcomes:

At the end of the course, the student will be able to

- Develop the use of matrix algebra techniques that is needed by engineers for practical applications (L6)
- Utilize mean value theorems to real life problems (L3)
- Solve the differential equations related to various engineering fields (L6) □
- Apply multiple integrals to find the area and volumes for different functions. (L3)
- Estimate the work done against a field, circulation and flux using vector calculus (L6)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B. Tech- V Sem

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(EC20APC501) ANTENNAS AND WAVE PROPAGATION

Course Objectives:

1. To introduce radiation mechanism and basic characteristics of antennas.
2. To discuss various antennas which are operated in VHF & UHF frequency range
3. To introduce design concepts of various types of antennas including micro-strip antenna & Lens antenna.
4. To explain the concept of antenna arrays and measurement of antenna parameters.
5. To demonstrate various modes of EM wave propagation.

UNIT-I

Antenna Basics, Monopole & Dipole antennas: Definition of antenna , Radiation mechanism- single wire, two wire, dipole, Basic antenna parameters- patterns, Main lobe and Side lobes, Beam widths, Beam area, Radiation Intensity, Beam Efficiency, Directivity, Gain & Resolution, Antenna Apertures, Effective height & length, Antenna impedance, Front-to-back ratio, Antenna theorems, Radiation from Monopole, Small Electric Dipole, Half wave Dipole Antennas – Current Distributions, Field Components, Radiated power, Radiation Resistance, Illustrative problems.

Learning Outcomes:

- Understand radiation mechanism and basic antenna characteristics. (L1)
- Compute radiation intensity, gain and directivity of antennas. (L2)

UNIT-II

VHF, UHF and Microwave Antennas - I: Loop Antennas - Introduction, Radiation Resistances and Directives of small and large loops, Arrays with Parasitic Elements - Yagi - Uda Arrays, Folded Dipoles & their characteristics. Helical Antennas- Helical Geometry, Helix modes, Practical Design considerations for Monofilar Helical Antenna in Axial and Normal Modes. Horn Antennas- Types, Fermat's Principle, Optimum Horns, Design considerations of Pyramidal Horns, Illustrative Problems.

Learning Outcomes:

- Derive expressions for radiation resistance, directivity of Loop antennas(L3)
- Obtain radiation pattern of various array antennas. (L2)

UNIT-III

VHF, UHF and Microwave Antennas - II: Micro strip Antennas- Introduction, features, advantages and limitations, Rectangular patch antennas- Geometry and parameters, characteristics of Micro strip antennas, reflector antennas - Introduction, Flat sheet and corner reflectors, parabola reflectors- geometry, pattern characteristics, Feed Methods, Reflector Types - Related Features, Lens Antennas - Geometry of Non-metallic Dielectric Lenses, Zoning, Tolerances, Applications, Illustrative Problems.

Learning Outcomes:

- Understand basic principles of Micro strip Antennas (L2)
- Describe feeding methods for micro-strip antennas. (L2)

UNIT-IV

Antenna Arrays: Arrays of 2 Isotropic sources- Different cases, Principle of Pattern Multiplication, Uniform Linear Arrays – Broadside Arrays, End-fire Arrays, General considerations and Binomial Arrays, Illustrative problems.

Antenna Measurements: Introduction, Near and Far Fields, Pattern Measurement, Directivity Measurement, Gain Measurements (by comparison, Absolute and 3-Antenna Methods).

Learning Outcomes:

- Compare radiation pattern and other antenna parameters of broad side and end fire array antennas. (L5)
- Describe the different types of Antenna Measurement (2)

UNIT-V

Wave Propagation-I: Introduction, Definitions, Categorizations and General Classifications, Different Modes of Wave Propagation ,Ray/Mode Concepts ,Ground-Wave Propagation- Introduction, Plane Earth Reflections, Space and Surface Waves, Wave Tilt, Curved Earth Reflections, Space-Wave Propagation- Introduction, Field Strength Variation with Distance and Height, Effect of Earth's Curvature, Absorption, Super refraction, M-Curves and Duct Propagation, Scattering Phenomena, Troposphere Propagation.

Wave Propagation - II: Sky-Wave Propagation -Introduction, Structure of Ionosphere, Refraction and Reflection of Sky-Waves by Ionosphere, Ray-Path, Critical-Frequency, MUF, LUF, OF, Virtual Height and Skip Distance, Relation between MUF and skip Distance, Multi-hop Propagation, illustrative problems.

Learning Outcomes:

- Understand effects of earth's magnetic field on wave propagation (L2)
- Apply the concepts to solve problems related to wave propagation (L3)

TEXT BOOKS:

1. John D. Kraus, Ronald J. Marhefka, Ahmad S. Khan, "Antennas and Wave Propagation", 4th Edition, TMH, 2010.
2. Jordan E.C. and Balmain. K.G., "Electromagnetic Waves and Radiating Systems", Prentice-Hall Publications.

REFERENCES:

1. Constantine A. Balanis, "Antenna Theory-Analysis and Design", Wiley Publication, 2016.
2. K.D. Prasad, "Antenna & Wave Propagation", Satya Prakash Publications, 2009.
3. Matthew N.O. Sadiku, "Principle of Electromagnetics", 4th edition, Oxford (International), 2012.

Course Outcomes:

- CO1:** Discuss various antenna parameters, principles of operation of basic antennas & Analyze field components of various dipole antennas.
- CO2:** Demonstrate the basic principles of antennas which are operated in VHF- UHF frequency range.
- CO3:** Demonstrate the basic principles of antennas which are operated in Microwave frequency & discuss various feeding mechanism.
- CO4:** Analyze radiation pattern of various antenna arrays & Evaluate the antenna parameters.
- CO5:** Discuss various EM wave propagation methods & Analyze mathematical aspects of wave propagation.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B. Tech- V Sem

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(EC20APC502) DIGITAL COMMUNICATIONS

Course Objectives:

1. To understand the key modules of digital communication systems with emphasis on digital modulation techniques.
2. To get introduced to the concept and basics of information theory and the basics of source and channel coding/decoding.
3. To prepare mathematical background for communication signal analysis.
4. To study signal flow in a digital communication system.
5. To analyze error performance of a digital communication system in presence of noise and other interferences.

UNIT- I:

Pulse Digital Modulation: Introduction, sampling process, quantization, quantization noise, encoding, Pulse-Code Modulation (PCM), Line codes, Differential encoding, Regeneration, Decoding & Filtering, Noise considerations in PCM systems, Time-Division Multiplexing (TDM), Synchronization, Delta modulation (DM)- Granular noise Slope over distortion, Differential PCM (DPCM), Processing gain, Comparison of the above systems.

Learning Outcomes:

- Understand source coding techniques & pulse modulation techniques. (L1)
- Describe and determine the performance of line codes. (L2)

UNIT- II:

Baseband Pulse Transmission: Introduction, Matched filter, Properties of Matched filter, Matched filter for rectangular pulse, Error rate due to noise, Inter-symbol Interference (ISI), Nyquist's criterion for distortion less baseband binary transmission, ideal Nyquist channel, raised cosine filter & its spectrum, Correlative coding – Duo binary & Modified duo binary signalling schemes, Partial response signalling, Baseband M-ary PAM transmission, Eye diagrams.

Learning Outcomes:

- Analyze the performance of baseband pulse transmission system. (L3)
- Describe the generation & detection of pass band modulated signals. (L2)

UNIT- III

Signal Space Analysis: Introduction, Geometric representation of signals, Gram-Schmidt orthogonalization procedure, Coherent detection of signals in noise - maximum likelihood decoder, Probability of error, Correlation receiver.

Learning Outcomes:

- Understand the concepts of signal space analysis. (L1)
- Examine the characteristics of maximum likelihood decoder. (L2)

UNIT- IV:

Passband Data Transmission: Introduction, Passband transmission model, Coherent modulation schemes- Generation and detection of binary phase shift keying (BPSK), Quadrature shift keying (QPSK), and Binary Frequency shift keying (BFSK). Analysis of probability of error for BPSK, QPSK, BFSK, M-ary PSK, Non-coherent orthogonal modulation schemes - Generation and detection of non-coherent BFSK, DPSK ,Comparison of power bandwidth requirements for all the above schemes, Illustrative Problems.

Learning Outcomes:

- Analyse the different digital modulation techniques, generation and detection, power spectra and their probability of error performance. (L3)
- Compare the power bandwidth, bit error probability for various modulation scheme. (L5)

UNIT- V

Channel Coding: Linear Block Codes, Syndrome decoding, minimum distance considerations, Cyclic codes- generator polynomial, parity check polynomial, encoder for cyclic code, calculation of syndrome, Convolutional Codes – generator polynomials, problems.

Learning Outcomes:

- Understand various error control encoding and decoding techniques. (L1)
- Apply information theory and linear algebra in source coding and channel coding. (L2)

Text Books:

1. Simon Haykin, "Communication Systems," Wiley India Edition, 4th Edition, 2011.
2. B. P. Lathi, "Modern Digital and Analog Communication Systems," 3rd Edition, Oxford Univ. press, 2006.

References:

1. A. Bruce Carlson, & Paul B. Crilly, "Communication Systems – An Introduction to Signals & Noise in Electrical Communication", McGraw-Hill International Edition, 5th Edition, 2010.
2. Sham Shanmugam, "Digital and Analog Communication Systems", Wiley-India edition, 2006.
3. Dr. Sanjay Sharma, Communication systems, S.K.Katari & Sons 6th Edition, 2013.

Course Outcomes:

- CO1:** Understand the elements of digital communication system, baseband pulse transmission, pass band digital modulation,
- CO2:** Understand the concepts of geometric representation of signals, basics of information theory and error correcting codes.
- CO3:** Apply the knowledge of signals and system & statistical theory to evaluate the performance of digital communication systems.
- CO4:** Analyze the different coding, modulation techniques, Probability of error performance of digital system.
- CO5:** Compare the performance of different modulation schemes& error correcting codes.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B. Tech- V Sem

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(EC20APC503) MICROPROCESSORS AND MICROCONTROLLERS

Course Objectives:

1. To study the architecture, pin diagram, memory organization, interrupt structure of 8086 Microprocessor.
2. To study Instruction Formats and Assembler Directives, macros and procedure, string instructions of 8086 microprocessor based ALP.
3. To study to interface 8086 with 8255, 8253, 8251, 8237, 8259 and RAM, ROM Memories.
4. To study the architecture, pin diagram, memory organization, interrupt structure, Instruction formats and addressing modes of 8051 Microcontroller.
5. To study to hardware features of timers, interrupts and serial port and also interface 8051 with Push button switches , LED, seven segment display, stepper motor & LCD.

Unit I

8086 Microprocessor- Features, Architecture, Register Organization, Flag Register, Pin Diagram, Maximum and minimum mode configuration, Memory organization, Memory Segmentation and memory banks accessing, Accessing memory locations. Interrupt structure of 8086 and Interrupt Vector Table.

Unit II

8086 Microprocessor - Instruction Formats, Addressing Modes, Instruction Set of 8086, Assembler Directives, Procedures and macros. Simple ALPs.

Unit III

8086 Microprocessor Interfacing: Semiconductor memories interfacing (RAM, ROM), Intel 8255 programmable peripheral interface, Intel timer IC 8253, Intel 8251 USART architecture and interfacing, Intel 8237 DMA controller, 8259 programmable interrupt controllers.

Unit IV

Intel 8051 Microcontroller - Architecture, Memory organization, internal RAM structure, Special Function Registers (SFRs). Addressing modes and instruction set of 8051. 8051 Assembly language programming.

Unit V

Hardware features of 8051- timers, interrupts and serial ports. 8051 Interfacing - Push button switches and LEDs, interfacing seven segment display. Interfacing stepper motor and LCD with 8051.

Text Books:

1. Microprocessors and Interfacing N. Senthil kumar, M. Saravanan S.Jeevananthan, S.K. Shah, Oxford University Press.
2. K M Bhurchandi, A K Ray, Advanced Microprocessors and Peripherals, 3rd edition, McGraw Hill Education, 2017.

References:

1. Microprocessors and Interfacing – Programming and Hardware by Douglas V Hall, SSSP Rao, Tata McGraw Hill Education Private Limited, 3rd Edition, 1994.
2. Kenneth J. Ayala, The 8051 Microcontroller, 3rd edition, Cengage Learning, 2004.
3. Raj Kamal, Microcontrollers: Architecture, Programming, Interfacing and System Design, 2nd edition, Pearson, 2012.

Course Outcomes:

- CO1:** Demonstrate ability to understand the architecture of 8086 microprocessor.
- CO2:** Demonstrate ability to develop 8086 assemble language programming using assembly language programming in MASM/TASM.
- CO3:** Demonstrate ability to describe interfacing of peripheral devices with 8086
- CO4:** Demonstrate ability to understand the architecture and addressing modes of 8051 microcontroller.
- CO5:** Demonstrate ability to understand the hardware features of 8051 and interfacing with pushbutton switches, LED, LCD, Stepper motor, Seven Segment Display., etc.

SRIVENKATESWARACOLLEGE OF ENGINEERING

(Autonomous)

B.Tech- V Sem

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(CE20AOE502) Principles of Waste Management

Course Objectives:

- Understanding of problems posed by various types of solid waste
- Categorize various solid and hazardous waste
- Obtain knowledge about various techniques adopted in field to treat solid and hazardous waste
- Become aware of various methods of disposal of solid and hazardous waste
- Understand engineering, financial and technical options for waste management.

UNIT –I

Introduction to Solid Waste

Waste-Types and classification, Waste sources and generation rates, Traditional methods of waste collection and disposal, Factors influencing waste generation and health hazards, Waste composition, Waste collection and Characterization of wastes.

Learning Outcomes:

After completion of this unit, students should

- Learn sampling and characterization of solid waste
- Analysis of hazardous waste constituents including QA/QC issues
- Understand traditional methods of waste collection and disposal

UNIT – II

Waste Processing

Waste processing: Size and volume reduction, Waste minimization, waste hierarchy and waste audit, Recycling of solid wastes,

Hazardous Waste

Definition, sources, classification, collection and segregation, Hazardous waste characterization, treatment and disposal, Radioactive waste

Learning Outcomes:

After completion of this unit, students should

- Learn waste processing techniques
- Determine the ways to reduce waste production
- Learn recycling of solid waste in their homes.
- Understand characteristics of hazardous waste and its treatment, final disposal

UNIT – III

Biomedical waste

e-waste and Plastic waste, Biomedical waste and Biomedical waste management rules, 2016

Composting

Definition- Vermi composting and Biogas production from solid waste

Learning Outcomes:

After completion of this unit, students should

- Learn composting and its types
- Determine the ways to produce more biogas from solid waste
- Understand the ways to dispose e-waste and plastic waste

UNIT –IV

Thermal treatment and Solid waste disposal

Thermal treatment of solid waste – Incineration, Thermal treatment of solid waste – Pyrolysis and gasification, Solid waste disposal – Sanitary landfilling, Landfill leachate and gas management, Landfill bioreactors, Fly ash- Generation and management

Learning Outcomes:

After completion of this unit, students should

- Design a sanitary landfill for a community
- Determine the ways to protect ground water from leachate contamination
- Learn about thermal treatment of solid waste.

UNIT – V

Solid waste management rules and Swachh Bharat Abhiyan

Fly ash management Solid waste management rules, 2016, Hazardous and other waste amendment rules, 2016, Plastic waste management rules, 2016, e-waste management rules, 2016, Swachh Bharat Abhiyan and Recent advances in solid waste management

Learning Outcomes:

After completion of this unit, students should

- Know the rules and regulatory bodies details.
- Use latest standards and techniques to manage the solid waste and hazardous waste
- Adopt the recent advancements in solid waste management

Course Outcomes (CO):

After studying this course, students will be able to:

- Understand various types of solid waste, sources and their collection methods.
- Identify various waste processing techniques and characteristics of hazardous waste
- Understand the process of management of biomedical waste and composting
- Apply various solid waste disposal techniques according to situation
- Obtain awareness on various solid waste management rules and Swachh Bharat Abhiyan

Textbooks:

1. Arcadio Sincero and Gregoria Sincero "Environmental Engineering", Second Edition, Prentice -Hall India
2. George Tchobanoglous "Integrated Solid Waste Management : Engineering Principles and Management", McGraw-Hill Publication 1993
3. M LaGrega and others "Hazardous Waste Management", McGraw-Hill Publication 2010
4. Tchobanoglous G, Theisen H and Vigil SA 'Integrated Solid Waste Management, Engineering Principles and Management Issues' McGraw-Hill, 1993.
5. Vesilind PA, Worrell W and Reinhart D, 'Solid Waste Engineering' Brooks/Cole Thomson Learning Inc., 2002.

Reference Books:

1. Peavy, H.S, Rowe, D.R., and G. Tchobanoglous, 'Environmental Engineering', McGraw Hill Inc., New York, 1985.
2. Qian X, Koerner RM and Gray DH, 'Geotechnical Aspects of Landfill Design and Construction' Prentice Hall, 2002

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech- V Sem

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(ME20AOE501) INDUSTRIAL AUTOMATION

Pre-Requisite: Operation Research, Production & Operation Management

Course Objectives:

Course Objectives:

- To understand the basic concepts of Automation
- To understand the concepts of automation cycle and hardware components
- To gain knowledge about pneumatic and hydraulic devices
- To understand the concepts of sensors and actuators
- To know the use of Robotics used in industries automation

UNIT -I: Introduction to Automation Definition and fundamentals of automation, reasons for Automating, basic elements of an automated system: Power, Program and control system, safety, maintenance & repair diagnosis, error detection and recovery, Automation principles and strategies: USA principle, strategies of automation and production system, automation migration strategy

Learning Outcomes:

At the end of the unit, students will be able to:

- To understand the fundamental concepts of automation and its basic elements
- To understand system safety requirements
- To understand about maintenance and repair strategies
- To know about production system automation

UNIT- II: Mechanization and Automation

Basic principles of Mechanization and automation, product cycle, hard Vs flexible automation, Capital- intensive Vs low cost automation. Types of systems-mechanical, electrical, hydraulic, pneumatic and hybrid systems, Automation using CAMS, Geneva mechanisms, gears etc.

Assembly line Automation: automated assembly systems, transfer systems, vibratory bowl feeders, non-vibratory feeders, part orienting, feed track, part placing & part escapement systems. Introduction to Material storage/ handling and transport systems, and its automation using AS/RS, AGVS and conveyors etc.

Learning Outcomes:

At the end of the unit, students will be able to:

- To know about how to analyse the various automation methods
- To know about assembling and placing of various parts

- To distinguish between mechanization and automation of systems
- To know about material storage, handling and automation using various approaches

UNIT -III:

Pneumatics and hydraulics

Hydraulic and pneumatic devices-Different types of valves, Actuators and auxiliary elements in Pneumatics & hydraulics , their applications and use of their ISO symbols. Synthesis and design of circuits (up to 3 cylinders)-pneumatic, electro pneumatics and hydraulics. Design of Electro-Pneumatic Circuits using single solenoid and double solenoid valves; with and without grouping.

Learning Outcomes:

At the end of the unit, students will be able to:

- To know design of various pneumatic and hydraulic components
- To understand about synthesis and design of Pneumatic circuits
 - To understand about electro pneumatic circuits
 - To design using various solenoid valves with and without grouping

UNIT -IV: Sensors & Actuators Sensors Selection of sensors (Displacement, temperature, acceleration, force /pressure) based on static and dynamic characteristics. Interfacing: Concept of interfacing, bit accuracy and sampling speed, amplifying electronics, and microcontroller. Actuators: Principle and selection of electro mechanical actuators (1) DC motors (2) Stepper Motors (3) Solenoid Actuators (4) Servo Motors (5) BLDC

Learning Outcomes:

At the end of the unit, students will be able to:

- To know about selection of sensors and actuators based on dynamic characteristics
 - To understand about necessity of interfacing sensors with Microcontroller
 - To understand principle and selection of actuators
 - To apply various electro mechanical actuators to certain machines

UNIT- V:

Robots and their applications

Introduction to robots, Types, Classifications, Selection of robots, Robot Degrees of freedom, Robot configuration, Accuracy and repeatability, Specification of a robot, Robot feedback controls: Point to point control and Continuous path control, Control system for robot joint, Adaptive control, Drives and transmission systems, End effectors, Industrial robot applications of robots

Learning Outcomes:

At the end of the unit, students will be able to:

- To know about Robots, classification, selection and specifications
- To understand the use of robotics in industrial applications
- To know about various feedback controls of Robot

- To understand how adaptive control strategies can be used in Robots

TEXT BOOKS:

1. Stamatios Manesis and George Nikolakopoulos, "Introduction to Industrial Automation", CRC Press, 2018.
2. Frank Lamb, "Industrial Automation", Hands on, McGraw Hill Education, 2013.

REFERENCES:

1. Richard L. Shell and Ernest L. Hall, "Hand Book of Industrial Automation", CRC Press, 2000.
- Through reading the text, references and discussion of cases students should be able to understand the fundamentals underlying the management of an Organization.
 - Understand where the plant is to be located based on facilities available and what are the important factors affecting the facilities location of a plant, and plant layout.
 - Determine work measurement techniques for time study.
 - Recognize the importance of Inventory control to ensure their availability with minimum capital lock up.
 - Understand the concepts of TQM, ISO, BIS etc.

Course Outcomes:

1. Understand the basic concepts of Industrial automation
2. Design and analysis of automation methods, placing and assembling of various parts
3. Design of various processing and control circuits using pneumatic and hydraulic elements
4. Selection of sensors based on the industrial application
5. Role of robotics in industrial applications

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B.Tech- V Sem

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(EE20AOE502) PROGRAMMABLE LOGIC CONTROLLERS

Course Objectives:

The student will be able to:

- Understand the basic functions and types of PLCs, Easy Veep software, its applications
- Understand Classification of PLCs and applications
- Design PLC Programming for various applications
- Analyze PLC Troubleshooting aspects

UNIT I INTRODUCTION TO PLCs

Introduction: Basic functions of PLCs, Mechanical relays versus PLC, Different types of PLC's – Allen-Bradley – Micrologix: ML1000, ML1100, SLC500, Compact Logix, Mitsubishi FX series, HMI's, Processor and I/O cards

UNIT II PLC COMPUTATIONAL TOOL

Introduction to Easy Veep software, Link between mechanical, electrical and programming documentation, Logic diagrams, Flip-Flop Logic, M8000, M8001 internal bits interpretation, Binary code, data table, manipulation and search engine in Mitsubishi environment Communication between PC and PLC, Communication between PC and HMI, PLC and HMI Serial Local network, Introduction to SLC500

UNIT III PLC DEVELOPMENT

PLC software and applications, Boolean algebra – understanding binary code, ADD and SUB functions, UP and Down Counters, Introduction to k1Y0, MOV function, CPR and ZCP functions, SHWT and SHRD instructions, Introduction to Absolutely Drum Instruction.

UNIT IV PLC PROGRAMMING

Programming instructions: Instructions and binary interpretation, Bit Instruction, Timers and counters, Comparison instructions, Programming Instructions - Math instructions, Move and Logical Instructions, Discussions of programming, communications for PLC-Robotic arm, Exercise of setup and monitoring.

UNIT V APPLICATIONS

Analog and Digital parameters by using SLC5/03-VFD-Panel Mate series 1700, Practical Troubleshooting, troubleshooting technique, Control system stability and tuning basics. Applications: Process to rewind, test, and integrate with extrusion process for wiring and fibre optic industries, Food industry – yeast, flour distribution and control. Process Medical equipment Industry – Gas analyzer, Leak tester (using CO₂), plastic wrapping machines etc.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Understand different types of PLCs, Its classification and the usage of Easy Veep software

CO2: Analyze the Computation tool.

CO3: Illustrate the Boolean logic & basic PLC

CO4: Design PLC Programming for various applications

CO5: Apply PLC programming concepts in different fields of Science and Technology

Reference Books:

1. Programmable Logic Controllers by R. Bliesener, F Ebel, Festo. Didactic publishers, 2002.
2. Programmable Logic Controllers by W. Bolton, 4th Edition, Newnes, 2006.
3. Introduction to PLCs by Jay F. Hooper, 2nd Edition, Carolina Academic Press, 2006.

Online Learning Resources:

1. <https://nptel.ac.in/courses/108105088>

SRI VENKATESWARA COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech V Sem

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(AM20A0E501) Introduction to Operating Systems

Course Objectives:

- Understand basic concepts and functions of operating systems.
- Understand the processes, threads and scheduling algorithms.
- Provide good insight on various memory management techniques.
- Expose the students with different techniques of handling deadlocks.
- Explore the concept of file-system and its implementation issues.
- Implement various schemes for achieving system protection and security.
- Familiarize with the basics of Windows and Linux operating systems.

UNIT I

Operating Systems Overview: Operating system functions, Operating system structure, operating systems Operations, protection and security, Kernel data Structures, Computing Environments, Open-Source Operating Systems.

Operating System Structure: Operating System Services, User and Operating-System Interface, system calls, Types of System Calls, system programs, operating system structure, operating system debugging, System Boot.

Processes: Process concept, process Scheduling, Operations on processes, Inter process Communication, Examples of IPC systems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify major components of operating systems and understand the types of computing environments.(L1)
- Explore several open source operating systems.(L2)
- Recognize operating system services to users, processes and other systems.(L2)
- Understand the importance, features of a process and methods of communication between processes.(L2)

UNIT II

Multithreaded Programming: Overview, Multi-core Programming, Multithreading Models, Thread Libraries, Implicit threading, Threading Issues, Examples.

CPU Scheduling: Basic concepts, Scheduling-Criteria, Scheduling Algorithms, Thread Scheduling, Multiple-Processor Scheduling, Real-Time CPU Scheduling, Algorithm Evaluation.

Inter-process Communication: Race conditions, Critical Regions, Mutual exclusion with busy waiting, Sleep and wakeup, Semaphores, Mutexes, Monitors, Message passing, Barriers, Classical IPC Problems - Dining philosopher's problem, Readers and writers problem.

Learning Outcomes:

At the end of this unit, the student will be able to

- Improving CPU utilization through multi programming and multithreaded programming. (L3)
- Examine several classical synchronization problems.(L2)
- Understand various process scheduling algorithms.(L2)
- Understand the importance, features of a process and methods of communication between processes.(L2)

UNIT III

Memory Management: Swapping, contiguous memory allocation, segmentation, paging, structure of the page table.

Virtual memory: demand paging, page-replacement, Allocation of frames, Thrashing, Memory-Mapped Files, Allocating Kernel Memory, Examples

Learning Outcomes:

At the end of this unit, the student will be able to

- Examine the various techniques of allocating memory to processes. (L2)
- Summarize how segmentation and paging works in contemporary computer systems. (L2)
- Understanding the benefits of virtual memory systems. (L2)

UNIT IV

Deadlocks: System Model, deadlock characterization, Ostrich algorithm, Methods of handling Deadlocks, Deadlock prevention, Detection and Avoidance, Recovery from deadlock.

File Systems: Files, Directories, File system implementation, management and optimization, Directory Implementation, Allocation Methods, Free-Space management.

Secondary-Storage Structure: Overview of disk structure, and attachment, Disk scheduling,

RAID structure, Stable storage implementation.

Learning Outcomes:

At the end of this unit, the student will be able to

- Investigate methods for preventing/avoiding deadlocks.(L3)
- Examine file systems and its interface in various operating systems.(L2)
- Analyze different disk scheduling algorithms.(L4)
- Understand the Stable-storage implementation and Free-Space management.(L2)

UNIT V

Protection: Goals of Protection, Principles of Protection, Domain of protection, Access Matrix, Implementation of Access Matrix, Access control, Revocation of Access Rights, Capability- Based systems, Language – Based Protection

Security: The Security problem, Program threats, System and Network threats, Cryptography as a security tool, User authentication, Implementing security defenses, Firewalling to protect systems and networks, Computer–security classifications.

Case Studies: Linux, Microsoft Windows.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify various schemes available for achieving system protection.(L2)
- Acquiring knowledge about various countermeasures to security attacks.(L2)
- Outline protection and security in Linux and Microsoft Windows. (L2)

Course Outcomes:

- Understand theOS design structures, its services and basics of a Process. (L2)

- Analyze various scheduling algorithms and examine concurrency mechanisms in Operating Systems. (L4)
- Apply memory management techniques in the design of operating systems. (L3)
- Compare and contrast various structures and organization of the file system and secondary storage structure. (L4)
- Apply different concepts of Protection and Security services in OS. (L3)

Text Books:

1. Operating System Concepts, Abraham Silberchatz, Peter B. Galvin, Greg Gagne, Ninth Edition, 2012, Wiley.
2. Modern Operating Systems, Andrew S Tanenbaum, Third Edition, Pearson Education, 2008

Reference Books:

1. Operating systems by A K Sharma, Universities Press.
2. Operating Systems: Internals and Design Principles, Stallings, Sixth Edition, 2009, Pearson Education.
3. Operating Systems, S. Haldar, A.A. Aravind, Pearson Education.
4. Operating Systems, A.S. Godbole, Second Edition, TMH.

Online Learning Resources:

- <https://nptel.ac.in/courses/106/106/106106144/>
<http://peterindia.net/OperatingSystems.html>

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B. Tech- V Sem

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(CS20AOE502) COMPUTER ARCHITECTURE & ORGANIZATION

(ECE)

Course Objectives:

- The purpose of the course is to introduce principles of computer organization and the basic architectural concepts.

UNIT I

Digital Computers: Introduction, Block diagram of Digital Computer, Definition of Computer Organization, Computer Design and Computer Architecture. Register Transfer Language and Micro operations: Register Transfer language, Register Transfer, Bus and memory transfers, Arithmetic Micro operations, logic micro operations, shift micro operations, Arithmetic logic shift unit. Basic Computer Organization and Design: Instruction codes, Computer Registers Computer instructions, Timing and Control, Instruction cycle, Memory Reference Instructions, Input – Output and Interrupt.

UNIT II

Micro programmed Control: Control memory, Address sequencing, micro program example, design of control unit.

Central Processing Unit: General Register Organization, Instruction Formats, Addressing modes, Data Transfer and Manipulation, Program Control.

UNIT III

Data Representation: Data types, Complements, Fixed Point Representation, Floating Point Representation.

Computer Arithmetic: Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating – point Arithmetic operations. Decimal Arithmetic unit, Decimal Arithmetic operations.

UNIT IV

Input-Output Organization: Input-Output Interface, Asynchronous data transfer, Modes of Transfer,

Priority Interrupt Direct memory Access.

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory,
Cache Memory.

UNIT V

Reduced Instruction Set Computer: CISC Characteristics, RISC Characteristics. Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processor. Multi Processors: Characteristics of Multiprocessors, Interconnection Structures, Interprocessor arbitration, Interprocessor communication and synchronization, Cache Coherence.

Course Outcomes:

CO1: Understand the basics of instructions sets and their impact on processor design.

CO2: Demonstrate an understanding of the design of the functional units of a digital computer system.

CO3: Evaluate cost performance and design trade-offs in designing and Constructing a computer processor including memory.

CO4: Design a pipeline for consistent execution of instructions with minimum hazards.

CO5: Recognize and manipulate representations of numbers stored in digital computers.

Textbook:

1. Computer System Architecture – M. Moris Mano, Third Edition, Pearson/PHI.

References:

1. Computer Organization – Car Hamacher, ZvonksVranesic, SafeaZaky, V th Edition, McGraw Hill.
2. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI.
3. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition, PHI/Pearson.

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B.Tech – V Sem

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(CH20AOE501) CHEMISTRY OF POLYMERS AND ITS APPLICATIONS

Course Objectives:

- To understand the basic principles of polymers
- To synthesize the different polymeric materials and their characterization by various instrumental methods.
- To impart knowledge to the students about fundamental concepts of Hydro gels of polymer networks, surface phenomenon by micelles
- To enumerate the applications of polymers in engineering

Unit – I : Polymers-Basics and Characterization

Basic concepts: monomers, repeat units, degree of polymerization, linear, branched and network polymers, classification of polymers, Polymerization: condensation, addition, radical chain, ionic and coordination and copolymerization. Average molecular weight concepts: number, weight and viscosity average molecular weights, polydispersity and molecular weight distribution Measurement of molecular weight: end group, viscosity, light scattering, osmotic and ultracentrifugation methods, analysis and testing of polymers.

Learning Outcomes:

At the end of this unit, the students will be able to

- Classify the polymers (L3)
- Explain polymerization mechanism (L2)
- Differentiate addition, condensation polymerizations (L2)
- Describe measurement of molecular weight of polymer (L2)

Unit – II : Synthetic Polymers

Addition and condensation polymerization processes - Bulk, Solution, Suspension and Emulsion polymerization. Preparation and significance, classification of polymers based on physical properties, Thermoplastics, Thermosetting plastics, Fibers and elastomers, General Applications.

Preparation of Polymers based on different types of monomers, Olefin polymers, Diene polymers, nylons, Urea - formaldehyde, phenol - formaldehyde and melamine Epoxy and Ion exchange resins. Characterization of polymers by IR, NMR, XRD.

Learning Outcomes:

At the end of this unit, the students will be able to

- Differentiate Bulk, solution, Suspension and emulsion polymerization (L2)
- Describe fibers and elastomers (L2)
- Identify the thermosetting and thermo polymers (L3)
- Characterize the properties of polymers by IR, NMR, XRD etc.,

Unit – III : Natural Polymers & Modified cellulotics

Natural Polymers: Chemical & Physical structure, properties, source, important chemical modifications, applications of polymers such as cellulose, lignin, starch, rosin, shellac, latexes, vegetable oils and gums, proteins.

Modified cellulotics: Cellulose esters and ethers such as Ethyl cellulose, CMC, HPMC, cellulose acetals, Liquid crystalline polymers; specialty plastics- PES, PAES, PEEK, PEAK.

Learning Outcomes:

At the end of this unit, the students will be able to

- Describe the properties and applications of polymers (L2)
- Interpret the properties of cellulose, lignin, starch, rosin, latex etc., (L2)
- Discuss the special plastics of PES, PAES, PEEK etc., (L3)
- Explain modified cellulotics (L2)

Unit-IV: Hydrogels of Polymer networks and Drug delivery

Definitions of Hydrogel, polymer networks, Types of polymer networks, Methods involved in hydrogel preparation, Classification, Properties of hydrogels, **Applications** of hydrogels in drug delivery.

Introduction to drug systems including, drug development, regulation, absorption and disposition, routes of administration and dosage forms. Advanced drug delivery systems and controlled release.

Learning Outcomes:

At the end of this unit, the students will be able to

- Identify types of polymer networks (L3)
- Describe methods involve in hydrogel preparation (L2)
- Explain applications of hydrogels in drug delivery (L2)
- Demonstrate the advanced drug delivery systems and controlled release (L2)

Unit – V : Surface phenomena

Surface tension, adsorption on solids, electrical phenomena at interfaces including electrokinetics, micelles, reverse micelles, solubilization. Application of photoelectron spectroscopy, ESCA and Auger spectroscopy to the study of surfaces.

Learning Outcomes:

At the end of this unit, the students will be able to

- Demonstrate electrical phenomena at interfaces including electrokinetics, micelles, reverse micelles etc., (L2)
- Explain photoelectron spectroscopy (L2)
- Discuss ESCA and Auger spectroscopy to the study of surfaces (L3)
- Differentiate micelles and reverse micelles (L2)

Course Outcomes

At the end of the course, the student will be able to:

- Understand the state of art synthesis of Polymeric materials
- Understand the hydro gels preparation, properties and applications in drug delivery system.
- Characterize polymers materials using IR, NMR, XRD.
- Analyze surface phenomenon for micelles and characterise using photoelectron spectroscopy, ESCA and Auger spectroscopy.

References :

1. A Text book of Polymer science, Billmeyer
2. Organic polymer Chemistry, K.J.Saunders, Chapman and Hall
3. Advanced Organic Chemistry, B.Miller, Prentice Hall
4. Polymer Chemistry - G.S.Mishra
5. Polymer Chemistry - Gowarikar
6. Physical Chemistry -Galston
7. Drug Delivery- Ashim K. Misra

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B.Tech- V Sem

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(EE20APE502) CONTROL SYSTEM ENGINEERING

Course Objectives:

To make the students learn about:

- The effect of feedback, the use of block diagram algebra and Mason's gain formula to find the overall transfer function
- Transient and steady state response and time domain specifications
- The concept of stability by Routh's stability criterion and Root loci
- Frequency domain specifications, Bode diagrams and Nyquist plots
- State space modeling of Control system and the concept of controllability and observability.

UNIT – I

CONTROL SYSTEMS CONCEPTS

Open loop and closed loop control systems and their differences- Classification of control systems, Feedback characteristics, Mathematical models – Differential equations of translational and rotational mechanical systems and electrical systems, Analogous Systems, Block diagram reduction methods – Signal flow graphs - Reduction using Mason's gain formula.

Principle of operation of DC and AC Servo motor, Transfer function of DC servo motor - AC servo motor, Synchros.

Learning Outcomes:

At the end of the unit, the student will be able to

- Write the differential equations for mechanical and electrical systems(L3)
- Obtain the transfer function from block diagrams, servo motors and signal flow graphs (L4)

UNIT-II

TIME RESPONSE ANALYSIS

Step Response - Impulse Response - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants, Basics of P, PI, PID Controllers.

Learning Outcomes:

At the end of the unit, the student will be able to

- Analyze the time domain specifications(L4)
- Calculate the steady state errors(L4)

- Understand about Proportional, Integral and Derivative controllers along with combinations(L2)

UNIT– III

STABILITY ANALYSIS IN TIME DOMAIN

The concept of stability – Routh’s stability criterion – Stability and conditional stability – limitations of Routh’s stability. The Root locus concept - construction of root loci-effects of adding poles and zeros to $G(s)H(s)$ on the root loci.

Learning Outcomes:

At the end of the unit, the student will be able to

- Analyze the concept of stability in time domain(L4)
- Apply the concept of Routh’s stability and Root locus in time domain (L5)

UNIT– IV

FREQUENCY RESPONSE ANALYSIS

Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Stability Analysis from Bode Plots. Polar Plots-Nyquist Plots- Phase margin and Gain margin-Stability Analysis. Basics of Compensation techniques – Lag, Lead, Lag-Lead Compensator in frequency Domain.

Learning Outcomes:

At the end of the unit, the student will be able to

- Evaluate the frequency domain specifications from Bode, Polar and Nyquist plots (L5)
- Design Compensators for various systems (L5)
- Deducing transfer functions from Bode Plots(L4)
- Understand difference between Phase and Gain margins (L2)

UNIT– V

STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS

Concepts of state, state variables and state model, state models - differential equations & Transfer function models - Block diagrams, Transfer function from state model, Solving the Time invariant state Equations- State Transition Matrix and it’s Properties, The concepts of controllability and observability.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the concept of state space, controllability and observability (L2)
- Obtain the transfer function from state space and vice versa (L4)
- Understand the state transition method of solving time invariant state equations (L2)

Text Books:

1. Katsuhiko Ogata, "Modern Control Engineering", 5th edition, Prentice Hall of India Pvt. Ltd., 2010.
2. J. Nagrath and M. Gopal, "Control Systems Engineering" 5th edition, New Age International (P) Limited Publishers, 2007.

Reference Books:

1. M. Gopal, "Control Systems Principles & Design" 4th Edition, McGraw Hill Education, 2012.
2. B. C. Kuo and FaridGolnaraghi, "Automatic Control Systems" 8th edition, John Wiley and sons, 2003.
3. Joseph J Distefano III, "Feedback and Control Systems", Allen R Stubberud& Ivan J Williams, 2nd Edition, Schaum's outlines, McGraw Hill Education, 2013.
4. Graham C. Goodwin, "Control System Design" Stefan F. Graebe and Mario E. Salgado, Pearson, 2000.
5. Gene F. Franklin, "Feedback Control of Dynamic Systems", J.D. Powell and Abbas Emami- Naeini, 6th Edition, Pearson, 2010.

Course Outcomes:

After completing the course, the student should be able to:

- CO-1:** Understand the concepts of control systems classification, feedback effect, mathematical modelling, and state space analysis. Apply the concepts of Block diagram reduction, Signal flow graph
- CO-2:** Analyse time response analysis, error constants, and stability characteristics of a given mathematical model using different methods.
- CO-3:** Apply the concepts of RH and Root locus for stability calculations
- CO-4:** Analyze system behavior of the system in frequency domain. frequency response characteristics, Design and develop different compensators. Bode, Nyquist, Polar plots for stability calculations
- CO-5:** Analyze system behavior based on the state space analysis of that system. controllability and observability

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B. Tech- V Sem

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(EC20APE501) MECHATRONICS

Course Objectives:

1. Learn about the operating principle of various sensors and its importance in real time measurement applications.
2. Acquire the knowledge to model Electrical system and Mechanical system building blocks.
3. Calculate the transfer function of both First-order and Second-order systems.
4. Learn about the interfacing procedure of Peripherals with Programmable Logic Controllers.
5. Study some of the recent Real-time Mechatronics system Design and Modelling solutions.

Unit I

Sensors and Transducers:

What is Mechatronics, Performance terminology, Microprocessor-based controllers, The Mechatronics approach, Performance terminology, Displacement, Position and Proximity, Velocity and Motion, Force, Fluid pressure, Liquid flow and level, Temperature and Light sensors, Selection of sensors and Inputting data by switches.

Unit II

Electrical Actuation Systems and System Models:

Electrical Systems, Mechanical switches, Solid-state switches, Solenoids, DC Motors, AC Motors and Stepper Motors, Mathematical models, Mechanical system building blocks, Electrical system building blocks, Fluid system building blocks and Thermal system building blocks.

Unit III

Dynamic Response and Transfer functions:

Modelling dynamic systems, First-order and Second-order systems, Performance measures for second-order systems, The transfer function, First-order and Second-order

systems, Systems in series, Systems with feedback loops and Effect of Pole location on transient response.

Unit IV

Programmable Logic Controllers:

Introduction, Basic structure, Input/output processing, Programming, Mnemonics, Timers, Internal relays and Counters, Shift registers, Master and Jump controls, Data Handling, Analogue input/output and Selection of PLC.

Unit V

Mechatronic Systems:

Traditional and Mechatronics designs, Possible Mechatronics design solutions and Case studies of Mechatronic Systems.

Text Books:

3. W.Bolton, "Mechatronics-Electronic Control systems in Mechanical and Electrical Engineering", Third Edition, Pearson Education Limited, 2018.
4. Nitaigour Premchand Mahalik, "Mechatronics Principles, Concepts and Applications", McGraw Hill Education, New Delhi, 2017.

References:

3. Davis G. Alciatore and Michael B. Histan, "Introduction to Mechatronics and Measurement systems", Second edition, McGraw Hill Education, New Delhi, 2019.
4. Devdas Shetty and Richard A. Kolk, "Mechatronics System Design", Second edition, Cengage learning India Pvt. Ltd., 2012.

Course Outcomes:

- CO1:** Decide the appropriate sensor for a given application of interest.
- CO2:** Develop a simulation model for simple physical systems and explain mechatronics design process.
- CO3:** Summarize the effects of Pole location on system transient response.
- CO4:** Interface Peripheral devices with Programmable Logic Controllers.
- CO5:** Analyze possible solutions in the design of Mechatronic systems.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B. Tech- V Sem

L	T	P	C
3	0	0	3

(EC20APE502) NANOELECTRONICS

Course Objectives:

1. To understand the evolution and basics of Nanoelectronics.
2. To understand various fabrication methods in nanotechnology (top down & bottom up).
3. To analyze and discuss various characterization methods in nanotechnology (optical, electrical, AFM, SEM, TEM, and nanoindentation).
4. To understand nano electronic systems and building blocks such as: low-dimensional semiconductors, hetero structures, carbon nano tubes, quantum dots, nano wires etc.
5. To familiarize students with the present research front in Nanoelectronics and to be able to critically assess future trends.

Unit I

Fundamentals of Nanoelectronics:

Moore's Law, Wave functions, wave packets, Schrodinger's wave equation, potential barriers and tunneling, Fermi-Dirac statistics, Density of states, Limitations of conventional FET in nanoscales, Quantum Well, Quantum wire, Quantum dot, current flow in two terminal Quantum dots, ballistic transport, Single Electron Transistor

Unit II

Introduction to methods of fabrication of Nano-Layers: Physical vapour deposition- evaporation & Sputtering, Chemical vapour deposition, Molecular Beam Epitaxy, Ion Implantation, Formation of Silicon Dioxide- dry and wet oxidation methods.

Fabrication of nanoparticles: grinding with iron balls, laser ablation, reduction methods, sol gel, self-assembly, precipitation of quantum dots.

Unit III

Introduction to characterization of nanostructures: Principle of operation of Scanning Tunneling Microscope, Atomic Force Microscope, Scanning Electron microscope - specimen interaction, X-Ray Diffraction analysis

Unit IV

Basic quantum structures: Quantum wells, quantum wires and quantum dots, Single electron devices charge quantization, energy quantization, Coulomb blockade, Coulomb staircase, Bloch oscillations.

Unit V

Nano electronic Devices: Carbon nanotubes based devices CNFET, characteristics; Spin-based devices spin FET, characteristics, Applications of MOSFET, CNFET and Spin FET devices.

Text Books:

1. George W Hanson, "Fundamentals of Nanoelectronics", Prentice Hall, 2008.
2. Karl Goser, "Nanoelectronics and Nano systems: From Transistors to Molecular and Quantum Devices", Springer, First edition, 2005.

References:

1. Rainer Waser (Ed), "Nanoelectronics and Information Technology", Second Edition, Wiley VCH, 2003.
2. Mary Eshaghian- Wilner, "Bio inspired and Nano Scale Integrated Computing", Wiley, 2009.

Course Outcomes:

- CO1:** Get an insight of quantum mechanical effects associated with low dimensional semiconductors.
- CO2:** Explain the different processes involved in the fabrication of nanoparticles and nanolayers.
- CO3:** Explain the different techniques for characterizing nanolayers and nanoparticles
- CO4:** Integrate and model the device with basic quantum structures.
- CO5:** Correlating device structures with type of materials, which are commonly used for fabrication, defend the tunneling devices with several parameters of hetero structures; compare characteristics study for the MOS/FET devices.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B. Tech- V Sem

L	T	P	C
3	0	0	1.5

(EC20APC504)DIGITAL COMMUNICATIONS LAB

Course Objectives:

1. To Develops skills for performance analysis of practical digital communication systems.
2. To understand the fundamental concepts on TDM, Pulse modulations& digital modulation techniques.
3. To evaluate the performance of PCM, DPCM and DM in a digital communication system.
4. To learns how to use MATLAB software and hardware effectively and creatively to synthesis digital communication systems.

LIST OF EXPERIMENTS

Minimum of Twelve experiments to be conducted

Part –A Hardware Experiment (All experiments)

1. Time Division Multiplexing
2. Pulse Code Modulation
3. Differential Pulse code Modulation
4. Delta Modulation
5. Frequency Shift Keying
6. Differential Phase Shift Keying
7. Verification of Sampling Theorem

Part –B Software Experiment (Any Seven experiments)

1. Sampling Theorem-Verification
2. Time Division Multiplexing
3. Delta Modulation
4. Pulse Code Modulation
5. Differential Pulse code Modulation
6. Amplitude Shift Keying
7. Frequency Shift Keying
8. Phase Shift Keying
9. Differential Phase shift Keying

10. QPSK Modulation and Demodulation

Course Outcomes:

- CO1:** Understand real time behavior of different digital modulation schemes and technically visualize spectra of different digital modulation schemes.
- CO2:** Design and implement different modulation and demodulation techniques.
- CO3:** Analyze digital modulation & demodulation techniques.
- CO4:** Simulate all digital modulation and demodulation techniques in MATLAB.

Equipment:

1. Regulated Power Supply (0-30) V .
2. CROs (0-20)MHz.
3. Function Generators (0-3)MHz
4. RF Signal Generators (0-1000)MHz
5. Multimeters.
6. Required Electronic components (active and passive) for the conduction of experiments from 1-7
7. Radio Receiver Demo kits or Trainers.
8. RF power meter frequency range (0 – 1000)MHz
9. Spectrum Analyzer

Software Required:

1. Computer Systems with latest specifications
2. Connected in LAN (Optional)
3. Operating system (Windows XP)
4. Simulations software (MATLAB).

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B. Tech- V Sem

L	T	P	C
3	0	0	1.5

(EC20APC505)MICROPROCESSORS AND MICROCONTROLLERS LAB

Course Objectives:

1. To study programming based on 8086 microprocessor and 8051 microcontrollers.
2. To study 8086 microprocessor based ALP using arithmetic, logical and shift operations.
3. To study modular and Dos/Bios programming using 8086 microprocessor.
4. To study to interface 8086 with I/O and other devices.
5. To study and interface 8051 micro controller with I/O and other devices.

Part- A

8086 Microprocessor Programs using MASM/TASM/8086 kit.

(Any Six Experiments)

1. Introduction to MASM/TASM Programming
2. Arithmetic operations.
3. Multiplication and Division.
4. Logical operations.
5. String operations and Instruction prefix: Move Block, Reverse string, Sorting, String comparison.
6. Code conversion.
7. Multi byte arithmetic operations.
8. DOS/BIOS Programming, reading keyboard -Display characters

Part-B

8086 Interfacing:

(Any Two Experiments)

9. 8259 – Interrupt Controller and its interfacing programs
10. 8255 – PPI and its interfacing programs (A /D, D/A,)
11. 8255 – PPI and its interfacing programs (stepper motor,)
12. 7-Segment Display.

Part-C:

Microcontroller 8051 Trainer kit:

(Any Four Experiments)

1. Addition and Subtraction– Signed and unsigned Arithmetic operation.
2. Multiplication and Division – Signed and unsigned Arithmetic operation.
3. Logic operations – Shift and rotate.
4. Sorting- Ascending and descending order.
5. Timer/Counter in 8051
6. Interrupt handling in 8051

Course Outcomes:

- CO1:** Demonstrate ability to handle arithmetic and Logical operations using assembly language programming in MASM/TASM.
- CO2:** Demonstrate ability to handle string instructions using assembly language programming in MASM/TASM.
- CO3:** Demonstrate ability to handle sorting operations and using assembly language programming in MASM/TASM.
- CO4:** Demonstrate ability to handle Arithmetic and Logical operations using 8051 trainer kits.
- CO5:** Demonstrate ability to handle sorting operations using 8051 trainer kits.
- CO6:** To interface the Microprocessor/Microcontroller with various peripherals for various applications.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B. Tech- V Sem

L	T	P	C
1	0	2	2

(EC20ASC501) PCB DESIGN AND PROTOTYPE DEVELOPMENT

Course Objectives:

- To know the various component and symbols in basic electronic circuit
- To understand the PCB in detail
- To analyze the PCB design using KICAD tools

UNIT I

Fundamental of basic electronics:

Fundamental of basic electronics: Component identification, Component symbols & their footprints, basic electronic circuits, understand schematic, Introduction PCB, Difference between PWB and PCB, Types of PCBs: Single Layer, Multi-Layer, Surface Mount, PCB Materials, Electronic Component packaging.

Learning Outcomes:

- Identification basic electronic circuit symbols and their footprints
- Understand the different types of PCB

UNIT II

Making Printed Circuit Boards: Layout Design, Copper Clad Preparation, Etching the PCB, drilling and soldering the PCB, Introduction to Electronic Design Automation (EDA): History of EDA, Different EDA Tools, Creating new PCB, Browsing footprints libraries, sets up the PCB layers, Design rule checking, Track width selection, Component selection, Routing and completion of the design. Design Issues: Transmission line, Cross talk and Thermal management.

Learning Outcomes:

- Understand the EDA Tools
- Analyze Design Issues: Transmission line, Cross talk and Thermal management.

UNIT III

Introduction to Development Tools: Introduction to PCB Design using KiCad tools.

PCB Design Process: PCB Design Flow, Placement and routing, Steps involved in layout design, General design factors for digital and analogue circuits, Layout and Artwork making for Single-side, double-side and Multilayer Boards, Design for manufacturability, Design-specification standards.

Learning Outcomes:

- Implement digital and analog circuits using PCB design
- Understand the Artwork making of Single-side, double-side and Multilayer Boards

Practice Exercises: Any Ten experiments are to be done (13th Experiment is Mandatory)

1. Practice following PCB Design steps

- Schematic Design: Familiarization of the Schematic Editor, Schematic creation, Annotation, and Netlist generation.
- Layout Design: Familiarization of Footprint Editor, Mapping of components, Creation of PCB layout Schematic.
- Create new schematic components.
- Create new component footprints.

2. Regulator circuit using 7805.

3. Inverting amplifier using op-amp.

4. Full-wave rectifier .

5. Astable multivibrator using IC555.

6. RC phase shift oscillator using BJT.

7. Full adder circuit.

8. RS flip flop with logic circuit.

9. Four-bit comparator.

10. LED Flashing / Blinking Circuit using 555 Timer IC.

11. Automatic street light controller using LDR & Transistor.

12. Two way traffic light controller using 555 timers.

13. Fabricate a Single sided PCB, Mount the components and assemble them in a cabinet for anyone of the circuits mentioned in the above listed.

References:

1. Jon Varteresian, Fabricating Printed Circuit Boards, Newnes, 2002
2. R. Tummala, Fundamentals of Microsystems Packaging, McGraw-Hill 2001

3. C. Robertson. PCB Designer's Reference. Prentice Hall, 2003
4. Open-source EDA Tool KiCad Tutorial: <http://kicad-pcb.org/help/tutorials>
<http://www.wikihow.com/Create-Printed-Circuit-Boards>
http://www.siongboon.com/projects/2005-09-07_home_pcb_fabrication/
http://reprap.org/wiki/MakePCBInstructions#Making_PCBs_yourself
5. Open-source EDA Tool Eagle Tutorial: https://en.freedownloadmanager.org/users-choice/Eagle_Pcb_Design_For_32bit_Windows_7.html
6. Open-source EDA Tool proteus Tutorial: <https://softfamous.com/proteus>

Course Outcomes:

- CO1:** Learn how to design schematic and layout using PCB.
- CO2:** Design and implement experiments using PCB.
- CO3:** Test and analyze the working of PCB.
- CO4:** Identify different components required in PCB Design.
- CO5:** Aware of PCB Making Process.
- CO6:** Able to design different circuits using design tools.

Software Required:

1. Computer Systems with latest specifications
2. Connected in LAN
3. Operating system (Windows10)
4. Simulations software (Eagle, kicad).

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B. Tech – V Sem

L	T	P	C
2	0	0	0

(BA20AMC501) CONSTITUTION OF INDIA

Course Objectives:

- To enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and Election Commission of India.
- To understand the central-state relation in financial and administrative control

UNIT-I

Introduction to Indian Constitution – Constitution -Meaning of the term - Indian Constitution- Sources and constitutional history - Features- Citizenship – Preamble - Fundamental Rights and Duties-Directive Principles of State Policy.

Learning Outcomes:-

After completion of this unit student will

- Understand the concept of Indian constitution
- Apply the knowledge on directive principle of state policy
- Analyze the History and features of Indian constitution
- Learn about Preamble, Fundamental Rights and Duties

UNIT-II

Union Government and its Administration Structure of the Indian Union-Federalism -Centre-State relationship-President's Role, power and position-PM and Council of ministers - Cabinet and Central Secretariat-Lok Sabha-Rajya Sabha - The Supreme Court and High Court-Powers

Learning Outcomes:-

After completion of this unit student will

- Understand the structure of Indian government
- Differentiate between the state and central government
- Explain the role of President and Prime Minister
- Know the Structure of Supreme Court and High court

UNIT-III

State Government and its Administration - Governor - Role and Position -CM and Council of ministers –State Secretariat-Organization Structure and Functions

Learning Outcomes:-

After completion of this unit student will

- Understand the structure of state government
- Analyze the role of Governor and Chief Minister
- Explain the role of State Secretariat
- Differentiate between structure and functions of state secretariat

UNIT-IV

Local Administration-District's Administration Head-Role and Importance-Municipalities - Mayor and role of Elected Representatives -CEO of Municipal Corporation Pachayati Raj - Functions- PRI -Zilla Parishath - Elected officials and their roles - CEO, Zilla Parishath -Block level Organizational Hierarchy-(Different departments)-Village level -Role of Elected and Appointed officials-Importance of grass root democracy

Learning Outcomes:-

After completion of this unit student will

- Understand the local Administration
- Compare and contrast district administration's role and importance
- Analyze the role of Mayor and elected representatives of Municipalities
- Learn about the role of Zilla Parishath block level organization

UNIT-V

Election Commission-Election Commission-Role of Chief Election Commissioner and Election Commissionerate -State Election Commission -Functions of Commissions for the welfare of SC/ST/OBC and Women

Learning Outcomes:-

After completion of this unit student will

- Know the role of Election Commission
- Contrast and compare the role of Chief Election commissioner and Commissionerate
- Analyze the role of state election commission
- Evaluate various commissions viz SC/ST/OBC and women

Course Outcomes:-

- At the end of the course, students will be able to

- Understand historical background of the constitution making and its importance for
- Building a democratic India.
- Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
- Understand the value of the fundamental rights and duties for becoming good citizen of India.
- Analyze the decentralization of power between central, state and local self-government
- Apply the knowledge in strengthening of the constitutional institutions like CAG,
- Election Commission and UPSC for sustaining democracy.

Textbooks:

- J.A. Siwach, "Dynamics of Indian Government & Politics".
- H.M. Sreevai, "Constitutional Law of India", 4th edition in 3 volumes (Universal Law Publication)
- J.C. Johari, "Indian Government and Politics", Hans India
- M.V. Pylee, "Indian Constitution", Durga Das Basu, Human Rights in Constitutional Law, Prentice-Hall of India Pvt. Ltd. New Delhi

References:

- J.A. Siwach, "Dynamics of Indian Government & Politics".
- H.M. Sreevai, "Constitutional Law of India", 4th edition in 3 volumes (Universal Law Publication)
- J.C. Johari, "Indian Government and Politics", Hans India
- M.V. Pylee, "Indian Constitution", Durga Das Basu, Human Rights in Constitutional Law, Prentice-Hall of India Pvt. Ltd. New Delhi

E-RESOURCES:

- nptel.ac.in/courses/109104074/8
- nptel.ac.in/courses/109104045/
- nptel.ac.in/courses/101104065/
- www.hss.iitb.ac.in/en/lecture-details
www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech-V Sem

L	T	P	C
2	0	0	0

(IT20AMC501) PROBLEM SOLVING AND PROGRAMMING

(Lateral Entry Students Only)

Course Objectives:

- To learn how to solve a given problem.
- To illustrate the basic concepts of C programming language.
- To discuss the concepts of Functions, Arrays, Pointers and Structures.
- To familiar with Dynamic memory allocation concepts.
- To apply concepts of structures and files to solve real word problems.

UNIT-1:

Introduction to Problem Solving: Problem Solving Aspect, Problem Identification, Problem Understanding, Algorithm Development, Solution Planning, Flowcharts, flowgorithm.

Overview of C: History Of C, C Language Elements, Basic Structure of C Program, C Tokens-Variables and Data Types, Operators, Expressions and Type Conversions.

Learning Outcomes:

The students will be able to

- Develop solution through problem understanding and decomposition (L6).
- Develop basic flowcharts for performing input and output and computations(L3).
- Solve Numerical Problems using Flowgorithm (L3).
- Use C basic concepts to write simple C programs (L3).

UNIT-2:

Control Statements: Selection Statements- if and switch statements.

Iterative Statements: for, while and do-while statements.

Jump Statements: break and continue statements.

Learning Outcomes:

The students will be able to

- Implement C program using Conditional statements (L2).
- Implement C program using Iterative statements (L2).

UNIT-3:

Arrays: Declaration, accessing array elements, Storing values, Operations on arrays, Multi-dimensional arrays.

Functions: Introduction, Using Functions, Function declaration, Function definition and Function call, Parameter passing, Passing arrays to functions, Recursion, Storage classes.

Learning Outcomes: The students will be able to

- Writing Structured programs using Functions (L5).
- Apply arrays concepts on real time applications (L6).

UNIT-4:

Pointers: Declaration and Initialization of pointer variables, Pointer arithmetic, Pointers and arrays, Pointer to pointer, Array of pointers, Pointers and functions, Dynamic Memory Allocation.

Strings: Introduction to Strings, String handling functions, Preprocessor Directives.

Learning Outcomes: The students will be able to

- Use pointers to write c Programs (L3).
- Understand the concepts of preprocessors (L2).
- Apply Dynamic Memory Allocation concepts on real time applications (L6).

UNIT-5:

Structures: Introduction, Nested Structures, Array of Structures, Structures and Functions, Unions.

Files in C: Using Files in C, Read data from Files, Writing data to Files, Randomaccess to files, Command-line Arguments

Learning Outcomes:

The students will be able to

- Use the concepts of Structures and Unions to write C programs (L3).
- Apply various operations on Files (L6).

Text Books:

1. Reema Thareja, Programming in C, Oxford University Press, AICTE Edition, 2018.
2. R.G. Dromey, "How to Solve it by Computer". 2014, Pearson.

Reference Books:

1. Jeri R. Hanly, Elliot B. Koffman, Problem Solving and Program Design in C, 5/e, Pearson
2. B. A. Forouzan and R. F. Gilberg, Computer Science: A Structured Programming Approach Using C, 3/e, Cengage Learning, 2007.
3. Brian W Kernighan and Dennis M Ritchie, The C Programming Language, Second Edition, Prentice Hall Publication.
4. Paul Deitel, Harvey Deitel -C How to Program with an introduction to C++, Eighth Edition

Course Outcomes:

At the end of the course, the students will be able to:

- Solve computational problems (L3).
- Select the features of C language appropriate for solving a problem (L4)
- Design computer programs for real world problems (L6)
- Organize the data which is more appropriated for solving a problem (L6).

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B. Tech- VI Sem

L	T	P	C
3	0	0	3

(EC20APC601)DIGITAL SIGNAL PROCESSING

Course Objectives:

1. To summarize and analyze the concepts of signals, systems in time and frequency domain.
2. To learn properties of DFT and its application to linear filtering.
3. To understand the designs of IIR and FIR filters.
4. To outline need of Multi-rate DSP.
5. To introduce the concepts of DSP architecture and its applications.

UNIT- I

Frequency analysis of Signals and Systems:

Review of Discrete time signals and systems, Discrete Fourier transform, Relationship of the DFT to other transforms, Properties of DFT, Linear filtering based on the DFT- Filtering of long data sequences - overlap save and overlap add method.

Fast Fourier Transform (FFT): Efficient computation of DFT - Radix-2 - Decimation-in-time (DIT), Decimation-in-frequency (DIF) algorithms, Inverse FFT.

UNIT- II

Infinite Impulse Response Filters:

Design of IIR filters from Analog filters –Approximation of derivatives, Impulse invariance method, and bilinear transformation. Frequency transformation in the analog domain, Illustrative Problems.

Realization of IIR Filter: Structures for IIR system- Direct-Form-I, Direct-Form-II, Transposed form, Cascade-Form, and Parallel-Form Structures.

UNIT- III

Finite Impulse Response Filters:

Design of linear phase FIR filters using Fourier series method - FIR filter design using windows (Rectangular, Hamming and Hanning window), Frequency sampling method, Illustrative Problems.

Realization of FIR Filter: Structures for FIR system-Direct-Form, Cascade-Form and Linear Phase Structure.

Unit -IV

Multi-rate Digital Signal Processing:

Introduction, Decimation, and interpolation, sampling rate conversion by a rational factor, Implementation of sampling rate conversion, Multi-stage implementation of

sampling rate conversion, sampling rate conversion of band-pass signals, Applications of multi-rate signal processing.

UNIT- V

Architectures for Programmable DSP Devices:

Basic Architectural features, DSP computation Building Blocks, Bus Architectures and Memory, Data Addressing Capabilities, Address Generation Unit, Programmability and Program Execution, Speed Issues.

Text Books:

1. John G. Proakis & Dimitris G. Manolakis, Digital Signal Processing – Principles, Algorithms & Applications, 4th Edition, Pearson Education / Prentice Hall, 2007.
2. A.V. Oppenheim, R.W. Schaffer and J.R. Buck, Discrete-Time Signal Processing, 8th Indian Reprint, Pearson, 2004.

References:

1. Emmanuel C. Ifeakor & Barrie. W. Jervis, Digital Signal Processing, 2nd Edition, Pearson Education / Prentice Hall, 2002.
2. P. Ramesh Babu, Digital Signal Processing, SCITECH, 7th Edition, 2019.
3. Sanjit K. Mitra, Digital Signal Processing – A Computer Based Approach, Tata Mc Graw Hill, 2007.

Course Outcomes:

- CO1:** Analyze DFT computation using fast algorithms.
- CO2:** Design & Implementation of IIR filters using different techniques.
- CO3:** Design of FIR filters based on windowing methods.
- CO4:** Analyse multi-rate signal processing techniques.
- CO5:** Understanding the architecture details and instruction sets of fixed and Floating point DSP's.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B. Tech- VI Sem

L	T	P	C
3	0	0	3

(EC20APC602) MICROWAVE ENGINEERING AND OPTICAL COMMUNICATIONS

Course Objectives:

1. To develop the knowledge on transmission lines for microwaves, cavity resonators and waveguide components and applications.
2. To understand the scattering matrix parameters and its use.
3. To differentiate Linear beam tubes and crossed field tubes in terms of operation and performance.
4. To remember various types of fibers, modes, configurations and signal degradations.
5. To analyze signal degradation in optical fibers and compare the performance of various optical sources and detectors.

Unit I

Introduction: Introduction to Microwaves, Microwave spectrum and bands, applications of Microwaves.

Rectangular Waveguides- Solution of Wave Equation in Rectangular Coordinates, TE/TM mode analysis, Expressions for fields, Characteristic equation and cutoff frequencies, filter characteristics, dominant and degenerate modes.

Circular Waveguides- Introduction, Expression for cut off frequencies

Learning Outcomes:

- Know the importance of waveguides (L1).
- Derive field expressions for different modes of propagation in the waveguides(L3).

Unit II

WAVEGUIDE COMPONENTS AND APPLICATIONS: Introduction to scattering parameters and their properties, Terminations, Attenuators, Phase shifters, Hybrid Tees (H-plane, E-plane, Magic Tees), Hybrid ring, Directional Couplers – Bethe hole and Two hole Couplers, Microwave propagation in Ferrites, Microwave devices employing Faraday rotation – Isolator, Circulator, Deriving Scattering matrix for Microwave passive devices.

Learning Outcomes:

- Understand principle of operation of all passive microwave devices (L1).
- Know the importance of Scattering parameters and their properties (L1)

Unit III**MICROWAVE TUBES**

Linear Beam Tubes – Two cavity Klystron amplifier -velocity modulation, bunching process, output power, Reflex Klystron oscillator, power output and efficiency, Travelling Wave Tube (TWT) – Bunching process and amplification process.

Crossed Field Tubes – Magnetron oscillator, pi-mode operation, power output and efficiency, Hartree Condition, Mode jumping in Magnetron, Principle of operation of Cross Field Amplifier (CFA).

Learning Outcomes:

- Understand principle of operation of Microwave Tubes and semiconductor devices (L1).
- Derive the expressions power output and efficiency of all microwave devices (L3).

Unit IV**OPTICAL COMMUNICATIONS:**

Overview of Optical Fiber Communications, optical fibers – Structures, Optical fiber modes and configurations, Signal degradation in optical fibers – Signal attenuation, absorption, scattering losses, Bending Losses, Core and Cladding losses, Signal distortion in optical waveguides, Information capacity determination, Group delay, waveguide dispersion, Inter modal dispersion.

Learning Outcomes:

- Remember the optical fiber types, modes, configurations, and signal degradation types (L1).
- Analyze the signal degradation in optical fibers (L4).

Unit V

OPTICAL SOURCES AND DETECTORS: Introduction, LEDs – structure – Light source, Quantum efficiency, Modulation of an LED, LASER diodes, Source to Fiber power launching, LASER diode to fiber coupling, LED coupling to single mode fibers, Fiber, Splicing, Optical Fiber connectors, Photo diodes – Principle of Photo diodes, Avalanche Photodiodes, Photo detector noise, detector response time, Comparison of Photo diodes.

Learning Outcomes:

- Understand the working principle of optical sources, detectors and power coupling (L2)
- Compare the performance of various optical source and detectors (L4)

Text Books:

1. Samuel Y. Liao, "Microwave Devices and Circuits", PHI publications, Third Edition, 1997. (For Units 1,2 and 3)
2. Gerd Keiser, "Optical Fiber Communications", McGraw Hill, Third Edition, 2000. (For Units 4, and 5)

References:

1. Om. P. Gandhi, "Microwave: Engineering and Applications", Kai Fa Book Company, 1981.
2. R. E. Collin, "Foundations for Microwave Engineering", Wiley Student Edition, Second Edition, 2009.
3. F E Terman, "Electronic and Radio Engineering", McGraw Hill, 4th Edition, 1984.

Course Outcomes:

- CO1:**Analyze micro-wave circuits incorporating hollow, dielectric and planar waveguides, transmission lines, filters and other passive components, active devices.
- CO2:** Understand microwave transmission lines and how to Use microwave components such as isolators, Couplers, Circulators, Tees, Gyrators etc.
- CO3:** Differentiate Linear beam tubes and crossed field tubes in terms of operation and performance.
- CO4:** Understand various types of fibers, modes, configurations and signal degradations.
- CO5:** Analyze signal degradation in optical fibers and compare the performance of various optical sources and detectors.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B. Tech- VI Sem

L	T	P	C
3	0	0	3

(EC20APC603) VLSI DESIGN

Course Objectives:

6. Learn about the various processing steps involved in the fabrication of a nMOS, pMOS and CMOS transistors.
7. Learn about the various Design rules and Layout of MOS transistors.
8. Enable the students to learn about the Scaling Models and Scaling factors of MOS transistors.
9. Study the various examples of structured design.
10. Learn about the Testing concepts in VLSI Chip design.

Unit I

Review of Microelectronics and Introduction to MOS technology:

The IC era, Basic MOS transistors- Enhancement mode and Depletion mode transistor action, nMOS fabrication, CMOS fabrication-P-Well, N-Well and Twin-tub process, Thermal Aspects of processing and Bi-CMOS. Drain-to-Source current versus Voltage V_{DS} relationships, MOS transconductance, output conductance and Figure of Merit.

Unit II

MOS and Bi-CMOS circuits and Design process:

The Pass transistor, nMOS inverter, Pull-up to Pull-down ratio of different cases, CMOS inverter and Latch-up in CMOS circuits. MOS layers, Stick diagrams-nMOS and CMOS design styles, Design rules and Layout- Lambda-based design rules, Contact cuts, Double Metal MOS process rules and CMOS Lambda-based design rules, 2 μ m Double Metal, Double Poly. CMOS/BiCMOS rules and Layout diagrams.

Unit III

Circuit Concepts and Scaling of MOS circuits:

Sheet resistance concept, Area Capacitance of layers and calculations, The Delay unit, Inverter delay, Driving large capacitance loads, Propagation delays and Wiring capacitances, Scaling Models and Scaling factors, Scaling factors for various device parameters and its summary.

Unit IV

Subsystem Design and Layout:

Architectural issues, Switch logic, Gate restoring logic-The inverter, Two-input nMOS, CMOS and BiCMOS NAND and NOR gates, Other forms of CMOS logic, Examples of Structured design- Parity generator, Multiplexers, Four-Line Gray code to Binary code converter, Clocked Sequential circuits-Two-phase clocking and Charge storage, System considerations- Bipolar drivers for Bus lines, Basic arrangements for Bus lines and Precharged bus concept.

Unit V

Test and Testability:

System partitioning, Layout and Testability, Reset/Initialization, Design for Testability, Testing Combinational Logic and Sequential Logic, Practical Design for Test guidelines, Scan Design Techniques and Built-In-Self-Test (BIST).

Text Books:

- 1 K.Eshraghian, D.A. Pucknell and S.Eshraghian, "Essentials of VLSI Circuits and Systems", Third Edition, PHI Learning Pvt. Ltd., 2019.
- 2 W.Wolf "Modern VLSI Design IP based design" Fourth edition, PHI Learning Pvt. Ltd., 2020.

References:

- 1 Mead, C.A and Conway, L.A., "Introduction to VLSI Systems", Addison -Wesley, USA, 1980.
2. Neil H. E. Weste & D.M.Harris, "CMOS VLSI Design-A Circuits and Systems Perspective", Fourth edition, Pearson Edition, 2020.

Course Outcomes:

- CO1:** Outline the processing steps in the fabrication of a nMOS, pMOS and CMOS structure.
- CO2:** Illustrate the Layout procedure of simple MOS circuit using Lambda based design rules.
- CO3:** Summarize the scaling effects of various key parameters of MOSFET devices.
- CO4:** Design various MOS based logic circuits.
- CO5:** Develop algorithms for automatic test generation for combinational and sequential circuits.

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B. Tech- VI Sem

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(EC20APE601) ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

Course Objectives:

1. To understand various measurement metrics for performance analysis and basic principles of various measurements like voltage, current, Resistance.
2. To familiarize the characteristics, operations, calibrations and applications of the different oscilloscopes.
3. To explain principles of operation and working of different electronic instruments like signal generators, wave analyzers etc.
4. Understand the basic principle of various DC/AC bridges for the measurement of unknown passive elements like R, L and C.
5. To provide exposure to working principles of different sensors and transducers.

UNIT-I

Performance characteristics of Instruments: Static characteristics, Accuracy, Precision, Resolution, Sensitivity, static and dynamic calibration, Errors in Measurement, and their statistical analysis, dynamic characteristics-speed of Response, fidelity, Lag and dynamic error. DC ammeters, DC voltmeters-multirange, range extension/solid state and differential voltmeters, AC voltmeters –multirange, range extension. Thermocouple type RF ammeter, ohm meters, series type, shunt type, multimeter for voltage, current and resistance measurements.

Learning Outcomes:

At the end of this unit, the student will be able to

- Define different terms used for characterizing the performance of an instrument/measurement system (L1).
- Understand the principle of operation of various meters (L1).

UNIT-II

Oscilloscopes: Standard specifications of CRO,CRT features, vertical and horizontal amplifiers, horizontal and vertical deflection systems, sweep trigger pulse, delay line, sync selector circuits, probes for CRO – active, passive, and attenuator type, dual trace/beam CRO, Principles of sampling oscilloscope, storage oscilloscope, and digital storage oscilloscope, Digital frequency counters, time & Period measurements.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basic blocks of analog and digital CROs (L1)
- Measure amplitude and frequency utilizing oscilloscopes (L2)

UNIT-III

Signal generators & Analyzers: Specifications & principles of working (Block diagram approach) Signal generators-fixed and variable, AF oscillators, function generators, pulse, random noise, sweep, and Wave analyzers, Harmonic distortion analyzers, Spectrum analyzers.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basic principle of various signal generators and analyzers (L1).
- Describe characteristics of signal generators and analyzers (L2).

UNIT-IV

Review of DC Bridges: Wheatstone bridge, Kelvin Bridge, errors and precautions in using bridges.

AC bridges: Measurement of inductance-Maxwell's bridge, Anderson Bridge. Measurement of capacitance- Schering Bridge. Measurement of frequency- Wein Bridge, Q-meter.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand principles of measurements associated with different DC/AC bridges(L2)
- Ability to derive balance condition of various bridges to find unknown values (L2)

UNIT-V

Sensors and Transducers - Active and passive transducers: Measurement of displacement (Resistance, capacitance, inductance; LVDT) Force (strain gauges) Pressure (piezoelectric transducers) Temperature (resistance thermometers, thermocouples, and thermistors), Velocity, Acceleration.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain basic principle of the different types of sensors and Transducers (L2)
- Select the appropriate sensor/transducer for the measurement of physical parameters (L5)

TEXT BOOKS:

1. A.D. Helfrick and W.D. Cooper, "Modern Electronic Instrumentation and Measurement Techniques", PHI, 5th Edition, 2002.
2. H.S.Kalsi, "Electronic instrumentation", second edition, Tata McGraw Hill, 2004.

REFERENCES:

1. Robert A. Witte, "Electronic Test Instruments, Analog and Digital Measurements", Pearson Education, 2nd Ed., 2004.
2. David A. Bell, "Electronic Instrumentation & Measurements", PHI, 2nd Edition, 2003.
3. K. Lal Kishore, "Electronic Measurements & Instrumentations", Pearson Education, 2009.

Course Outcomes:

- CO 1:** Describe the basic principles involved in the meters for measuring voltage, current, resistance and frequency (L2).
- CO 2:** Analyze CRO for measuring signal characteristics (L4)
- CO3:** Analyze different waveforms using advanced instruments such as signal generators, logic analyzer & Spectrum analyzer (L4)
- CO4:** Apply the principles of various DC/AC bridges to solve various measurement parameters (L3)
- CO5:** Analyze various parameters using sensors and transducers (L4)

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(EC20APE602) INFORMATION THEORY AND CODING

Course Objectives:

1. To teach basic parameters of Information, concepts of source coding techniques, and error control coding techniques.
2. To transmit knowledge on Information theory and error control coding techniques for solving problems.
3. To Introduce various source coding and channel coding techniques for error detection and error correction in the information-bearing signals.
4. To dissimilate block to variable length coding and variable to block length coding techniques for merits and demerits.
5. To describe various systems for linear block codes and convolutional codes.

Unit I

Information Theory:

Introduction, Definition of Entropy, Conditional Entropy, Relative Entropy, Basic Properties of Entropy, Mutual Information, Information Inequalities, Kraft Inequality, optimal codes, bounds on optimal Code length, Shanon-Fano Coding, Huffman Coding, Related Problems.

Unit II

Asymptotic Equipartition Property: Introduction, Block to Block Coding of DMS: Consequences of Asymptotic Equipartition Property, Problem-solving.

Universal Source Coding: Lempel-Ziv Algorithm, LZ -77 Encoding, and Decoding, Lempel- Ziv Welch (LZW) Algorithm, LZW Encoding, and Decoding.

Unit III

Error Control Coding:

Introduction to Error Control Codes, Error Probability with Repetition in the Binary Symmetric Channel, Parity Check Bit Coding for Error Detection, Block Coding for Error Detection and Correction, The Hamming Distance,

Unit IV

Linear Block Codes:

Introduction to Linear Block Codes, Syndrome and Error Detection, Encoding Block Codes, Decoding of Block Codes, Single Parity Check bit Code, Repeated Codes, Hadamard Code, Hamming Code, Cyclic Codes, Generator and Parity-Check Matrices of Cyclic Codes, Encoding and Decoding of Cyclic Codes, BCH codes.

Unit V

Convolutional Coding:

Convolutional Coding, Code Generation, Decoding Convolutional Code, the Code Tree, Decoding in the presence of Noise, State and Trellis Diagrams, The Viterbi Algorithm.

Textbooks:

1. Thomas M.Cover, Joy A. Thomas, Elements of Information Theory, John Wiley & Sons, 2nd Edition, 2006.
2. Shu Lin, Daniel J. Costello Jr., Error Control Coding, Pearson, Second Edition, 2013.

References:

1. Herbert Taub, Donald L Shilling, Goutam Saha, Principles of Communication Systems, 4th Edition, McGraw Hill, 2017.
2. Simon Haykin, Communication Systems, John Wiley, 4th Edition, 2010.

Course Outcomes:

- CO1:** Describe basic parameters of Information, the concepts of source coding techniques, and Error Control coding techniques.
- CO2:** Apply knowledge of Information theory and error control coding techniques to solve problems.
- CO3:** Analyze various source coding and channel coding techniques for error detection and error correction in the information-bearing signals.
- CO4:** Compare various block to variable length coding and variable to block length coding techniques for merits and demerits.
- CO5:** Design various systems for linear block codes and convolutional codes

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B. Tech- VI Sem

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(EC20APE603)INTRODUCTION TO DIGITAL SIGNAL PROCESSING (EEE)

Course Objectives:

1. To summarize and analyze the concepts of signals, systems in time and frequency domain.
2. To learn properties of DFT and its application to linear filtering.
3. To understand the designs of FIR filters.
4. To understand the design of IIR filters.
5. To outline need of Multi-rate DSP.

UNIT- I

Frequency analysis of Signals and Systems:

Review of Discrete time signals and systems, Discrete Fourier transform, Relationship of the DFT to other transforms, Properties of DFT, Linear filtering based on the DFT- Filtering of long data sequences - overlap save and overlap add method.

Fast Fourier Transform (FFT): Efficient computation of DFT - Radix-2 - Decimation-in-time (DIT), Decimation-in-frequency (DIF) algorithms, Inverse FFT.

UNIT- II

Infinite Impulse Response Filters:

Design of IIR filters from Analog filters –Approximation of derivatives, Impulse invariance method, and bilinear transformation. Frequency transformation in the analog domain, Illustrative Problems.

Realization of IIR Filter: Structures for IIR system- Direct-Form-I, Direct-Form-II, Transposed form, Cascade-Form, and Parallel-Form Structures.

UNIT- III

Finite Impulse Response Filters:

Design of linear phase FIR filters using Fourier series method - FIR filter design using windows (Rectangular, Hamming and Hanning window), Frequency sampling method, Illustrative Problems.

Realization of FIR Filter: Structures for FIR system-Direct-Form, Cascade-Form and Linear Phase Structure.

Unit -IV

Multi-rate Digital Signal Processing:

Introduction, Decimation, and interpolation, sampling rate conversion by a rational factor, Implementation of sampling rate conversion, Multi-stage implementation of sampling rate conversion, sampling rate conversion of band-pass signals, Applications of multi-rate signal processing.

UNIT- V

Architectures for Programmable DSP Devices:

Basic Architectural features, DSP computation Building Blocks, Bus Architectures and Memory, Data Addressing Capabilities, Address Generation Unit, Programmability and Program Execution, Speed Issues.

Text Books:

1. John G. Proakis & Dimitris G. Manolakis, Digital Signal Processing – Principles, Algorithms & Applications, 4th Edition, Pearson Education / Prentice Hall, 2007.
2. A.V. Oppenheim, R.W. Schaffer and J.R. Buck, Discrete-Time Signal Processing, 8th Indian Reprint, Pearson, 2004.

References:

1. Emmanuel C. Ifeachor & Barrie. W. Jervis, Digital Signal Processing, 2nd Edition, Pearson Education / Prentice Hall, 2002.
2. P. Ramesh Babu, Digital Signal Processing, SCITECH, 7th Edition, 2019.
3. Sanjit K. Mitra, Digital Signal Processing – A Computer Based Approach, Tata McGraw Hill, 2007.

Course Outcomes:

- CO1:** Analyze DFT computation using fast algorithms.
- CO2:** Design & Implementation of IIR filters using different techniques.
- CO3:** Design of FIR filters based on windowing methods.
- CO4:** Analyse multi-rate signal processing techniques.
- CO5:** Understanding the architecture details and instruction sets of fixed and Floating point DSP's.

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B. Tech- VI Sem

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(EC20APE604)RADAR SYSTEMS

Course Objectives:

1. Make student to acquire the knowledge on types of Radars, working principles, applications.
2. Make student to acquire the knowledge on tracking a target and understand phased array antennas, navigational aids.

Unit I

Basics of Radar: Introduction, Maximum Unambiguous Range, Simple form of Radar Equation, Radar Block Diagram and Operation, Radar Frequencies and Applications, Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise, Modified Radar Range Equation, Illustrative Problems.

Radar Equation: SNR, Envelope Detector, False Alarm Time and Probability, Integration of Radar Pulses, Radar Cross Section of Targets (simple targets - sphere, cone-sphere), Transmitter Power, PRF and Range Ambiguities, System Losses (qualitative treatment), Illustrative Problems.

Unit II

CW and Frequency Modulated Radar: Doppler Effect, CW Radar – Block Diagram, Isolation between Transmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirements, Applications of CW radar, Illustrative Problems.

FM-CW Radar: Range and Doppler Measurement, Block Diagram and Characteristics (Approaching/ Receding Targets), FM-CW altimeter, Multiple Frequency CW Radar.

Unit III

MTI and Pulse Doppler Radar: Introduction, Principle, MTI Radar with - Power Amplifier Transmitter and Power Oscillator Transmitter, Delay Line Cancellers – Filter Characteristics, Blind Speeds, Double Cancellation, and Staggered PRFs. Range Gated Doppler Filters, MTI Radar Parameters, Limitations to MTI Performance, MTI versus Pulse Doppler radar.

Unit IV

Tracking Radar: Tracking with Radar, Sequential Lobing, Conical Scan, Mono pulse Tracking

Radar – Amplitude Comparison Mono pulse (one- and two-coordinates), Phase Comparison Mono pulse, Tracking in Range, Acquisition and Scanning Patterns, Comparison of Trackers.

Detection of Radar Signals in Noise: Introduction, Noise Figure and Noise Temperature, Matched Filter Receiver – Response Characteristics and Derivation, Correlation detection, Detection criteria, Detector Characteristics, Automatic Detection, Constant False Alarm Rate Receiver.

Unit V

Phased Array Antennas and Navigational Aids: Introduction to Phased Array Antennas - Basic Concepts, Radiation Pattern. Beam Steering and Beam Width changes. Navigational Aids: Direction Finder, VOR, ILS and Loran.

Text Books:

1. Merrill I. Skolnik, "Introduction to Radar Systems", 2nd Edition, TMH Special Indian Edition, 2007.
2. Byron Edde, "Radar Principals, Technology, Applications", Pearson Education, 1992.

Reference Books:

1. F.E. Terman, "Radio Engineering", Mc Graw Hill Book Co. (for Chapter 7 only), Fourth Edition 1955
2. Simon Kingsley & Shaun Quegan, "Understanding RADAR Systems", McGraw Hill Book Co., 1993.

Course Outcomes:

- CO1.** Learn the basic working principle of Radar and target detection procedure.
- CO2.** Know the working and applications of CW and Frequency Modulated Radar.
- CO3.** Gain the knowledge of MTI and Pulse Doppler Radar.
- CO4.** Understand different methods of tracking a target and analyze the effect of noise at the receiver.
- CO5.** Learn about the phased array antennas and different navigational aids.

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B.Tech –VI Sem

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(CE20AOE601) Disaster Management

Course Objectives:

The objective of this course is to:

- Give the basic knowledge of Natural Hazards and disasters.
- Develop an awareness of the chronological phases of natural disaster response and rescue relief operations.
- Understand the 'relief system' and the 'disaster victim.'
- Describe the three planning strategies useful in mitigation.
- Identify the regulatory controls used in hazard management.
- Understand the tools of post-disaster management.

UNIT –I

Introduction:

Hazards, Disasters, Disaster Management, Disaster Management cycle – Five priorities for action.

Natural Hazards and Disaster Management:

Floods, droughts, Earthquakes, global warming, cyclones & Tsunamis, landslides, Post Tsunami hazards along the Indian coast, landslides.

Learning outcomes:

At the end of unit, students will be able to

- Gain the basic knowledge about hazards and disasters.
- Know about the natural hazards and its management.
- Understand about the global warming, cyclones and tsunamis

UNIT II

Man-Made Disaster and Management:

Case study methods of the following: Fire hazards, transport hazards, biological hazards, waste management, post disaster, bio terrorism -threat in mega cities.

Learning outcomes:

At the end of unit, students will be able to

- Know about the fire hazards and solid waste management.
- Gain knowledge about transport and biological hazards.

UNIT – III**Risk and Vulnerability:**

Building codes and land use planning, social vulnerability, environmental vulnerability, and sustainable development, climate change risk rendition, financial management of disaster – related losses.

Learning outcomes:

At the end of unit, students will be able to

- Know about the regulations of building codes and land use planning related to risk and vulnerability.
- Understand about the financial management of disaster and related losses

UNIT – IV**Role of Technology in Disaster Managements:**

Disaster management for infra structures, taxonomy of infra-structure – treatment plants and process facilities-electrical substations- roads and bridges- mitigation programme for earth quakes –multimedia technology in disaster risk management and knowledge in disaster reduction.

Learning outcomes:

At the end of unit, students will be able to

- Know about the technological aspects of disaster management.
- Understand the multimedia technology in disaster risk management.
- Get knowledge about the factors for disaster reduction.

UNIT –V**Emerging approaches in Disaster Management**

- Pre- disaster stage (preparedness)
- Emergency Stage
- Post Disaster stage-Rehabilitation.

Learning outcomes:

At the end of unit, students will be able to

- Gets knowledge about three planning strategies useful in mitigation?
- Understand about preparedness and rehabilitation stage.

Course Outcomes (CO):

On completion of the course the students will be able to

- Know the different types of disasters and their effects on environment.
- Have the knowledge about Causes of disasters.
- Gain knowledge about disaster management through engineering applications.
- Explain the process of risk management
- Distinguish between the different approaches needed to manage pre- during and post disaster periods

Textbooks:

1. Rajib Shah & R R Krishnamurthy "Disaster Management" – Global Challenges and Local Solutions' Universities press. (2009),
2. Tushar Bhattacharya, "Disaster Science & Management" Tata McGraw Hill Education Pvt. Ltd., New Delhi.
3. Jagbir Singh "Disaster Management" – Future Challenges and Opportunities' I K International Publishing House Pvt. Ltd. (2007),

Reference Books:

1. Harsh. K .Gupta "Disaster Management edited", Universities press, 2003
2. Donald Hyndman & David Hyndman "Natural Hazards & Disasters" – Cengage Learning

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B.Tech - VI Sem

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(ME20AOE601) FUNDAMENTALS OF ADDITIVE MANUFACTURING

Pre-requisite: Manufacturing Processes

Course Objectives:

- Familiarize of additive manufacturing / rapid prototyping and its applications in various fields.
- Impart reverse engineering techniques.
- Explain different processes available in additive manufacturing.
- Bring awareness on mechanical properties of materials and geometric issues related to additive manufacturing applications.

UNIT – 1:

Introduction to Additive Manufacturing (AM) Systems :

History and Development of AM, Need of AM, Difference between AM and CNC, Classification of AM Processes: Based on Layering Techniques, Raw Materials and Energy Sources, AM Process Chain, Benefits and Applications of AM, Representation of 3D model in STL format.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn the importance of AM process and development process cycle of AM.
- Distinguish the difference between CNC and AM.
- Identify the role of AM in the industrial applications.
- Understand the different formats to represent the 3D Model.

UNIT – 2:

CAD & Reverse Engineering:

Basic Concept, Digitization techniques, Model Reconstruction, Data Processing for Additive Manufacturing Technology: CAD model preparation, Part Orientation and support generation, Model Slicing, Tool path Generation, Software's for Additive Manufacturing Technology. Reverse Engineering (RE) –Meaning, RE – The Generic Process, Phase of RE Scanning, Contact Scanners, Noncontact Scanners, Point Processing.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn the different process steps of Additive Manufacturing.
- Understand the role of software tools for Additive Manufacturing Technology
- Build the CAD model and generate support for required 3D printing Component.

UNIT – 3:

Solid & Liquid Based AM Systems

Stereolithography (SLA) and Solid Ground Curing (SGC): Principle, Process, Materials, Advantages, Limitations and Applications. Fusion Deposition Modeling (FDM). Laminated Object Manufacturing (LOM).

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn the Additive Manufacturing process of Stereolithography (SLA) and Solid Ground Curing (SGC)
- Distinguish the differences between FDM and SLA processes.
- Analyze the limitations and the opportunities of current AM processes to develop the future AM technologies.

UNIT – 4:

Powder Based AM Systems:

Principle and Process of Selective Laser Sintering (SLS), Advantages, Limitations and Applications of SLS, Principle and Process of Laser Engineered Net Shaping (LENS), Advantages, Limitations and Applications of LENS, Principle and Process of Electron Beam Melting (EBM), Advantages, Limitations and Applications of EBM.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn the Additive Manufacturing process of SLS, LENS, EBM.
- Distinguish the differences between SLS and EBM processes.
- Analyze the limitations and the opportunities of SLS, EBM, LENS AM processes to develop the future AM technologies.
- Distinguish the various AM processes and use them for specific problem-based applications.

UNIT – 5:

Other Additive Manufacturing Systems:

Three Dimensional Printing (3DP): Principle, Process, Advantages, Limitations and Applications. Ballistic Particle Manufacturing (BPM). Shape Deposition Manufacturing (SDM): Principle, Process, Advantages, Limitations, Applications.

Learning Outcomes:

- Learn the Additive Manufacturing process of BPM, SDM.
- Understand the differences between BPM and SDM processes.
- Analyze the limitations and the opportunities of BPM, SDM processes to develop the future AM technologies.

Textbooks:

1. Ian Gibson, David W. Rosen, Brent Stucker, Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing, 1/e Springer, 2010.
2. Chua C.K., Leong K.F. and Lim C.S., Rapid Prototyping: Principles and Applications, 2/e World Scientific Publishers, 2003.

Reference Books:

1. Liou W. Liou, Frank W., Liou, Rapid Prototyping and Engineering Applications: A Tool Box for Prototype Development, CRC Press, 2007.
2. Pham D.T. and Dimov S.S., Rapid Manufacturing; The Technologies and Application of RPT and Rapid Tooling, Springer, London 2001.
3. Gebhardt A., Rapid prototyping, Hanser Gardener Publications, 2003.
4. Hilton P.D. and Jacobs P.F., Rapid Tooling: Technologies and Industrial Applications, CRC Press, 2005.
5. Rafiq Noorani, Rapid Prototyping: Principles and Applications in Manufacturing, John Wiley & Sons, 2006.

Online Learning Resources:

- NPTEL Course on Rapid Manufacturing
<https://nptel.ac.in/courses/112/104/112104265/>
- <https://www.hubs.com/knowledge-base/introduction-fdm-3d-printing/>
- <https://slideplayer.com/slide/6927137/>
- <https://www.mdpi.com/2073-4360/12/6/1334>
- <https://www.centropiaggio.unipi.it/sites/default/files/course/material/2013-11-29%20-%20FDM.pdf>
- <https://lecturenotes.in/subject/197>

- https://www.cet.edu.in/noticefiles/258_Lecture%20Notes%20on%20RP-ilovepdf-compressed.pdf
- https://www.vssut.ac.in/lecture_notes/lecture1517967201.pdf
- <https://www.youtube.com/watch?v=NkC8TNts4B4>

Course Outcomes:

At the end of the course, the student will be able to

- **Apply** the fundamentals concepts of additive manufacturing to develop of effective process steps.
- **Analyse** the various fabrication techniques and apply them to manufacture a 3D printed part.
- **Develop** a 3D model in standard tessellation language format.
- **Build** the feasible designs of support structure to the 3D printing models.

Analyse the limitations of various additive manufacturing techniques for the selective applications.

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(EE20AOE603) OPTIMIZATION TECHNIQUES THROUGH MATLAB

Course Objectives

- Introduce basics of MATLAB
- Familiarize the fundamentals of optimization
- Explain single variable optimization using various methods
- Implement multi variable optimization using various methods
- Train various evolutionary algorithms.

UNIT -I

Introduction to MATLAB: Overview, MATLAB Preliminaries, Basics of MATLAB, Beyond the Basics of MATLAB, Popular Functions and Commands, Plotting using MATLAB, Optimization with MATLAB.

UNIT -II

Introduction to Optimization: Statement of an optimization problem, Classifications of optimization Problems: Single variable optimization, Multi variable optimization with no constraints, Multi variable optimization with equality constraints, Multi variable optimization with inequality constraints, Convex and Concave programming.

UNIT -III

Single Variable Optimization: Finite difference method, Central difference method, Runge-Kutta method, interval halving method, golden section method with MATLAB code.

UNIT- IV

Multi Variable Optimization: Conjugate gradient method, Newton's method, Powell's method, Fletcher- Reeves method, Hook and Jeeves method, interior penalty function with

UNIT -V

Evolutionary Algorithms: Overview, Genetic Algorithms: Basics of Genetic Algorithms, Options in MATLAB, Multi Objective Optimization using Genetic Algorithms, Ant Colony Optimization, Simulated Annealing, Particle Swarm Optimization.

Course Outcomes:

After completion of this course the student can be able to

CO1:Use optimization terminology and concepts, and understand how to classify an optimization problem.

CO2:Apply optimization methods to engineering problems.

CO3:Implement optimization algorithms.

CO4:Compare different genetic algorithms.

CO5:Solve multivariable optimization problems.

TEXT BOOKS:

1. Rao V.Dukkipati, MATLAB: "An Introduction with Applications", Anshan, 2010.
2. Achille Messac, "Optimization in practice with MATLAB", Cambridge University Press, 2015.
3. Jasbir S Arora, "Introduction to optimum design", 2nd edition. Elsevier, 2004.

REFERENCES:

1. Cesar Perez Lopez, "MATLAB Optimization Techniques", Academic press, Springer publications, 2014.
2. Steven C.Chapra, "Applied Numerical Methods with MATLAB for Engineers and scientists": 4th edition, McGraw-Hill Education, 2018.

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B. Tech- VI SEM

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(CS20A0E602) JAVA Programming

Course Objectives:

- To understand object-oriented concepts and problem-solving techniques
- To obtain knowledge about the principles of inheritance and polymorphism
- To implement the concept of packages, interfaces, exception handling and concurrency mechanism.
- To design the GUIs using applets and swing controls.

UNIT - I

Introduction to OOP: OOP principles, Java Buzzwords, Implementing Java program, JVM, Data Types, Variables, Type conversions and Casting, Operators, Control statements, Arrays. Classes, Objects, Methods, Constructors, this keyword, static keyword, Overloading Methods and Constructors, Argument passing, Exploring String class.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the syntax, semantics and features of Java Programming Language (L1).
- Learn object-oriented features and understanding type conversion and casting (L2).
- Understand different types of string handling functions and its usage (L1).

UNIT – II

Inheritance: Basics, Using Super, Creating Multilevel hierarchy, Method overriding, Dynamic Method Dispatch, Using Abstract classes, Using final with inheritance

Interfaces: Definition, Implementing Interfaces, Extending Interfaces, Nested Interfaces, Applying Interfaces, Variables in Interfaces.

Packages: Basics, finding packages and CLASSPATH, Access Protection, Importing packages.

Learning Outcomes:

At the end of this unit, the student will be able to

- Implement types of Inheritance and developing new classes based on existing classes(L3)
- Demonstrate features of interfaces to implement multiple inheritances (L2).
- Distinguish between system packages and user defined packages (L2).

UNIT – III

Exception handling - Fundamentals, Exception types, uncaught exceptions, using try and catch, Multiple catch clauses, nested try statements, throw, throws and finally, built-in exceptions, creating own exception sub classes.

I/O and Other Topics: – I/O basics, Reading Console input, Writing console Output, The PrintWriter class, Reading and writing files, Automatically closing a file, enumerations, type wrappers.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn what exceptions are and how they are handled (L1).
- Learn when to use exception handling and how to create user defined exceptions(L3)
- Learn the difference between various files and streams (L1).

UNIT - IV

Multithreading: The Java thread model, Creating threads, Thread priorities, Synchronizing threads, Inter thread communication.

The Collections Framework (java.util): Collections overview, Collection Interfaces, The Collection classes- Array List, Linked List, Hash Set, Hash table, Properties, Stack, Vector, String Tokenizer, Date, Calendar, Random, Scanner.

Applets- Definition, Life Cycle and Execution.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand concurrency, parallelism and multithreading(L1).
- Learn the importance of collections and use prebuilt generic data structures from Framework (L1).
- Develop applets for web applications(L5)

UNIT – V

Event Handling-Delegation Event Model, Event Sources, Event Classes, Event Listener Interfaces, Handling Mouse and Keyboard Events, Adapter classes.

AWT AND Swings: AWT: AWT Hierarchy, AWT controls, Layout Managers: FlowLayout, BorderLayout, GridLayout, CardLayout, and Limitations of AWT. SWINGS: JFrame, JPanel, JComponent- JLabel and ImageIcon, JTextField, JTabbedPane , Swing Buttons, JScrollPane, JComboBox, JTable.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the GUI programming (L1).

Course Outcomes:

After completion of the course the student will be able

- To solve real world problems using OOP techniques (L3).
- To apply code reusability through inheritance, packages and interfaces(L3)
- To solve problems using java collection framework and I/O classes (L3).
- To develop applications by using parallel streams for better performance (L4).
- To build GUIs and handle events generated by user interactions (L4).

Text Books:

1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill Education (India) Pvt. Ltd.
2. Java How to Program, 10th Edition, Paul Dietel, Harvey Dietel, Pearson Education.

Reference Books:

1. T. Budd "Understanding Object-Oriented Programming with Java", updated edition, Pearson Education.
2. Cay S. Horstmann "Core Java Volume – 1 Fundamentals", Pearson Education.
3. Sagayaraj, Dennis, Karthik and Gajalakshmi "Java Programming for core and advanced learners, University Press.
4. Y. Daniel Liang, "Introduction to Java programming", Pearson Education.
5. P. Radha Krishna "Object Oriented Programming through Java", University Press.
6. S. Malhotra, S. Chudhary, "Programming in Java", 2nd edition, Oxford Univ. Press.
7. R.A. Johnson, "Java Programming and Object-oriented Application Development", Cengage Learning.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(AUTONOMOUS)

B.Tech - VI Sem

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(AM20A0E502) Web Technologies

Course Objectives:

- Giving the students the insights of the Internet programming and how to design and implement complete applications over the web.
- It covers the notions of Web servers and Web Application Servers, Design Methodologies with concentration on Object-Oriented concepts, Client-Side
- Programming, Server-Side Programming, Active Server Pages, Database Connectivity to web applications, Adding Dynamic Content to web applications, Programming Common Gateway Interfaces, Programming the User Interface for the web applications

UNIT I:

Web Basics and Overview: Introduction to Internet, World Wide Web, Web Browsers, URL, MIME, HTTP, Web Programmers Tool box. HTML Common tags: List, Tables, images, forms, frames, Cascading Style Sheets (CSS) & its Types. Introduction to Java Script, Declaring variables, functions, Event handlers (on click, on submit, etc.,) and Form Validation.

Learning Outcomes:

At the end of the unit students will be able to:

- Create standard tags of HTML tags and Knowing the features of designing static web pages. (L6)
- List different types of CSS to design web page attractively. (L1)
- Utilized different tools like Adobe Dreamweaver and Microsoft Frontpage. (L3)

UNIT II:

Introduction to XML: Document type definition, XML Schemas, Presenting XML, Introduction to XHTML, Using XML Processors: DOM and SAX. PHP: Declaring Variables, Data types, Operators, Control structures, Functions.

Learning Outcomes:

At the end of the unit, students will be able to:

- Explain different types of client side scripting. (L2)
- Construct dynamic web pages using DHTML. (L6)
- Illustrate validation for web pages. (L2)

UNIT III:

Web Servers and Servlets: Introduction to Servlets, Life cycle of a Servlet, JSDK, Deploying Servlet, The Servlet API, The javax. Servlet Package, Reading Servlet parameters, Reading Initialization parameters. The javax. Servlet HTTP package, Handling Http Request & Responses, Cookies and Session Tracking.

Learning Outcomes:

At the end of the unit, students will be able to:

- Analyze the importance of server side scripting. (L4)
- Demonstrate deployment of the application using Tomcat Server. (L2)
- Experiment with storing and retrieving data from JDBC. (L3)

UNIT IV:

Database Access: Database Programming using JDBC, JDBC drivers, Studying javax.sql.* package, Connecting to database in PHP, Execute Simple Queries, Accessing a Database from a Servlet. Introduction to struts frameworks.

Learning Outcomes:

At the end of the unit, students will be able to:

- Understand how XML interacts with different applications. (L1)
- Develop PHP Programs using WAMP and XAMPP Server. (L3)
- Examine background applications using XSL and XSLT. (L4)

UNIT V:

JSP Application Development: The Anatomy of a JSP Page, JSP Processing. JSP Application Design and JSP Environment, JSP Declarations, Directives, Expressions, Scripting Elements, implicit objects.

JavaBeans: Introduction to Beans, Deploying java Beans in a JSP page.

Learning Outcomes:

- Explain the importance of AJAX Architecture.
- Integrate and test web services.

CourseOutcomes:

- Analyze a web page and identify its elements and attributes.
- Create web pages using XHTML and Cascading Styles sheets.
- Installation and usage of Server software's.
- Database Connectivity to web applications
- Build web applications using Servlet and JSP

TEXTBOOKS:

1. Web Programming, building internet applications, Chris Bates 2nd edition, WILEY Dreamtech (UNITs 1,2)
2. Core SERVLETS AND JAVASERVER PAGES VOLUME 1: CORE TECHNOLOGIES By Marty Hall and Larry Brown Pearson (UNITs 3, 4,5)

REFERENCEBOOKS:

1. Programming world wide web - Sebesta, Pearson Education, 2007.
2. Internet and World Wide Web – How to program by Dietel and Nieto PHI/ Pearson Education Asia

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B.Tech– VI SEM

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(EG20AOE601) TECHNICAL COMMUNICATION AND PRESENTATION SKILLS

Course Objectives:

- To develop awareness in students of the relevance and importance of technical communication and presentation skills.
- To prepare the students for placements
- To sensitize the students to the appropriate use of non-verbal communication
- To train students to use language appropriately for presentations and interviews
- To enhance the documentation skills of the students with emphasis on formal and informal writing

SYLLABUS

UNIT -1:

Basics of Technical Communication – Introduction – Objectives & Characteristics of Technical Communication – Importance and need for Technical communication – LSRW Skills – Barriers to effective communication

Learning Outcomes:

At the end of the module, the learners will be able to

- Understand the importance of LSRW skills
- Identify and overcome the barriers to effective communication
- Realize the need and importance of technical communication

UNIT -II

Informal and Formal Conversation – Verbal and Non-verbal communication –Kinesics, Proxemics, Chronemics, Haptics, Paralanguage

Learning Outcomes:

At the end of the module, the learners will be able to

- State the difference between formal and informal conversation.
- Apply the knowledge of the difference between the verbal and non-verbal communication
- Evaluate the different aspects of non-verbal communication.

UNIT -III

Written communication – Differences between spoken and written communication – Features of effective writing –Advantages and disadvantages of spoken and written communication- Art of condensation- summarizing and paraphrasing

Learning Outcomes:

At the end of the module, the learners will be able to

- Know the difference between written and spoken communication
- Apply the awareness of features of effective writing.
- Implement the understanding of summarizing and paraphrasing.

UNIT -IV

Presentation Skills – Nature and importance of oral presentation – Defining the purpose – Analyzing the audience – Planning and preparing the presentation, organizing and rehearsing the presentation –Individual and group presentations – Handling stage fright

Learning Outcomes:

At the end of the module, the learners will be able to

- State the importance of presentation skills in corporate climate.
- Analyze the demography of the audience.
- Plan, prepare and present individual and group presentations.

UNIT -V

Interview Skills – The Interview process –Characteristics of the job interview – Pre-interview preparation techniques – Projecting the positive image – Answering Strategies

Learning Outcomes:

At the end of the module, the learners will be able to

- Identify the characteristics of the job interview.
- Understand the process of Interviews.
- Develop a positive image using strategies in answering FAQs in interviews

Course Outcomes

- Understand the importance of effective technical communication
- Apply the knowledge of basic skills to become good orators
- Analyze non-verbal language suitable to different situations in professional life
- Evaluate different kinds of methods used for effective presentations
- Create trust among people and develop employability skills

TEXT BOOKS:

1. Ashrif Rizvi, "Effective Technical Communication", TataMcGrahill, 2011
2. Meenakshi Raman & Sangeeta Sharma, "Technical Communication", 3rd Edition, O U Press 2015

REFERENCES:

1. Pushpalatha & Sanjay Kumar, "Communication Skills", Oxford Univsesity Press
2. Barron's/Books on TOEFL/GRE/GMAT/CAT/IELTS DELTA/Cambridge University Press. 2012.
3. Butterfield Jeff, "Soft Skills for Everyone", Cengage Publications, 2011.
4. Universities Press (India) Pvt Ltd., "Management Shapers Series", Himayatnagar, Hyderabad 2008.
5. John Hughes & Andrew Mallett, "Successful Presentations" Oxford.
6. Edgar Thorpe and Showick Thorpe, "Winning at Interviews" Pearson
7. Munish Bhargava, "Winning Resumes and Successful Interviews", McGraw Hil

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B. Tech- VI Sem

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(EC20APC604)DIGITAL SIGNAL PROCESSING LAB

Course Objectives:

1. Ability to apply knowledge of mathematics, science and engineering Construction of tools for visualizing the basic concepts of discrete signal representation such as Fourier Transforms, discrete time representations.
2. Students will learn numerous programming tools for design and Implementations of filtering algorithms.
3. Understand the concept of Multi-rate signal processing and sample rate Conversion.
4. Develop and Implement DSP algorithms in software using CCS with DSP Floating Point Processor.

The Programs shall be implemented in Software (Using MATLAB / Lab View / C Programming/ Equivalent) and Hardware (Using TI / Analog Devices / Motorola / Equivalent DSP processors).

List of Experiments:

1. Find energy and power of any given signal.
2. Generate random signals and plot its PSD.
3. Generate sum of two sinusoidal signals and find the frequency response (magnitude and phase).
4. Find frequency response of a system given by difference equation form.
5. Compute and implement the N-point DTFT of a given sequence and compute the power density spectrum of the sequence.
6. Compute and implement the N-point DFT of a given sequence and compute the power density spectrum of the sequence.
7. Implement and verify N-point FFT of a given sequence and find the frequency response (magnitude and phase).
8. Design IIR Butterworth filter and compare their performances with different orders (Low Pass Filter /High Pass Filter)
9. Design IIR Chebyshev filter and compare their performances with different orders (Low Pass Filter /High Pass Filter).
10. Design and implementation of IIR filter using bilinear transformation & Impulse invariant method.

11. Design FIR filter (Low Pass Filter /High Pass Filter) using windowing technique.
 - i. Using rectangular window
 - ii. Using hamming window
 - iii. Using Kaiser window
12. Design and verify Filter IIR frequency response by using Filter design and Analysis Tool.
13. Design and verify Filter FIR frequency response by using Filter design and Analysis Tool.
14. Compute the Decimation and Interpolation for the given signal.

Note: Any TWELVE of the experiments are to be conducted.

References:

1. Matlab Simulink For Digital Signal Processing by Won,Y.Yang, Tbh/Yes Dee, 2014, Paperback
2. Fundamentals of Digital Signal Processing Using MATLAB 1st Edition (English, Paperback, Schilling Robert J.)

Course Outcomes:

- CO1:** Implement various DSP Algorithms using software packages.
- CO2:** Implement DSP algorithms with Digital Signal Processor.
- CO3:** Analyze and observe magnitude and phase characteristics (Frequency response Characteristics) of digital IIR-Butterworth, Chebyshev filters.
- CO4:** Analyze & observe magnitude and phase characteristics (Frequency response Characteristics) of digital FIR filters using window techniques.
- CO5:** Analyze digital filters using Software Tools.

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B. Tech- VI Sem

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(EC20APC605) MICROWAVE AND OPTICAL COMMUNICATIONS LAB

Course Objectives:

1. To Understand microwave waveguides, passive & active devices, tubes and network analysis.
2. To design microwave matching networks.
3. To Understand the S-matrix of Tee Junctions
4. To perform microwave measurements.

LIST OF EXPERIMENTS

Minimum of Ten experiments to be conducted (Any seven from Part-A)

Part –A (Microwave Experiments)

1. Reflex Klystron Characteristics.
2. Gunn Diode Characteristics.
3. Attenuation Measurement.
4. Directional Coupler Characteristics.
5. VSWR Measurement.
6. Impedance Measurement.
7. Frequency and Wavelength Measurement using slotted line section.
8. Scattering parameters of Magic Tee.
9. Scattering parameters of Isolator.
10. Scattering Parameters of Circulator.

Part –B (Optical Experiments)

1. Measurement of Numerical Aperture of the given fiber.
2. Measurement of Data rate for Digital Optical link.
3. Measurement of losses for Analog Optical link.
4. Characterization of LED.
5. Characterization of Laser Diode.

Course Outcomes:

- CO1:** Understand the mode characteristics of Reflex Klystron oscillator and negative resistance characteristics of Gunn Oscillator.
- CO2:** Determine the Scattering matrix of given passive device experimentally and verify the same theoretically.
- CO3:** Determine numerical aperture and bending losses of a given optical fiber.
- CO4:** Establish optical link between transmitter and receiver experimentally to find attenuation and signal strength of the received signal.

Equipment's Required:

1. Regulated Klystron Power Supply	:	6 Nos
2. VSWR Meter	:	6Nos
3. Milli/Micro Ammeters	:	10Nos
4. Multimeters	:	10Nos
5. CROs	:	8Nos
6. GUNN power supply & PIN modulator	:	4Nos
7. Relevant Microwave Components	:	---
8. Fiber Optic Analog Trainer Based LED	:	3Nos
9. Fiber Optic Analog Trainer Based Laser	:	2Nos
10. Fiber Optic Digital Trainer	:	1No
11. Fiber Cables	:	(Plastic, Glass)

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(EC20APC606)VLSI DESIGN LAB

Course Objectives:

1. To understand and develop HDL source code for the given problem/experiment
2. To analyze the obtained results of the given experiment/problem
3. To simulate the given circuit with suitable simulator and verify the results
4. To understand how to use FPGA/CPLD hardware tools in the lab
5. To design and implement the experiments using FPGA/CPLD hardware tools

List of Experiments:

PART (A): FPGA Level Implementation (Any Seven Experiments)

Note 1: The students need to develop VHDL/ Verilog Source code, perform simulation using relevant simulator and analyze the obtained simulation results using necessary synthesizer.

Note 2: All the experiments need to be implemented on the latest FPGA/CPLD Hardware in the Laboratory.

Design and Implementation of the following

1. Implementation of Universal logic gates
2. 4-bit Parallel Adder/Subtractor circuit
3. 4-bit Carry Look Ahead Adder circuit
4. (2X2) Multiplexer
5. (16:1) Multiplexer through (4:1) Multiplexer
6. 8:3 Priority Encoder
7. 8-bit parity generator and checker
8. Ring Counter
9. Binary counter

EDA Tools/Hardware Required:

1. EDA Tool that supports FPGA Programming including Xilinx Vivado / Altera (Intel) / Cypress / Equivalent Industry Standard tool along with corresponding FPGA Hardware.
2. Desktop Computer with appropriate Operating system that supports the EDA tools.

PART (B): Back-end Level Design and Implementation (Any Three Experiments)

Note: The students need to design the following experiments at schematic level using CMOS logic and verify the functionality. Further students need to draw the corresponding layout and verify the functionality including parasitics. Available state of the art technology libraries can be used while simulating the design using Industry standard EDA Tools.

Design and Implementation of the following

1. Universal Gates
2. CMOS Inverter
3. Full Adder
4. Decoder
5. D-Flip-Flop

EDA Tools/Hardware Required:

1. Mentor Graphics Software / Cadence/Synopsys/Tanner or Equivalent Industry Standard Software/CAD Tool.
2. Desktop Computer with appropriate Operating system that supports the EDA tools.

Course Outcomes:

- CO1:** Understand how to use FPGA/CPLD hardware tools in the lab.
- CO2:** Develop HDL source code for the given problem/experiment, and simulate the given circuit with suitable simulator and verify the results.
- CO3:** Analyze the obtained results of the given experiment/problem.
- CO4:** Design and implement the experiments using FPGA/CPLD hardware tools.

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B. Tech- VI Sem

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(EC20ASC601)GRAPHICAL SYSTEM DESIGN USING Lab VIEW

Course Objectives:

1. To acquire familiarity with the LabVIEW Programming language and to know what is meant by 'Graphical Programming Language'.
2. To be able to write LabVIEW programs incorporating pre-written and new code.
3. To build graphical user interfaces (GUIs) for laboratory instrumentation.

Unit I

NAVIGATING LabVIEW:

Introducing LabVIEW environment, Comparison with Text Based Programming, Creating and using LabVIEW projects, Parts of VI-Front Panel-Block Diagram-Icon And Connector Panel-Controls Pallete-Functions Pallete.

LabVIEW ENVIRONMENT:

Indicators-Controls- wiring the controls and indicators- building VIs- run modes data, Types in labVIEW- development of GUIs- labVIEW help. Searching controls, VIs and functions- implementing a VI- basic arithmetics in LabVIEW, Understanding the dataflow programming model of LabVIEW, Recognizing different data types.

Unit II

LabVIEW FOUNDATION:

Arithmetic functions- Expression node- Formula node-Compound arithmetic-Comparison pallet, Boolean pallete, Arrays -Various functions of arrays-strings- various functions of strings-clusters -various functions of clusters.

Unit III

PROGRAMMING EXECUTION WITH STRUCTURES:

Case structure, For Loop - The While Loop - Placing Objects inside Objects - Counting the Loops
- Shift Registers, Introduction to MyDAQ.

Practice Exercises: Any ten experiments are to be done

1. Verification of basic arithmetic operations.

2. Perform Boolean operations.
3. Verify even or odd of a given numbers.
4. Verify application using expression node, formula node.
5. Construct array maximum and minimum.
6. Verify applications of string functions.
7. Find the sum of 'n' numbers using loop.
8. Find the factorial of a give number using loop.
9. Verify applications of shift register.
10. Design traffic light control using case structure.
11. Design water level indicator (Nested loop).
12. Data acquisition using MyDAQ.

References:

1. <https://www.ni.com/pdf/training/us/core-1-sample-course-manual>
2. https://ptolemy.berkeley.edu/eecs20/labs/LabVIEW_Labs/Lab01/Lab01.pdf

Course Outcomes:

- C01:** Able to develop and edit functional block diagrams and front panels.
- C02:** Able to utilize composite data in the form of Arrays and Clusters.
- C03:** Able to control program execution through structures such as 'For-While' loops and 'Case Structures'.
- C04:** Able to utilize features which will reconfigure the general physical and software layouts of the LabVIEW programming environment.

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B. Tech – VI Sem

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(BA20AMC502) INTELLECTUAL PROPERTY RIGHTS AND PATENTS

Course Objectives:

This course introduces the student to the basics of Intellectual Property Rights, Copy Right Laws, Cyber Laws, Trade Marks and Issues related to Patents. The overall idea of the course is to help and encourage the student for startups and innovations

UNIT-I

Introduction to Intellectual Property Law – Evolutionary past – Intellectual Property Law Basics – Types of Intellectual Property – Innovations and Inventions of Trade related Intellectual Property Rights – Agencies Responsible for Intellectual Property Registration – Infringement – Regulatory – Overuse or Misuse of Intellectual Property Rights – Compliance and Liability Issues.

UNIT-II

Introduction to Copyrights – Principles of Copyright – Subject Matters of Copy right – Rights Afforded by Copyright Law – Copyright Ownership – Transfer and Duration – Right to Prepare Derivative Works – Rights of Distribution – Rights of performers – Copy right Formalities and Registration – Limitations – Infringement of Copyright – International Copyright Law – Semiconductor Chip Protection Act.

UNIT-III

Introduction to Patent Law – Rights and Limitations – Rights under Patent Law – Patent Requirements – Ownership and Transfer – Patent Application Process and Granting of Patent – Patent Infringement and Litigation – International Patent Law – Double Patenting – Patent Searching – Patent Cooperation Treaty – New developments in Patent Law – Invention Developers and Promoters.

UNIT-IV

Introduction to Trade Mark – Trade Mark Registration Process – Post registration procedures – Trade Mark maintenance – Transfer of rights – Inter parties Proceedings – Infringement – Dilution of Ownership of Trade Mark – Likelihood of confusion – Trade Mark claims – Trade Marks Litigation –International Trade Mark Law.

UNIT-V

Introduction to Trade Secrets – Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreement – Trade Secret Law – Unfair Competition – Trade Secret Litigation–Breach of Contract–Applying State Law. Introduction to Cyber Law–Information Technology Act – Cyber Crime and E-commerce – Data Security – Confidentiality –Privacy–International aspects of Computer and Online Crime.

Course Outcomes:

- Understand IPR law & Cyber law
- Discuss registration process, maintenance and litigations associated with trademarks
- Illustrate the copy right law
- Enumerate the trade secret

Textbooks:

- Deborah E. Bouchoux: "Intellectual Property". Cengage Learning, New Delhi
- Kompal Bansal & Parishit Bansal "Fundamentals of IPR for Engineers", BSP Publications (Press)
- Cyber Law. Texts & Cases, South-Western's Special Topics Collections

References:

- Prabhuddha Ganguli: "Intellectual Property Rights" Tata McGraw-Hill, New Delhi
- Richard Stim: "Intellectual Property", Cengage Learning, New Delhi.
- R. Radha Krishnan, S. Balasubramanian: "Intellectual Property Rights", Excel Book. New Delhi.
- M. Ashok Kumar and Mohd. Iqbal Ali: "Intellectual Property Right" Serials Pub.

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B. Tech – VI Sem

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(AM20AMC601) AI TOOLS TECHNIQUES & APPLICATIONS

Course Outcomes:

At the end of the course, a student will be able to:

CO1: Demonstrate various AI applications, languages and Intelligent Agents.

CO2: Solve problems using search strategies and understand the basic process of Machine Learning. CO3: Apply classification and regression algorithms on real world data.

CO4: Develop an expert system.

CO5: Comprehend the structure of an artificial neural network and identify the building blocks of a convolutional neural network.

UNIT-I:

ARTIFICIAL INTELLIGENCE: Introduction, Definition of AI, Goals of AI, Turing Test, Applications of AI, AI Programming Languages; Introduction, Intelligent Systems, the Concept of rationality, types of Agents, Environments and its properties, PEAS.

Learning Outcomes:

At the end of the unit, student will be able to

1. classify various AI Applications. (L2)
2. list the AI Languages. (L1)
3. explain various types of Agents. (L2)

UNIT-II:

SEARCH STRATEGIES: Introduction, Brute Force or Blind Search, Breadth-First Search, Depth-First Search, Hill Climbing, Best-First Search.

MACHINE LEARNING: Introduction, Machine Learning Process, Feature Engineering-Feature Extraction, Feature Selection, Feature Engineering Methods, Feature Engineering, Data Visualization-Line Chart, Bar Chart, Pie Chart, Histograms, Scatter Plot, Seaborn-Distplot, joint plot.

Learning Outcomes:

At the end of the unit, student will be able to

1. apply informed search techniques to problems. (L3)
2. interpret the features using feature engineering. (L2)
3. analyse the data using different visualization techniques. (L4)

UNIT-III:

REGRESSION: Simple Regression, Multiple Regression, Model Assessment-Training Error, Generalized Error, Testing Error, Bias-Variance Tradeoff

CLASSIFICATION: Linear Classification, Logistic Regression, Decision Trees

Learning Outcomes:

At the end of the unit, student will be able to

1. analyse different classification models and make recommendations towards learning. (L4)
2. solve real world data using classification techniques. (L3)
3. understand different regression models and about its problems. (L2)

UNIT-IV:

CLUSTERING: K-Means Clustering. EXPERT SYSTEMS: Introduction, Need and Justification of ES, Knowledge Representation, Knowledge Acquisition and Variation, Utilisation and Functionality, Basics of Prolog.

Learning Outcomes:

At the end of the unit, student will be able to

1. Understand the concept of clustering over classification. (L2)
2. Distinguish between expert systems and traditional systems. (L2)
3. Identify different applications of expert systems. (L3)

UNIT-V:

ARTIFICIAL NEURAL NETWORKS (ANNs): Biological Neuron, Types of ANN, Optimization Techniques, Vanishing Gradient Problem, Exploding Gradient Problem, Weight Initialization.

CONVOLUTION NEURAL NETWORKS(CNNs): Introduction, Components of CNN Architecture Convolution Layer(with example), Pooling/Down sampling Layer, Flattening Layer, Fully Connected Layer; Rectified Linear Unit Layer, Exponential Linear Unit, Unique Properties of CNN, Architectures of CNNs, Applications of CNN.

Learning Outcomes:

At the end of the unit, student will be able to

1. Understand the architecture of an artificial neuron. (L2)
2. Illustrate different artificial neural network architecture. (L2)
3. Analyse the effect of different activation functions of a CNN unit. (L4)

TEXT BOOKS:

1. Dr.Nilakshi Jain, Artificial Intelligence, As per AICTE: Making a System Intelligent, Wiley Publications, 1st Edition,2019.
2. Vijayvargia, Abhishek, Machine Learning with Python: An Approach to Applied Machine Learning, BPB Publications; 1st edition,2018.
3. Dr.S.Lovelyn Rose, Dr. L.Ashok Kumar, Dr.D.Karthika Renuka, Deep Learning using Python, Wiley India Pvt. Ltd 2019.

REFERENCES:

1. Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, Pearson Publications, 4th Edition, 2020.
2. Saroj Kaushik, Artificial Intelligence, Cengage Learning India, 2011.

WEB REFERENCES: 1. <https://keras.io/> 2. <https://ai.google/> 3. <https://www.coursera.org/learn/neural-networks-deep-learning#syllabus> 4. https://swayam.gov.in/nd1_noc19_me71/preview

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B. Tech- VII Sem

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(EC20APE701) ANALOG & DIGITAL IC DESIGN

Course Objectives:

1. Learn the operation of MOS transistor in Triode, Saturation and Cut-off regions.
2. Learn about the use of Current mirror circuits as resistive loads in the implementation of CMOS amplifier circuits.
3. Study the importance of Compensation circuits in the design of CMOS operational amplifiers.
4. Learn about the working principle of two, three and four input CMOS logic circuits.
5. Study the working cycles of DRAM and SRAM cells.

Unit I

MOS transistor and its Modelling:

Basic Operation, Large-Signal Modelling, Body Effect, p-Channel Transistors, Low-Frequency and High-Frequency Small-Signal Modelling in the Active Region, Small-Signal Modelling in the Triode and Cutoff Regions, Analog Figures of Merit and Trade-offs, MOS transistor equations and Advanced MOS Modelling concepts.

Unit II

Current Mirrors and Single-Stage Amplifiers:

Simple CMOS Current Mirror, Common-Source Amplifier, Source-Follower or Common-Drain Amplifier, Common-Gate Amplifier, Source-Degenerated Current Mirrors, Cascode Current Mirrors and Cascode Gain Stage.

Unit III

Operational Amplifier (OPAMP) Design and Compensation:

Two-Stage CMOS Opamp, Opamp Gain, Frequency Response, Slew Rate, n-Channel or p-Channel Input Stage, Systematic Offset Voltage, Opamp Compensation-Dominant-Pole Compensation and Lead Compensation, Compensating the Two-Stage Opamp, Making Compensation Independent of Process and Temperature.

Unit IV

Combinational and Sequential MOS Logic Circuits:

MOS logic circuits with Depletion nMOS loads, CMOS logic circuits, Complex logic circuits, Behavior of Bistable elements, SR Latch circuit, Clocked latch and Flip-Flop circuits, CMOS D-Latch and Edge-Triggered Flip-Flop.

Unit V

Semiconductor Memories:

Overview of Semiconductor memories, RAM array organization, DRAM-Cell types, Operation of Three-Transistor DRAM cell and One-Transistor DRAM cell, Leakage currents and Refresh operation, SRAM- Various configurations, Full CMOS SRAM cell, Memory structure of SRAM Cell array and Leakage currents.

Text Books:

1. T.C.Carusone, D.A.Johns & K.W.Martin, "Analog Integrated Circuit Design", Second Edition, John Wiley & Sons, Inc., 2019.
2. S.M.Kang & Y.Leblebici, "CMOS Digital Integrated Circuits-Analysis and Design" Third edition, McGraw Hill Education (India) Pvt. Ltd., 2020.

References:

1. Neil H. E. Weste & D.M.Harris, "CMOS VLSI Design-A Circuits and Systems Perspective", Fourth edition, Pearson Edition, 2020.
2. Kiat Seng Yeo and Kaushik Roy, "Low- Voltage, Low-Power VLSI Subsystems", McGraw Hill Professional Engineering Education, 2018.

Course Outcomes:

CO1: Interpret the various Modelling effects encountered in a MOSFET

CO2: Evaluate the various parameters of CG, CD and CS amplifier circuits.

CO3: Summarize the various steps in the design of a Compensated CMOS Operational amplifier circuit.

CO4: Design two, three and four input CMOS logic circuits.

CO5: Illustrate the working cycles of DRAM and SRAM cells.

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(EC20APE702)FPGA DESIGN

Course Objectives:

1. Introduce digital design concepts through various Programmable Logic Devices
2. Understand the FPGA architectures in detail
3. Analyze the physical design cycle in FPGA
4. Know the various applications of FPGAs

Unit I

Introduction to Programmable Logic Devices: Programmable logic devices (PLD)- Programmable Read Only Memory, Programmable Logic Arrays (PLA), Programmable Array Logic (PAL), Digital design using PLDs. Complex Programmable Logic Devices - Features and applications of complex programmable logic devices, Altera Max - 7000 series and Altera FLEX logic- 10K series CPLD.

Unit II

Field Programmable Gate Arrays: Features and applications of FPGAs, advantages and disadvantages of FPGA, architecture of FPGA, recent technology trends, programming technologies, commercially available FPGAs.

Unit III

SRAM Field Programmable Gate Arrays: SRAM Programming Technology, SRAM Programmable FPGAs: Xilinx XC4000, Spartan-3 FPGA Architectures.

Unit IV

Anti-Fuse Programmed FPGAs: Anti-fuse Programming technology, The Actel ACT1, ACT2 and ACT3 architectures.

Unit V

Physical Design Implementation on FPGAs: FPGA Design flow, Physical Design cycle for FPGAs, Partitioning, Routing-non-segmented, segmented and staggered models.

Design Applications: General design issues, Counter design using FPGA, Designing Adders with the ACT Architecture.

Text Books:

1. Field Programmable Gate Array Technology, Stephen M. Trimberger, Springer International Edition, 1994.
2. Field-Programmable Gate Arrays, Stephen D. Brown, Springer, 1992
3. Fundamentals of digital logic with verilog design, Stephen Brown and Zvonko Vranesic, McGraw-Hill, 2002.

References:

1. Algorithms for VLSI Physical Design Automation, Naveed Sherwani, 3rd Edition, Springer International Edition, 2005
2. Fundamentals of Logic Design, Charles H. Roth Jr, 5th Edition, Cengage Learning, 2004.

Course Outcomes:

- CO1:** Design digital applications using PLDs.
- CO2:** Analyze the architectural features of FPGAs.
- CO3:** Analyze the SRAM programming technology of FPGAs.
- CO4:** Analyze the Anti-Fuse Programmed FPGA.
- CO5:** Analyze Physical Design cycle for FPGA and implement various applications using FPGA.

(EC20APE703)LOW POWER VLSI CIRCUITS AND SYSTEMS

Course Objectives:

1. Learn the operation of MOS transistor in Triode, Saturation and Cut-off regions.
2. Learn about the implementation of MOS dynamic circuits.
3. Learn the various types of power dissipations in a MOS transistor.
4. Enable the students to learn about the Scaling Models and Scaling factors.
5. Study in detail about the various approaches for minimizing leakage power MOS transistor circuits.

Unit I

MOS Transistors:

Introduction, Historical background, why low power, sources of power dissipations, low-power design methodologies, Structure of MOS Transistor, the Fluid model, Modes of operation of MOS Transistor and Electrical characteristics of MOS Transistors, MOS Transistors as a switch.

Unit II

MOS Inverters: Introduction, inverter and its characteristics, configurations, inverter ratio in different situations, switching characteristics.

MOS Combinational Circuits: introduction, Pass-Transistor logic, Gate logic, MOS Dynamic Circuits: Single-phase, Two-phase and CMOS dynamic circuits, Domino CMOS circuits and NORA logic.

Unit III

Sources of Power Dissipation:

Introduction, Short-circuit power dissipation, Switching power dissipation, Glitching power dissipation and Leakage power dissipation.

Unit IV

Supply voltage scaling for low power:

Introduction, device features size scaling, architecture-level approaches, voltage scaling, multilevel voltage scaling, challenges, dynamic voltage and frequency scaling and adaptive voltage scaling.

Unit V

Leakage Power Minimization:

Introduction, fabrication of multiple threshold voltages, approaches for minimizing leakage power, VTCMOS approach, Transistor stacking, MTCMOS approach, Adiabatic Logic Circuits-Adiabatic Charging, Adiabatic Amplification and Adiabatic logic gates.

Text Books:

1. Ajit Pal, "Low Power VLSI Circuits and Systems", Springer New Delhi, 2019.
2. W.Wolf "Modern VLSI Design IP based design" Fourth edition, PHI Learning Pvt. Ltd., 2020.

References:

1. K.Eshraghian, D.A. Pucknell and S.Eshraghian, "Essentials of VLSI Circuits and Systems", Third Edition, PHI Learning Pvt. Ltd., 2019.
2. Neil H. E. Weste & D.M.Harris, "CMOS VLSI Design-A Circuits and Systems Perspective", Fourth edition, Pearson Edition, 2020.

Course Outcomes:

- CO1:** Interpret the structure and various electrical characteristics of MOS transistor.
- CO2:** Compare Voltage–Current and transfer characteristics of inverters of different configurations
- CO3:** Evaluate the Power dissipation both at circuit level and system level.
- CO4:** Summarize the scaling effects of various key parameters of MOSFET devices.
- CO5:** Distinguish between standby and run-time leakage power dissipation.

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(EC20APE704)DIGITAL IMAGE PROCESSING

Course Objectives:

1. To introduce fundamentals of Image Processing.
2. To expose various transforms in frequency domains.
3. To describe various intensity transformations in spatial and frequency domains.
4. To disseminate various segmentation and compression techniques for image processing.
5. To discuss various color models and to introduce the concepts of color image processing.

Unit I

Digital Image Fundamentals:

A simple image model, Fundamental Steps in Digital Image Processing, Elements of visual perception, image sensing and acquisition, image sampling and quantization, basic relationships between pixels – neighborhood, adjacency, connectivity and distance measures

Unit II

Image Transforms:

Two dimensional Discrete Fourier transform, Walsh Transform, Discrete Cosine Transform, Hadamard transform, Haar transform, Slant transform, Wavelet Transforms – Introduction, continuous vs Discrete wavelet Transform, Discrete wavelet transform – Haar wavelet Transform.

Unit III

Image Enhancement and Filtering:

Gray level transformations, Histogram Processing, Histogram equalization and Specifications, Spatial Filtering, Smoothing filters, Sharpening filters, Enhancement in Frequency domain - Low-pass, High-pass and Homomorphic filtering.

Unit IV

Image Segmentation:

Point, Line and Edge Detection, Canny Edge Detection, Laplacian of Gaussian Edge Detection, Thresholding, Region Growing, Region Splitting and Merging

Image Compression:

Fundamentals of Compression, Image compression model, Types of Redundancy – Coding, Inter pixel and Psycho visual, Lossless compression – Huffman coding, Shannon-Fano coding, Lossy Compression – Transform coding.

Unit V

Color Image Processing:

Color Fundamentals, Color Models – RGB, YUV, HIS, Pseudo Color, Full Color image processing, Color transformations – formulation, Color complements, Color slicing, tone and Color corrections. Color image smoothing and Sharpening.

Text Books:

1. Rafael C. Gonzalez, Richard E. Woods and Steven L. Eddins, "Digital Image processing using MATLAB", Tata McGraw Hill, 2010.
2. K.P. Soman, "Insight Into Wavelets : from Theory to Practice", PHI Learning Pvt. Ltd., 2010

References:

1. Milan Sonka, Vaclav Hlavac, Roger Boule, Image Processing, Analysis, and Machine Vision, Third Edition, Cengage Learning, 2016.
2. S. Jayaraman, S. Esakkirajan, T. Veerakumar, "Digital Image processing", Tata McGraw Hill.
3. William K. Pratt, "Digital Image Processing", John Wiley, 3rd Edition, 2004.

Course Outcomes:

- CO1:** Understand fundamentals of digital image processing and apply engineering mathematics in processing of digital image.
- CO2:** Compute 2D transforms in frequency domains w.r.t digital image processing
- CO3:** Analyze different image enhancement techniques in spatial and frequency domains
- CO4:** Describe various techniques in image segmentation and apply various algorithms to perform image compression.
- CO5:** Illustrate various color models and apply color models in image processing.

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(EC20APE705) ELECTRONIC DEFENSE SYSTEMS

Course Objectives:

1. Study about the need for Weapon systems.
2. Learn about various Artillery Systems and its performance parameters.
3. Learn about the operation of Radar Warning Receivers.
4. Study about the various Electronic Countermeasures in Defense systems.
5. Know about the Antistealth Techniques and State of the Art and its Perspectives.

Unit I

Electronic Defense:

Introduction, Systems in use in the Armed Forces, The main weapon systems, Objectives of Electronic Defense-Organization of Electronic Defense, Electronic Defense Systems and their Operational Objective, Information Operation (IO), Information Warfare (IW) and Need for the Study of Weapon Systems.

Unit II

Sensors:

Infrared Sensors: Review of Radiant Energy, Infrared Radiation Produced by Targets of Interest, IR Range Equation, Suppression of Background Effects and IR Systems

Weapon Systems:

Introduction, Artillery Systems-Firing Accuracy, Susceptibility to Jamming of an Artillery System, Missile Systems-Command Missiles, Beam-Riding Missiles, Semiactive Homing Missiles, Active Homing Missiles, Track-Via-Missile (TVM) Systems, Passive IR-Guided Missiles, Sea-Skimming Missiles and Passive Antiradiation Missiles

Unit III

Electronic Intercept Systems:

Introduction, Equation of a Passive System, Radar Warning Receivers-RWR Sensitivity, Electronic Support Measures-Omnidirectional Antennas, Antennas for Direction Finding and Frequency Measurement Receiver, Electronic Intelligence (ELINT) Systems- ELINT Sensors, Surveillance Network and ELINT Processing Center (EWAC), Infrared Intercept Systems- Missile Launch Warner/Missile Approach

Warner, Forward-Looking Infrared Systems, Communications ESM and Communication Intelligence- Communications ESM and COMINT.

Unit IV

Electronic Countermeasures Systems:

Introduction, Operational Jamming Modes: SPJ, SOJ, and EJ, Onboard ECM Systems- Passive Systems, Active Systems, The Jammer Equations, The DRFM, Transmitters, ECM Antennas, The Pod, ECM Techniques-Spot Noise, Barrage Noise, Swept Noise/CW and Gated Noise, High-Resolution Radar Jamming, Infrared Countermeasures(IRCM)-Modulated Sources, Laser IRCM, Off-Board ECM Systems- Passive Systems, Active Systems and Communications Countermeasures

Unit V

New Electronic Defense Techniques and Technologies:

Introduction, New Electronic Defense Architectures, ED Basic Technology Advances, Shared Apertures, HPM Weapons, Anti-Antiradiation Missile Techniques, Antistealth Techniques and State of the Art and Perspectives.

Text Books:

1. Filippo Neri, "Introduction to Electronic Defense Systems", Second Edition, Artech House, Boston, 2017.
2. Ray Tricker, "Defence Electronics" Second edition, Butterworth-Heinemann, 2015.

References:

1. Warren J. Boord and John B. Hoffman, "Air and Missile Defense Systems Engineering", First Edition, CRC Press, Taylor and Francis Group, 2018.
2. William P. Delaney, "Perspectives on Defense Systems Analysis", MIT Lincoln Laboratory Series, 2019.

Course Outcomes:

- CO1:** Summarize the objectives of Electronic Defense Systems.
- CO2:** Interpret the operating principles of various Artillery Systems.
- CO3:** Analyze Radar warning receivers, Electronic support systems and Electronic intelligence systems.
- CO4:** Illustrate the working principle of various jamming techniques in different operational modes.
- CO5:** Discuss newly designed systems to counter the recent threat embodied in stealth aircrafts.

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(EC20APE706) SMART SENSOR NETWORKS

Course Objectives:

1. Study about the Sensor systems and its various characteristics.
2. Learn about Transduction Mechanisms and its Application range in Biosensors.
3. Learn about the parameters of interest related to Chemical sensors, Capacitive and Inductive Sensors for use in real-time applications.
4. Study the working principle and applications of Temperature and Nanotechnology-Enabled Sensors.
5. Understand the issues pertaining to sensor networks and the challenges involved in managing a sensor network.

Unit I

Sensor Fundamentals:

Introduction, Sensor Systems, Sensor Characteristics, System Characteristics, Instrument Selection, Data Acquisition and Readout, Installation and Conditioning Bridge Circuits

Unit II

Sensors-I:

Introduction, Technology Fundamentals, Selecting and Specifying Accelerometers, Applicable Standards, Interfacing and Designs.

Biosensors: What is a Biosensor, Applications of Biosensors, Origin of Biosensors, Bioreceptor Molecules, Transduction Mechanisms in Biosensors, Application Range of Biosensors and Future prospects.

Unit III

Sensors-II:

Chemical Sensors: Technology Fundamentals and Applications.

Capacitive and Inductive Displacement Sensors: Introduction, Capacitive Sensors, Inductive Sensors, Capacitive and Inductive Sensor Types, Selecting and Specifying Capacitance and Inductive Sensors, Comparing Capacitive and Inductive Sensors, Applications, Latest Developments.

Unit IV : Sensors-III

Temperature Sensors: Sensor Types and Technologies, Selecting and Specifying Temperature Sensors.

Nanotechnology-Enabled Sensors: Possibilities, Realities and Applications.

Unit V

Introduction to Wireless Sensor Networks: Challenges for Wireless Sensor Networks, Applications for Wireless Sensor Networks, Enabling Technologies for Wireless Sensor Networks, Single Node Architecture-Hardware Components, Energy Consumption of Sensor Nodes.(Only Operation Stats With Different Power Consumption of Sensor and Actuators is Included), Deployment Environments Sensor Network Architecture-Sensor network scenarios, Optimization Goals and Figures of Merit, Design Principles of WSN, Service Interfaces of WSNs and Gateway-Concepts.

Text Books:

1. John S. Wilson, "Sensor Technology Handbook", Elsevier Inc., 2012.
2. Holger Karl and Andreas Willig, "Protocols and Architectures for Wireless Sensor Networks", Third Edition, John Wiley & Sons, Ltd., 2016.

References:

1. Alan S Morris, "Measurement and Instrumentation Principles", Third Edition, Butterworth-Heinemann, 2016.
2. John R.Taylor, "Introduction to Error Analysis: The Study of Uncertainties in Physical Measurements", Second Edition, University Science Books, California, 2014.

Course Outcomes:

- CO1:** Discuss the various characteristics of Sensors and Systems.
- CO2:** Interpret the various Transduction Mechanisms in Biosensors.
- CO3:** Decide the appropriate sensor for a given application of interest.
- CO4:** Outline the Possibilities and Realities of Nanotechnology-Enabled Sensors.
- CO5:** Explore the Physical layer, Transceiver design considerations and Assignment of MAC addresses.

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(EC20APE707) DATA COMMUNICATION AND NETWORKING

Course Objectives:

1. Provide a solid conceptual understanding of the fundamentals of data communication.
2. Explore the various layers of TCP/IP and OSI network models and protocols.
3. Explore the various protocols used in data communication networks.
4. Make students to understand related to computer networks.

Unit I

Data Communication: Advantages and applications of Computer Networks, Components, Networks, Protocols and Standards, ISO-OSI and TCP/IP Network Models.

Physical Layer: Transmission media-guided and Unguided, Switching systems - Circuit switching, Packet switching - Datagram switching & Virtual circuit switching.

Unit II

Data link layer: Framing, Flow and Error control, Protocols - Stop-and-wait Protocol, Stop-and-wait ARQ, Sliding window protocol, Go-Back-N ARQ, Selective Repeat ARQ, HDLC, Point to Point Protocol.

Unit III

Medium Access Sub layer: Multiple access techniques - random access and controlled access, Channelization, multiple access protocols, IEEE standard 802.3 & 802.11 for LANS and WLAN, Connecting Devices - repeaters, hubs, bridges, switches, routers, Gateway, Backbone networks, Virtual LANs.

Unit IV

Network Layer: Addressing types - Physical, Logical & port address, Internetworking, IP addressing (Class full & Classless), Network layer protocols - ARP, RARP, BOOTP, DHCP, IPV4, ICMP, IPV6, ICMPV6, IGMP, Unicast and Multicast Routing protocols.

Unit V

Transport Layer: Process to process delivery, Connection oriented & Connectionless Transport, UDP, TCP, congestion control and Quality of Service.

Application Layer: Application layer protocols - DNS, WWW and HTTP, FTP, SMTP. Introduction to streaming Audio/Video.

Text Books:

1. Behrouz A. Forouzan, "Data Communications and Networking", McGraw Hill, 4th Edition.
2. S. Tannenbum, D. Wetherall, "Computer Networks", Prentice Hall, Pearson, 5th Edition.

Reference Books:

1. Fred Halsall, "Computer Networks", Addison – Wesley Pub. Co. 1996.
2. Larry L, Peterson and Bruce S. Davie, "Computer Networks: A system Approach", Elsevier, 4th Edition.
3. Tomasi, "Introduction To Data Communications & Networking", Pearson 7th impression, 2011
4. William Stallings, "Data and Computer Communications", Prentice Hall, Imprint of Pearson, 9th Edition.

Course Outcomes:

- CO1.** Choose the appropriate technology for data transmission based on the requirement by analysing various computer networks.
- CO2.** Analyze different flow and error control protocols.
- CO3.** Analyze different multiple access protocols and network standards, connecting devices.
- CO4.** Configure simple networks and assign IP addresses to hosts.
- CO5.** Apply the concept of different application layer protocols and provide congestion free quality service.

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(EC20APE708) SATELLITE COMMUNICATIONS

OBJECTIVES

1. To enable the student to become familiar with satellites and satellite services.
2. Study the satellite orbits and launching.
3. Study the earth segment and space segment components
4. Study the satellite access by various users.

UNIT I

SATELLITE ORBITS

Kepler's Laws, Newton's Law, Orbital Parameters, Orbital Perturbations, Station Keeping, Geo Stationary and Non Geo-Stationary Orbits, Look Angle Determination, Limits of Visibility, Eclipse, Sub Satellite Point, Sun Transit Outage, Launching Procedures Launch Vehicles and Propulsion.

UNIT II

SPACE SEGMENT

Spacecraft Technology, Structure, Primary Power, Attitude and Orbit Control, Thermal Control and Propulsion, Communication Payload and Supporting Subsystems, Telemetry, Tracking and Command, Transponders, The Antenna Subsystem.

UNIT III

SATELLITE LINK DESIGN

Basic Link Analysis, Interference Analysis, Rain Induced Attenuation and Interference, Ionospheric Characteristics, Link Design with and without Frequency Reuse.

UNIT IV

SATELLITE ACCESS AND CODING METHODS

Modulation and Multiplexing: Voice, Data, Video, and Analog, Digital Transmission System, Digital Video Broadcast, And Multiple Accesses: FDMA, TDMA, CDMA, DAMA Assignment Methods, Compression, Encryption, Coding Schemes.

UNIT V

SATELLITE APPLICATIONS

INTELSAT Series, INSAT, VSAT, Mobile Satellite Services: GSM, GPS, INMARSAT, LEO, MEO, Satellite Navigational System. GPS Position Location Principles, Differential GPS, Direct Broadcast satellites (DBS/DTH).

TEXT BOOKS

1. Dennis Roddy, "Satellite Communication", 4th Edition, Mc Graw Hill International, 2006.
2. Timothy, Pratt, Charles, W. Bostain, Jeremy E. Allnutt, "Satellite Communication", 2nd Edition, Wiley Publications, 2002.

REFERENCES

1. Wilbur L. Pritchard, Hendri G. Snyderhoud, Robert A. Nelson, "Satellite Communication Systems Engineering", Prentice Hall/Pearson, 2007.
2. N. Agarwal, "Design of Geosynchronous Space Craft", Prentice Hall, 1986.
3. Bruce R. Elbert, "The Satellite Communication Applications", Hand Book, Artech House Boston London, 1997.

COURSE OUTCOMES

CO1: Define orbital mechanics and launch methodologies.

CO2: Describe satellite subsystems.

CO3: Design link power budget for satellites.

CO4: Compare competitive satellite services.

CO5: Explain satellite access techniques and DTH and compression standards.

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(EC20APE709) WIRELESS SENSOR NETWORKS

COURSE OBJECTIVES

1. To make students understand the basics of Wireless sensor Networks.
2. To familiarize with learning of the Architecture of WSN.
3. To understand the concepts of Networking and Networking in WSN.
4. To study the design consideration of topology control and solution to the various problems.
5. To introduce the hardware and software platforms and tool in WSN.

UNIT I

OVERVIEW OF WIRELESS SENSOR NETWORKS

Single Node Architecture- Hardware Components- Network Characteristics- unique constraints and challenges, Enabling Technologies for Wireless Sensor Networks-Types of wireless sensor networks

UNIT II

ARCHITECTURES

Network Architecture - Sensor Networks Scenarios - Design Principle, Physical Layer and Transceiver Design Considerations, Optimization Goals and Figures of Merit, Gateway Concepts, Operating Systems and Execution Environments - introduction to Tiny OS and nesC - Internet to WSN Communication.

UNIT III

NETWORKING SENSORS

MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts-SMAC, B-MAC Protocol, IEEE 802.15.4 standard and Zigbee, the Mediation Device Protocol, Wakeup Radio Concepts, Address and Name Management, Assignment of MAC Addresses, Routing Protocols Energy Efficient Routing, Geographic Routing.

UNIT IV

INFRASTRUCTURE ESTABLISHMENT

Topology Control, Clustering, Time Synchronization, Localization and Positioning, Sensor Tasking and Control.

UNIT V

SENSOR NETWORK PLATFORMS AND TOOLS

Sensor Node Hardware-Berkeley Motes, Programming Challenges, Node level software platforms, Node- level Simulators, State centric programming

BOOKS:

1. Kazem Sohraby, Daniel Minoli, & Taieb Znati, "Wireless Sensor Networks - Technology, Protocols, and Applications", John Wiley, 2007.
2. Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003

COURSE OUTCOMES

CO1: Understand challenges and technologies for wireless networks.

CO2: Understand architecture and sensors.

CO3: Describe the communication, energy efficiency, computing, storage and transmission.

CO4: Establishing infrastructure and simulations.

CO5: Explain the concept of programming the in WSN environment.

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(CE20AOE701) Air Pollution and Quality Control

Course Objectives:

After studying this course, students will be able to:

- The objectives of the course are to understand the Air pollution Concepts
- Identify the source of air pollution
- To know about Air pollution Control devices and distinguish the Air quality monitoring devices

UNIT –I

Introduction to Air Pollution

Introduction: Sources, effects on ecosystems, classification and characterization of air pollutants, Air Pollution Episodes of environmental importance. Indoor air pollution –sources, Effects.

Learning outcomes:

- Understanding the basic Air pollution concepts
- Identifying the source of air pollution
- To understand the character of atmospheric pollutants and their effects

UNIT II

Effects of Air Pollution

Effects of Air pollutants on man, material and vegetation: Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holes etc.

Learning outcomes:

- To know effects of air pollution on man
- To know effects of air pollution on material and vegetation

UNIT – III

Plume Behavior

Meteorology and plume Dispersion; properties of atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity, Influence of Meteorological phenomena on Air Quality-wind rose diagram.

Learning outcomes:

- Understand the composition and structure of atmosphere
- To Understand the wind rose diagram

UNIT – IV

Control Techniques

Particulate matter and gaseous pollutants- settling chambers, cyclone separators, scrubbers, filters & ESP.

Learning outcomes:

- Learning about air pollution control techniques
- Study on latest devices and advancements in existing devices
- Choose and design control techniques for particulate and gaseous emissions.

UNIT –V

Noise Pollution

Noise pollution–Sources, Measurements, effects and control, noise standards. Environmental issues, global episodes, laws, acts, protocols.

Learning outcomes:

- Learning about noise pollution.
- Understand the laws, acts and protocols related to noise pollution & control

Course Outcomes (CO):

After studying this course, students will be able to:

- Identify the major sources of air pollution
- Understand their effects on health and environment.
- Evaluate the dispersion of air pollutants in the atmosphere and to develop air quality models.
- Choose and design control techniques for particulate and gaseous emissions.
- Understand the noise pollution and control methods.

Textbooks:

1. Noel De Nevers, "Air Pollution Control Engineering" , Waveland PrInc 2016
2. Anjaneyulu Y, "Text book of Air Pollution and Control Technologies", Allied Publishers
3. M.N. Rao and HVN Rao, Air Pollution, Tata McGraw Hill Publishers 2017

Reference Books:

1. Nevers, "Air Pollution Control Engineering", McGraw-Hill, Inc., 2000.
2. Dr. B.S.N. Raju, "Fundamentals of Air Pollution" Oxford & I.B.H.
3. T. Holgate, Hillel S. Koren, Jonathan M. Samet, Robert L. "Air Pollution and Health" Maynard publisher Academic Press.

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(ME20AOE703) INTRODUCTION TO INDUSTRIAL ENGINEERING

Pre-Requisite: Operation Research, Production & Operation Management

Course Objectives:

- Through reading the text, references and discussion of cases students should be able to understand the fundamentals underlying the management of an Organization.
- Understand where the plant is to be located based on facilities available and what are the important factors affecting the facilities location of a plant, and plant layout.
- Determine work measurement techniques for time study.
- Recognize the importance of Inventory control to ensure their availability with minimum capital lock up.
- Understand the concepts of TQM, ISO, BIS etc.

UNIT – 1:

Concepts of Management-Administration and Organization – Functions of Management– Schools of Management Thought: Taylor’s Scientific Management, Fayol’s Principles of Management, Douglas Mc-Gregor’s Theory X and Y, Mayo’s Hawthorne Experiments, Herzberg’s Two factor Theory of Motivation, Maslow’s Hierarchy of Human needs – Systems Approach to Management. Organizational Structures- Functional- Divisional- Matrix etc., Basic Concepts Related to Organization.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concepts of Management, Scientific management, management theories etc. (L2)
- Define the types of structures of an organization. (L2)

UNIT – 2:

Plant Location: Definition, Factors affecting the Plant Location, Comparison of Rural and Urban sites, Selection of Plant Location, Plant Layout: Definition, Objectives, Types of Plant Layout.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand where the plant is to be located based on facilities available and what are the important factors affecting the facilities location of a plant, and plant layout. (L2)
- Analyze plant layout design to facilitate material flow and processing of a product in the most efficient manner through the shortest possible time. (L4)

UNIT – 3:

Work Study – Definition, Objectives, Method Study – Steps Involved – Various Types of Process Charts –Micro motion and Memo motion Studies. Work Measurement - Definition, Time Study, Steps involved - Equipment, Different Methods of Performance Rating - Allowances, Standard Time Calculation. Work Sampling - Definition, Steps Involved, Standard Time Calculations - Applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concepts of Work study, Method study, steps, process charts etc. (L2)
- Determine work measurement techniques for time study (L3)
- Evaluate Work sampling methods to calculate standard time. (L4)

UNIT – 4:

Inventory Models- Deterministic models- EOQ Models – With and Without Shortages Models; Inventory Models with Price Breaks -Probabilistic Models –Discrete Variable, Continuous Variable. Inventory Control Systems

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concepts of Inventory, Classification, Functions, it's associated costs etc., (L2)
- Determine the Economic order quantity. (L2)

UNIT – 5:

Inspection & Quality Control: Statistical Quality Control- Techniques-Variables and Attributes- Control Charts: X and R Charts; P Charts and C Charts. Introduction to TQM- Quality circles-BIS & ISO Standards-Importance.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the Inspection and Quality control concepts. (L2)
- Apply SQC techniques of Variables and attribute charts for effective inspection. (L3)
- Understand the concepts of TQM, ISO, BIS etc. (L2)

Textbooks:

1. Manufacturing Organization and Management, T.Amrine/ Pearson, 2nd Edition, 2004
2. Industrial Engineering and Management ,O.P.Khanna, DhanpatiRai, 18th edition, 2013.
3. Industrial Engineering and Management, Dr. C.Nadamuni Reddy, New Age International Publishers, 1st edition, 2011.

Reference Books:

1. Industrial Engineering and production management, MartindTelsang S.Chand..
2. Work Study by ILO(International Labour Organization)
3. Management by James AF Stoner, Freeman 6th Ed, Pearson Education, New Delhi,2005
4. Production and Operations management, PanneerSelvam, PHI,2004.
5. Statistical Quality Control by EL Grantt, McGrawhil
6. Motion and time studies by Ralph M Barnes, John Wiley and Sons,2004

Course Outcomes:

At the end of the course, the student will be able to

- **Understand** the various concepts, principles and theories of management. (L2)
- **Understand** the structure of an organization through understanding various structures of organizations. (L2)
- **Understand** where the plant is to be located based on facilities available and what are the important factors affecting the facilities location of a plant, and plant layout. (L2)
- **Understand** the concepts of Work study, Method study, steps, process charts etc. (L2)
- **Define** Work sampling and methods of work sampling to calculate standard time. (L4)
- **Understand** the concepts of Inventory, Classification, Functions, it's associated costs etc., (L2)
- **Recognize** the importance of Inventory control to ensure their availability with minimum capital lock up. (L1)

Apply SQC techniques of Variables and attribute charts for effective inspection. (L4)

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(EE20AOE701) EMBEDDED SYSTEMS

Course Objectives:

The objective of this course is to

1. To understand the basics of an embedded system and RTOS.
2. To introduce the typical components of an embedded system and different communication interfaces.
3. To provide knowledge on the design process of embedded system

UNIT I - Introduction to Embedded Systems

Definition of Embedded System, Embedded Systems Vs General Computing Systems, History and classification of Embedded Systems, Major Application Areas, Characteristics and Quality Attributes of Embedded Systems.

UNIT II - Typical Embedded System

Core of the Embedded System - General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory - ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: Onboard and External Communication Interfaces

UNIT III - Embedded Firmware

Fundamental issues in hardware software co-design, Embedded Firmware Design Approaches and Development Languages.

UNIT-IV - RTOS based Embedded System Design

Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.

UNIT-V - Task Communication

Task Communication - Shared Memory, Message Passing, Remote Procedure Call and Sockets, Task Synchronization - Task Communication/Synchronization Issues, Task Synchronization Techniques, Device Drivers, Methods to Choose an RTOS.

Text Books:

1. Introduction to Embedded Systems - Shibu K.V, Mc Graw Hill.
2. An Embedded software primer - David E. Simon, Pearson Ed. 2005.

References:

1. Embedded Systems - Raj Kamal, TMH.
2. Embedded System Design - A Unified Hardware/Software Introduction - Frank Vahid, Tony d. Givargis, John Wiley, 2002.

Course Outcomes:

After completion of the course, student will be able to:

CO1: Understand the selection procedure of Processors in the embedded domain.

CO2: Explain different components of embedded system.

CO3: Design Procedure for Embedded Firmware.

CO4: Describe the role of Real time Operating Systems in Embedded Systems.

CO5: Evaluate the Correlation between task synchronization and latency issues.

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(AM20A0E601)Machine Learning Tools & Techniques

UNIT I

Introduction: Introduction to Machine Learning: Introduction. Different types of learning, Hypothesis space and inductive bias, Evaluation. Training and test sets, cross validation, Concept of over fitting, under fitting, Bias and Variance.

Linear Regression: Introduction, Linear regression, Simple and Multiple Linear regression, evaluating regression fit.

UNIT II

Decision tree learning: Introduction, Decision tree representation, appropriate problems for decision tree learning, the basic decision tree algorithm, hypothesis space search in decision tree learning, inductive bias in decision tree learning, issues in decision tree learning, Python exercise on Decision Tree.

(Principal Component Analysis) ,Python exercise on kNN and PCA.

UNIT III

Instance based Learning: K nearest neighbor, the Curse of Dimensionality, **Feature Selection:** forward search, backward search, univariate , multivariate feature selection approach, Feature reduction.

Probability and Bayes Learning(Move to Data Mining): Bayesian Learning, Naïve Bayes, Python exercise on Naïve Bayes, Logistic Regression.

UNIT IV

Support Vector Machine: Introduction, the Dual formulation, Maximum margin with noise, nonlinear SVM and Kernel function, solution to dual problem.

Artificial Neural Networks: Introduction, Biological motivation, ANN representation, appropriate, problem for ANN learning, Perceptron, multilayer networks and the back propagation algorithm;

UNIT V

Ensembles: Introduction, Bagging and boosting, Random forest, Clustering: Introduction, K-mean clustering, agglomerative hierarchical clustering, Python exercise on k-mean clustering.

TEXTBOOKS

1. Machine Learning. Tom Mitchell. First Edition, McGraw- Hill, 1997.
2. Alpaydin, Ethem. Introduction to machine learning. MIT press, 2020.

REFERENCES

1. Kevin P. Murphy, "Machine Learning: A Probabilistic Perspective", MIT Press, 2012

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(CS20A0E503)Structured Query Language

Course Objectives:

- To be able to write SQL statements that edit existing data. Be able to write SQL statements that create database objects.
- To understand the structure and design of relational databases and understand the importance and major issues of database security and the maintenance of data integrity.
- To add, update, or delete records within a database.
- SQL can create new databases.
- SQL users can add new tables to an existing database.
- SQL can create views or stored procedures in a database.

UNIT-I

Introduction to Database and RDBMS, Introduction to SQL, Database Engine, SQL Syntax, Introduction to mysql workbench, mysql workbench usage. SQL Datatypes and operators.

Learning Outcomes:

At the end of the unit, students will be able to:

- 1.Distinguish between DBMS and RDBMS
- 2.Explain about mysql.
- 3.Know usage of mysql workbench.
- 4.List datatypes of sql for different workbench.

UNIT-II

SQL Database: create database, use database, drop database, rename database, delete database.

SQL table: create table, drop table, delete table, rename table, truncate table, copy table and alter table.

Learning Outcomes:

At the end of the unit, students will be able to:

1. Create databases and tables
2. Perform operations on database as well as table.
3. Explain Databases and its usage.

UNIT-III

SQL SELECT: Select statement, select IN, Select Multiple, Select Date.

SQL WHERE clause, SQL AS, SQL HAVING clause.

DDL (data definition language) commands in SQL.

Learning Outcomes:

At the end of the unit, students will be able to:

1. Use select statement to retrieve data.
2. List DDL commands

UNIT-IV

DML (Data manipulation Language) commands in SQL.

SQL Keys: Primary key, foreign key, unique key.

Learning Outcomes:

At the end of the unit, students will be able to:

1. List DML commands
2. Construct key relationships on a table.

3.Explain types of keys and its uses

UNIT-V

SQL Insert: INSERT statement, INSERT INTO statement, INSERT multiple rows.

SQL joins:Types of joins(four types along with an examples).

Learning Outcomes:

At the end of the unit, students will be able to:

- 1.Insert data into the table.
- 2.Explain how to join more than one table..

TEXT BOOKS:

1. Getting Started with SQL Author: Thomas Nield ,Edition: 1st Edition
2. SQL: A Step-by-Step Guide for Beginners , by Daniel Bell.

REFERENCE BOOKS:

- 1.SQL Quickstart Guide: The Simplified Beginner's Guide to SQL Paperback – 11 March 2015

Online Learning Resources:

- 1.<https://www.guru99.com/sql.html>
- 2.<https://www.w3schools.com/sql/>

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(EE20AOE704) INTRODUCTION TO SMART GRID & ELECTRIC VEHICLES

COURSE OBJECTIVES

- To understand various aspects of smart grid.
- To Study about Smart Grid technologies, different smart meters and advanced metering infrastructure.
- To familiarize the power quality management issues in Smart Grid.
- To familiarize the high performance computing for Smart Grid applications.

UNIT 1 INTRODUCTION TO SMART GRID

Evolution of Electric Grid, Concept, Definitions and Need for Smart Grid, Smart grid drivers, functions, opportunities, challenges and benefits, Difference between conventional & Smart Grid, Concept of Resilient & Self Healing Grid, Present development & International policies in Smart Grid.

UNIT 2 SMART GRID TECHNOLOGIES AND SMART METERS

Components and Architecture of Smart Grid Design, Smart Grid Communication, Introduction to Smart Meters, Advanced Metering infrastructure (AMI) drivers and benefits, AMI protocols, standards and initiatives, AMI needs in the smart grid, Phasor Measurement Unit(PMU), Intelligent Electronic Devices(IED)

UNIT 3 POWER QUALITY MANAGEMENT IN SMART GRID

Power Quality & EMC in Smart Grid, Power Quality issues of Grid connected Renewable Energy Sources, Power Quality Conditioners for Smart Grid, Web based Power Quality monitoring, Power Quality Audit. Need of CLOUD Computing and Cyber Security for Smart Grid.

UNIT 4 Hybrid Electric Vehicles

Concepts of hybrid electric drive train, types, architecture of series and parallel hybrid electric drive train, merits and demerits, series and parallel hybrid electric drive train design.

UNIT 5 Energy Storages

Electrochemical batteries – lead acid batteries and lithium based batteries, Ultra capacitors, Flywheels. Basic principles of Fuel Cell and Solar Cell.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Illustrate the concepts of Smart Grid and its present developments.

CO2 - Analyze the various Smart Grid technologies.

CO3 - Realize the power quality management in Smart Grids.

CO4 - Analyze the concepts of Hybrid Electric Vehicles.

CO5 – Apply the Concepts of Energy Storage system technologies in Smart Grid.

TEXT BOOKS:

1. Stuart Borlase "Smart Grid: Infrastructure, Technology and Solutions", CRC Press 2012.
2. Janaka Ekanayake, Nick Jenkins, Kithsiri Liyanage, Jianzhong Wu, Akihiko Yokoyama, "Smart Grid: Technology and Applications", Wiley, 2012.
3. Larminie, J. and Lowry, J. (2012) Electric Vehicle Technology Explained, Second Edition. John Wiley & Sons, Chichester
4. Alfred Rufer, Energy Storage: Systems and Components, CRC Press, 2017

REFERENCE BOOKS:

1. Vehbi C. Güngör, Dilan Sahin, Taskin Kocak, Salih Ergüt, Concettina Buccella, Carlo Cecati, and Gerhard P. Hancke, "Smart Grid Technologies: Communication Technologies and Standards", IEEE Transactions On Industrial Informatics, Vol. 7, No. 4, November 2011.
2. Xi Fang, Satyajayant Misra, Guoliang Xue, and Dejun Yang "Smart Grid – The New and Improved Power Grid: A Survey", IEEE Transaction on Smart Grids, Vol.14, No.4, pp.944-980, 2012.
3. Denton, T. (2013) Automobile Electrical and Electronic Systems. Routledge, London.

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(MA20AOE701) NUMERICAL METHODS FOR ENGINEERS

Course objectives:

This course aims at providing the student with the knowledge on various numerical methods for solving equations, interpolating the polynomials, evaluation of integral equations and solution of differential equations.

UNIT-I:

Solution of Algebraic & Transcendental Equations:

Introduction-Bisection method-Iterative method-Regula falsi method-Newton Raphson method. System of Algebraic equations: Gauss Jordan method-Gauss Siedal method.

Learning Outcomes:

Students will be able to

- Calculate the roots of equation using Bisection method and Iterative method.
- Calculate the roots of equation using Regula falsi method and Newton Raphson method.
- Solve the system of algebraic equations using Gauss Jordan method and Gauss Siedal method.

UNIT-II:

Curve Fitting

Principle of Least squares- Fitting of curves- Fitting of linear, quadratic and exponential curves.

Learning Outcomes:

Students will be able to

- understand curve fitting
- understand fitting of several types of curves

UNIT-III:

Interpolation

Finite differences-Newton's forward and backward interpolation formulae – Lagrange's formulae. Gauss forward and backward formula, Stirling's formula, Bessel's formula.

Learning Outcomes:

Students will be able to

- Understand the concept of interpolation.
- Derive interpolating polynomial using Newton's forward and backward formulae.
- Derive interpolating polynomial using Lagrange's formulae.
- Derive interpolating polynomial using Gauss forward and backward formulae.

UNIT-IV:

Numerical Integration

Numerical Integration: Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule

Learning Outcomes:

Students will be able to

- Solve integral equations using Simpson's 1/3 and Simpson's 3/8 rule.
- Solve integral equations using Trapezoidal rule.

UNIT-V:

Solution of Initial value problems to Ordinary differential equations

Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Modified Euler's Method-Runge-Kutta Methods.

Learning Outcomes:

Students will be able to

- Solve initial value problems to ordinary differential equations using Taylor's method.
- Solve initial value problems to ordinary differential equations using Euler's method and Runge Kutta methods.

Course Outcomes:

After the completion of course, students will be able to

- Apply numerical methods to solve algebraic and transcendental equations.
- Understand fitting of several kinds of curves.
- Derive interpolating polynomials using interpolation formulae.
- Solve differential and integral equations numerically.

Text Books:

1. B.S.Grewal, "Higher Engineering Mathematics", Khanna publishers.
2. Ronald E. "Probability and Statistics for Engineers and Scientists", Walpole, PNIE.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India

Reference Books:

1. B.V.Ramana, "Higher Engineering Mathematics", Mc Graw Hill publishers.
2. Alan Jeffrey, "Advanced Engineering Mathematics", Elsevier.

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(CE20AOE704) Environmental Impact Analysis & Management

Course Objectives:

- To impart knowledge on different concepts of Environmental Impact Assessment.
- To teach procedures of risk assessment.
- To teach the EIA methodologies and the criterion for selection of EIA methods.
- To teach the procedures for environmental clearances and audit.
- To know the impact quantification of various projects on the environment.

UNIT –I

Concepts and methodologies of EIA

Initial environmental Examination, Elements of EIA, - Factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters- Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods.

Learning outcomes:

After completion of this unit student will

- Understand the elements of EIA.
- Explain the criteria for selection of EIA methodology

UNIT II

Impact of Developmental Activities and Land Use

Introduction and Methodology for the assessment of soil and ground water, EIA in surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface waterenvironment, Air pollution sources, Generalized approach for assessment of Air pollution Impact

Learning outcomes:

After completion of this unit student will

- Study the factors causing impact of development activities
- Decide mitigation measures of pollution on environment

UNIT – III

Assessment of Impact on Vegetation& Wildlife

Introduction - Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation.

Learning outcomes:

After completion of this unit student will

- Understand effect of development activities on environment.
- Know the design procedures for assessment of environmental risk

UNIT – IV

Environmental Audit

Introduction - Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocol, stages of Environmental Audit, onsite activities, evaluation of Audit data.

Learning outcomes:

After completion of this unit student will

- Learn about the process of environmental auditing.
- Understand procedures for preparation of environmental audit report

UNIT –V

Environmental Acts and Notifications

The Environmental protection Act, The water preservation Act, The Air (Prevention & Control of pollution Act), Wild life Act - Provisions in the EIA notification, procedure for environmental clearance, procedure for conducting environmental impact assessment report- Evaluation of EIA report. Concept of ISO and ISO 14000.

Learning outcomes:

After completion of this unit student will

- Understand the importance of environmental protection acts
- Explain acts and notifications in Environmental legislation

CourseOutcomes (CO):

- To prepare EMP, EIS, and EIA report.
- To identify the risks and impacts of a project.
- To choose an appropriate EIA methodology.
- To evaluation the EIA report.
- To Estimate the cost benefit ratio of a project

Textbooks:

1. Canter Larry W., "Environmental Impact Assessment", McGraw-Hill education Edi (1996)
2. Y. Anjaneyulu, "Environmental Impact Assessment Methodologies", B. S. Publication, Hyderabad 2nd edition 2011

Reference Books:

1. Peavy, H. S, Rowe, "Environmental Engineering", D. R, Tchobanoglous, G.Mc-Graw Hill International Editions, New York 1985
2. J. Glynn and Gary W. Hein Ke, "Environmental Science and Engineering", Prentice Hall Publishers 1988
3. Suresh K. Dhaneja, S.K., "Environmental Science and Engineering", Katania& Sons Publication, ND

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(ME20AOE704) INTRODUCTION TO PRODUCT MARKETING

Pre-Requisite: Managerial Economics & Financial Analysis

Course Objectives:

- Introduce the basic concepts of Product marketing.
- Familiarize with market information systems and research.
- Understand the nature and importance of industrial market.
- Discuss the major stages in new product development.
- Identify the factors affecting pricing decisions.

UNIT – 1:

Historical development of marketing management, Definition of Marketing, Core marketing concepts, Marketing Management philosophies, Micro and Macro Environment, Characteristics affecting Consumer behaviour, Types of buying decisions, buying decision process.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concepts of Marketing management, philosophies etc. (L2)
- Classification of consumer products, types of buying decisions. (L2)

UNIT – 2:

Components of marketing information system–benefits & uses marketing research system, marketing research procedure, Demand Estimation research, Test marketing, Sales forecasting: objective and subjective methods. Nature and importance of the Industrial market, major factors influencing industrial buying behavior, characteristics of industrial market demand.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply skills and techniques in designing data collection instruments including surveys. (L3)
- Sales Forecast of objective and subjective methods to analyze market demand. (L4)

UNIT – 3:

The concept of a product, features of a product, classification of products, product policies – product planning and development, product line, product mix – factors influencing change in product mix, product mix strategies, meaning of “New – product; major stages in new – product development product life cycle.

Learning Outcomes:

At the end of this unit, the student will be able to

- Demonstrate an understanding of fundamental concepts related to product and branding. (L2)
- Evaluate new product and branding ideas. (L5)

UNIT – 4:

Importance of Price, pricing objectives, factors affecting pricing decisions, procedure for price determination, kinds of pricing, pricing strategies and decisions Labeling: Types, functions advantages and disadvantages, Packaging: Meaning, growth of packaging, function of packaging, kinds of packaging.

Learning Outcomes:

At the end of this unit, the student will be able to

- Distinguish relevant from irrelevant costs when setting prices. (L3)
- Analyze competition for pricing decisions. (L3)

UNIT – 5:

Advertising and sales promotion: Objectives of advertisement, function of advertising, classification of advertisement copy, advertisement media – kinds of media, advantages of advertising. Objectives of sales promotion, advantages sales promotion. Personal Selling : Objectives of personal selling, qualities of good salesman, types of salesman, major steps in effective selling.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concepts of Advertisement and their classifications. (L2)
- Analyze a firm’s marketing and promotional situation. (L4)

Textbooks:

1. Philip Kotler, Principles of Marketing, Prentice – Hall.
2. Philip Kotler, Marketing Management, Prentice – Hall.

Reference Books:

1. William J Stanton, Fundamentals of Marketing, McGraw Hill
2. R.S.N. Pillai and Mrs. Bagavathi, Marketing, S. Chand & Co. Ltd.
3. Rajagopal, Marketing Management Text & Cases, Vikas Publishing House.

Course Outcomes:

At the end of the course, the student will be able to

- Understand basic marketing management concepts and their relevance to business development. (L2)
- Prepare a questionnaire for market research. (L5)
- Design marketing research plan for business organizations. (L5)
- Optimize marketing mix to get competitive advantage. (L4)

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(EE20AOE703) IOT APPLICATIONS IN ELECTRICAL ENGINEERING (OPEN ELECTIVE)

COURSE OBJECTIVES

- To program Arduino to control lights, motors, and other devices.
- To learn Arduino's architecture, including inputs and connectors for add-on devices.
- To add third-party components such as LCDs, accelerometers, gyroscopes, and GPS trackers to extend Arduino's functionality.
- To understand various options in programming languages, from C to drag-and-drop languages.
- To test, debug, and deploy the Arduino to solve real world problems.

UNIT 1: Introduction to sensors

Transducers, Classification, Roles of sensors in IOT, Various types of sensors, Design of sensors, sensor architecture, special requirements for IOT sensors, Role of actuators, types of actuators.

UNIT 2: Hardware

Physical device – Arduino Interfaces, Hardware requirement for Arduino, Connecting remotely over the network using VNC, GPIO Basics, Controlling GPIO Outputs Using a Web Interface, – Programming, APIs / Packages- Quark SOC processor, programming, Arduino Boards using GPIO (LED, LCD, Keypad, Motor control and sensor)

UNIT 3: Platforms

History - Creative Coding Platforms - Open Source Platforms – PIC - Arduino, Sketch, Iterative coding methodology – Python Programming - Mobile phones and similar devices - Arm Devices - Basic Electronics (circuit theory, measurements, parts identification) Sensors and Software: Understanding Processing Code Structure, variables and flow control, Interfacing to the Real World

Unit 4 Programming an Arduino IoT

Preparing the development environment (Arduino IDE), Exploring the Arduino language (C/C++) syntax, Coding, compiling, and uploading to the microcontroller, Working with Arduino Communication Modules: Bluetooth Modules, WiFi Modules and I2C and SPI, Interfacing arduino and Blynk via USB : LED Blinking, Controlling a Servomotor.

Unit 5 DOMAIN SPECIFIC APPLICATIONS OF IoT

Home automation, Industry applications, Surveillance applications, Other IoT applications – Introduction to different IoT tools, Developing applications through IoT tools, Developing sensor based application through embedded system platform – case studies: Soil moisture monitoring, Weather monitoring, Air quality Monitoring, Movement Detection

TEXT BOOKS :

1. Adrian McEwen and Hakim Cassimally, —Designing the Internet of ThingsII, John Wiley and Sons Ltd, UK, 2014.
2. Vijay Madiseti, Arshdeep Bahga, —Internet of Things (A Hands-on Approach), Universities Press, 2015.

REFERENCE BOOKS:

1. Dieter Uckelmann, Mark Harrison, Florian Michahelles, —Architecting the Internet of ThingsII, Springer, New York, 2011.
2. John H. Davies, —MSP430 Microcontroller BasicsII, First Edition, Newnes Publication. 2010.

COURSE OUTCOMES:

- C01:** Recall the basics of sensors, its functioning.
- C02:** Execute basic and advanced assembly language programs.
- C03:** Learn the ways to interface I/O devices with processor for task sharing.
- C04:** Recall the basics of co-processor and its ways to handle float values by its instruction set.
- C05:** Apply the IOT technology in various fields.

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(AM20A0E701) Cyber Security Techniques

Course Objectives:

This course is designed to:

- Understand essential building blocks and basic concepts of cyber security
- Explore Web security and Network security
- Explain the measures for securing the network and cloud
- Understand privacy principles and policies
- Describe the legal issues and ethics in computer security

UNIT I

Introduction: Introduction to Computer Security, Threats, Harm, Vulnerabilities, Controls, Authentication, Access Control, and Cryptography, Authentication, Access Control, Cryptography.

Programs and Programming: Unintentional (Non-malicious) Programming Oversights, Malicious Code—Malware, Countermeasures.

Learning Outcomes:

After completing this Unit, students will be able to

- Explain Vulnerabilities, threats and. Counter measures for computer security [L2]
- Interpret the design of the malicious code [L2]

UNIT II

Web Security: User Side, Browser Attacks, Web Attacks Targeting Users, Obtaining User or Website Data, Email Attacks. Operating Systems Security: Security in Operating Systems, Security in the Design of Operating Systems, Rootkit.

Learning Outcomes:

After completing this Unit, students will be able to

- Outline the attacks on browser, Web and email. [L2]
- Explain the security aspects of Operating Systems. [L3]

UNIT III

Network Security: Network Concepts, Threats to Network Communications, Wireless Network Security, Denial of Service, Distributed Denial-of-service Strategic Defenses: Security Counter measures, Cryptography in Network Security, Firewalls, Intrusion Detection and Prevention Systems, Network Management. Cloud Computing and Security: Cloud Computing Concepts, Moving to the Cloud, Cloud Security Tools and Techniques, Cloud Identity Management, Securing IaaS.

Learning Outcomes:

After completing this Unit, students will be able to

- Identify the network security threats and attacks.[L3]
- Design the Counter measures to defend the network security attacks.[L6]
- Analyze the security tools and techniques for Cloud computing[L4]

UNIT IV

Privacy: Privacy Concepts, Privacy Principles and Policies, Authentication and Privacy, Data Mining, Privacy on the Web, Email Security, Privacy Impacts of Emerging Technologies, Where the Field is Headed.

Management and Incidents: Security Planning, Business Continuity Planning, Handling Incidents, Risk Analysis, Dealing with Disaster.

Learning Outcomes:

After completing this Unit, students will be able to

- Interpret the need for Privacy and its impacts of Emerging Technologies.[L2]
- Explain how to handle incidents and deal with Disaster.[L2]

UNIT V

Legal Issues and Ethics: Protecting Programs and Data, Information and the Law, Rights of Employees and Employers, Redress for Software Failures, Computer Crime, Ethical Issues in Computer Security, Incident Analysis with Ethics, Emerging Topics: The Internet of Things, Economics, Computerized Elections, Cyber Warfare.

Learning Outcomes:

After completing this Unit, students will be able to

- Adapt legal issues and ethics in computer security.[L6]
- Elaborate on the Emerging topics.[L6]

Course Outcomes:

Upon completion of the course, the students should be able to:

- Illustrate the broad set of technical, social & political aspects of Cyber Security and security management methods to maintain security protection (L2)
- Assess the vulnerabilities and threats posed by criminals, terrorists and nation states on national infrastructure (L5)
- Identify the nature of secure software development and operating systems (L3)
- Demonstrate the role of security management in cyber security defense (L2)
- Adapt the legal and social issues at play in developing solutions. (L6)

Text Books:

1. Pfleeger, C.P., Security in Computing, Prentice Hall, 2010, 5th edition.
2. Schneier, Bruce. Applied Cryptography, Second Edition, John Wiley & Sons, 1996

Reference Books:

1. Rhodes-Ousley, Mark. Information Security: The Complete Reference, Second Edition, Information Security Management: Concepts and Practice, McGraw-Hill, 2013.
2. Whitman, Michael E. and Herbert J. Mattord. Roadmap to Information Security for IT and Info sec Managers. Boston, MA: Course Technology, 2011.

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(CS20AOE601) Data Analysis Using R

Course Objectives:

- Understand the R Programming Language.
- Exposure on Solving of data science problems.
- Understand The Regression Model

Unit 1: INTRODUCTION TO COMPUTING

Installation of R , The basics of R syntax, workspace , Matrices and lists, Sub setting, System-defined functions; the help system, Errors and warnings; coherence of the workspace, Viewing and manipulating Data, Viewing and manipulating Data, Plotting data, Reading the data from console, file (.csv) local disk and web, Working with larger datasets

Unit 2: SHAPE OF DATA AND DESCRIBING RELATIONSHIPS

Tables, charts and plots, Univariate data, measures of central tendency, frequency distributions, variation, and Shape Multivariate data, relationships between a categorical and a continuous variable, Relationship between two continuous variables – covariance, correlation coefficients, comparing multiple correlations, Visualization methods – categorical and continuous variables, two categorical variables, two continuous variables.

Unit 3: PROBABILITY DISTRIBUTIONS

Sampling from distributions – Binomial distribution, normal distribution, tTest, zTest, Chi Square test, . Density functions, Data Visualization using ggplot – Box plot, histograms, scatter plotter, line chart, bar chart, heat maps.

EXPLORATORY DATA ANALYSIS Demonstrate the range, summary, mean, variance, median, standard deviation, histogram, box plot, scatter plot using population dataset.

Unit 4: TESTING HYPOTHESES

Null hypothesis significance testing, Testing the mean of one sample, Testing two means, Linear models, Simple linear regression, Multiple regression, Bias-variance trade-off – cross-validation

Unit 5: CORRELATION

How to calculate the correlation between two variables, How to make scatter plots, Use the scatter plot to investigate the relationship between two variables, Perform tests of hypotheses about the mean when the variance is known, Compute the p-value, . Explore the connection between the critical region, the test statistic, and the p-value, Least Squares Estimates, The R Function lm, scrutinizing the Residuals

Course Outcomes:

- Install and use R for simple programming tasks (L3).
- Extract data from files and other sources and perform various data manipulation tasks on them (L3).
- Explore statistical functions in R (L4).
- Use R Graphics and Tables to visualize results of various statistical operations on data (L3).
- Apply the knowledge of R gained to data Analytics for real-life applications (L3).

Reference Books:

1. SandipRakshit, "Statistics with R Programming", McGraw Hill Education, 2018.
2. Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, "AN Introduction to Statistical Learning: with Applications in R", Springer Texts in Statistics, 2017.
3. Joseph Schmuller, "Statistical Analysis with R for Dummies", Wiley, 2017.
4. K G Srinivasa, G M Siddesh, ChetanShetty, Sowmya B J, "Statistical Programming in R", Oxford Higher Education, 2017

Web References:

- <http://www.r-bloggers.com/how-to-perform-a-logistic-regression-in-r/>
- <http://www.ats.ucla.edu/stat/r/dae/rreg.htm>
- <http://www.coastal.edu/kingw/statistics/R-tutorials/logistic.html>
- <http://www.ats.ucla.edu/stat/r/data/binary.csv>

SOFTWARE REQUIREMENTS:

SOFTWARE: R Software, R Studio Software

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(PH20AOE701) NANOMATERIALS

Course Objectives:

- To understand synthetic principles of Nanomaterials by various methods
- To characterize the synthetic nanomaterials by various instrumental methods
- To enumerate the applications of nanomaterials in engineering

Course Outcomes:

- Understand the state of art synthesis of nano materials
- Characterize nano materials using ion beam, scanning probe methodologies, position sensitive atom probe and spectroscopic ellipsometry.
- Analyze nanoscale structure in metals, polymers and ceramics
- Analyze structure-property relationship in coarser scale structures
- Understand structures of carbon nano tubes

UNIT I

Introduction: Scope of nanoscience and nanotechnology, nanoscience in nature, classification of nanostructured materials, importance of nano materials.

Synthetic Methods: Bottom-Up approach: Sol-gel synthesis, microemulsions or reverse micelles, co-precipitation method, solvothermal synthesis, hydrothermal synthesis, microwave heating synthesis and sonochemical synthesis.

UNIT II

Top-Down approach: Inert gas condensation, arc discharge method, aerosol synthesis, plasma arc technique, ion sputtering, laser ablation, laser pyrolysis, and chemical vapour deposition method, electrodeposition method, high energy ball milling.

UNIT III

Techniques for characterization: Diffraction technique, spectroscopy techniques, electron microscopy techniques for the characterization of nanomaterials, BET method for surface area analysis, dynamic light scattering for particle size determination.

UNIT IV

Studies of Nano-structured Materials: Synthesis, properties and applications of the following nanomaterials, fullerenes, carbon nanotubes, core-shell nanoparticles, nanoshells, self-assembled monolayers, and monolayer protected metal nanoparticles, nanocrystalline materials, magnetic nanoparticles and important properties in relation to nanomagnetic materials, thermoelectric materials, non-linear optical materials, liquid crystals.

UNIT V

Engineering Applications of Nanomaterials

Textbooks:

1. NANO: The Essentials: T Pradeep, McGraw-Hill, 2007.
2. Textbook of Nanoscience and nanotechnology: B S Murty, P Shankar, BaldevRai, BB Rath and James Murday, Univ. Press, 2012.

References:

1. Concepts of Nanochemistry; Ludovico Cademrtiri and Geoffrey A. Ozin& Geoffrey A. Ozin, Wiley-VCH, 2011.
2. Nanostructures & Nanomaterials; Synthesis, Properties & Applications: Guozhong Cao, Imperial College Press, 2007.
3. Nanomaterials Chemistry, C. N. R. Rao, Achim Muller, K.Cheetham, Wiley-VCH, 2007.

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(BA20AHS703) ENTREPRENEURSHIP & INCUBATION

Course Objectives:

- To make the student understand about Entrepreneurship
- To enable the student in knowing various sources of generating new ideas in setting up of new enterprise
- To facilitate the student in knowing various sources of finance in starting up of a business
- To impart knowledge about various government sources which provide financial assistance to entrepreneurs / women entrepreneurs?
- To encourage the student in creating and designing business plans

UNIT-I

Entrepreneurship-Concept, knowledge and skills requirement - Characteristics of successful entrepreneurs - Entrepreneurship process - Factors impacting emergence of entrepreneurship - Differences between Entrepreneur and Intrapreneur - Understanding individual entrepreneurial mindset and personality-Recent trends in Entrepreneurship.

Learning Outcomes:

At the end of the Unit, the learners will be able to

- Understand the concept of Entrepreneur and Entrepreneurship in India
- Know Entrepreneurship process and emergence of Entrepreneurship
- Analyze the differences between Entrepreneur and Intrapreneur
- Develop a creative mindset and personality
- Understand recent trends in Entrepreneurship across the globe

UNIT-II

Starting the New Venture - Generating business idea - Sources of new ideas & methods of generating ideas-Opportunity recognition-Feasibility study-Market feasibility, technical / operational feasibility - Financial feasibility - Drawing business plan - Preparing project report - Presenting business plan to investors.

Learning Outcomes:

At the end of the Unit, the learners will be able to

- Know the process of starting a new venture

- Analyze the sources of new methods in generating business idea
- Evaluate market feasibility, financial feasibility and technical feasibility
- Design and draw business plans in project preparation and prepare project reports

UNIT-III

Sources of finance - Various sources of Finance available - Long term sources - Short term sources - Institutional Finance - Commercial Banks, SFC's in India - NBFC's in India - their way of financing in India for small and medium business - Entrepreneurship development programs in India - The entrepreneurial journey - Institutions in aid of entrepreneurship development

Learning Outcomes:

At the end of the Unit, the learners will be able to

- Know the various sources of finance to start a new venture
- Contrast & compare between Long term & Short term finance sources
- Analyze the role of banks and other financial institutions in promoting entrepreneurship in India
- Evaluate the need and importance of MSMEs in the growth of country

UNIT-IV

Women Entrepreneurship - Entrepreneurship Development and Government - Role of Central Government and State Government in promoting women Entrepreneurship - Introduction to various incentives, subsidies and grants - Export-oriented Units - Fiscal and Tax concessions available - Women entrepreneurship - Role and importance - Growth of women entrepreneurship in India - Issues & Challenges - Entrepreneurial motivations.

Learning Outcomes:

At the end of the Unit, the learners will be able to

- Understand the role of government in promoting women entrepreneurship
- Know various incentives, subsidies and grants available to women entrepreneurs
- Analyze the role of export-oriented units
- Know about the tax concessions available for Women entrepreneurs
- Prepare to face the issues and challenges.

UNIT-V

Fundamentals of Business Incubation - Principles and good practices of business incubation - Process of business incubation and the business incubator and how they operate and influence the Type/benefits of incubators - Corporate/educational / institutional incubators -

Broader business incubation environment - Pre-Incubation and Post - Incubation process - Idea lab, Business plan structure - Value proposition

Course Outcomes:

At the end of the course, students will be able to

- Understand the concept of Entrepreneurship and challenges in the world of Competition.
- Apply the Knowledge in generating ideas for New Ventures.
- Analyze various sources of finance and subsidies to entrepreneur / women Entrepreneurs.
- Evaluate the role of central government and state government in promoting Entrepreneurship.
- Create and design business plan structure through incubations.

Textbooks:

- D F Kuratko and T V Rao, "Entrepreneurship" - A South-Asian Perspective - Cengage Learning, 2012. (For PPT, Case Solutions Faculty may visit: login.cengage.com)
- Nandan H, "Fundamentals of Entrepreneurship", PHI, 2013

References:

- Vasant Desai, "Small Scale Industries and Entrepreneurship", Himalaya Publishing 2012.
- Rajeev Roy "Entrepreneurship", 2nd Edition, Oxford, 2012.
- B. Janakiram and M. Rizwana "Entrepreneurship Development: Text & Cases", Excel Books, 2011.
- Stuart Read, Effectual "Entrepreneurship", Routledge, 2013.

E-RESOURCES

- Entrepreneurship-Through-the-Lens-of-VentureCapital
- <http://www.onlinevideolecture.com/?course=mba-programs&subject=entrepreneurship>
- http://nptel.ac.in/courses/122106032/Pdf/7_4.pdf

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(BA20AHS704) ENTERPRISE RESOURCE PLANNING

Course Objectives:

- To provide a contemporary and forward-looking on the theory and practice of Enterprise Resource Planning
- To enable the students in knowing the Advantages of ERP
- To train the students to develop the basic understanding of how ERP enriches the Business organizations in achieving a multi-dimensional growth.
- Impart knowledge about the historical back ground of BPR
- To aim at preparing the students, technologically competitive and make them ready to self-upgrade with the high technical skills

UNIT-I

Introduction to ERP: Enterprise–An Overview Integrated Management Information, Business Modeling, Integrated Data Model Business Processing Reengineering(BPR), Data Warehousing, Data Mining, On-line Analytical Processing (OLAP), Supply Chain Management(SCM), Customer Relationship Management(CRM)

UNIT-II

Benefits of ERP: Reduction of Lead-Time, On-time Shipment, Reduction in Cycle Time, Improved Resource Utilization, Better Customer Satisfaction, Improved Supplier Performance, Increased Flexibility, Reduced Quality Costs, Improved Information Accuracy and Design-making Capability

UNIT-III

ERP Implementation Lifecycle :Pre-evaluation Screening, Package Evaluation, Project Planning Phase, Gap Analysis, Reengineering, Configuration, Implementation Team Training, Testing, Going Live,End-user Training,Post-implementation(Maintenance mode)

UNIT-IV

BPR: Historical background: Nature, significance and rationale of business process reengineering (BPR), Fundamentals of BPR. Major issues in process redesign: Business vision and process objectives, Processes to be redesigned, Measuring existing processes

UNIT-V

IT in ERP: Role of information technology (IT) and identifying IT levers. Designing and building a prototype of the new process: BPR phases, Relationship between BPR phases. MIS– Management Information System, DSS-Decision Support System, EIS- Executive Information System

Course Outcomes:

- Understand the basic use of ERP Package and its role in integrating business functions.
- Explain the challenges of ERP system in the organization
- Apply the knowledge in implementing ERP system for business
- Evaluate the role of IT in taking decisions with MIS
- Create reengineered business processes with process redesign

Textbooks:

- Pankaj Sharma. "Enterprise Resource Planning". Aph Publishing Corporation, New Delhi, 2004.
- Alexis Leon, "Enterprise Resource Planning", IV Edition, Mc.Graw Hill, 2019

References:

- Marianne Bradford "Modern ERP", 3rd edition.
- "ERP making it happen Thomas F. Wallace and Michael
- Directing the ERP Implementation Michael W. Pehrey

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(BA20AHS705) MANAGEMENT SCIENCE

Course Objectives:

- To provide fundamental knowledge on Management, Administration, Organization & its concepts.
- To make the students understand the role of management in Production
- To impart the concept of HR in order to have an idea on Recruitment, Selection, Training & Development, job evaluation and Merit rating concepts
- To create awareness on identify Strategic Management areas & the PERT/CPM for better Project Management
- To make the students aware of the contemporary issues in management

UNIT-I

INTRODUCTION TO MANAGEMENT:

Management- Concept and meaning- Nature- Functions-Management as a Science and Art and both. Schools of Management Thought - Taylor's Scientific Theory-Henry Fayol's principles -Elton Mayo's Human relations - Systems Theory - Organisational Designs - Line organization - Line & Staff Organization-Functional Organization-Matrix Organization-Project Organization-Committee form of Organization - Social responsibilities of Management.

UNIT-II

OPERATIONS MANAGEMENT– Principles and Types of Plant Layout - Methods of Production (Job, batch and Mass Production), Work Study - Statistical Quality Control- Deming's contribution to Quality. Material Management -Objectives - Inventory-Functions - Types, Inventory Techniques - EOQ-ABC Analysis - Purchase Procedure and Stores Management-Marketing Management-Concept-Meaning-Nature-Functions of Marketing - Marketing Mix- Channels of Distribution -Advertisement and Sales Promotion-Marketing Strategies based on Product Life Cycle.

UNIT-III

HUMAN RESOURCES MANAGEMENT(HRM)– HRM - Definition and Meaning - Nature - Managerial and Operative functions - Evolution of HRM -Job Analysis - Human Resource Planning(HRP) - Employee Recruitment-Sources of Recruitment -Employee Selection-Process and Tests in Employee Selection-Employee Training and Development-On-the-job& Off-the-

job training methods-Performance Appraisal Concept-Methods of Performance Appraisal-Placement-Employee Induction-Wage and Salary Administration

UNIT-IV

STRATEGIC&PROJECT MANAGEMENT: Differences between Leader & Manager - Leadership - Leadership styles Leadership theories - Managerial Grid - Transactional Vs Transformational Leadership - Qualities of a good leader- Women Leadership in India.

UNIT-V

CONTEMPORARY ISSUES IN MANAGEMENT -The concept of Management Information System(MIS) - Materials Requirement Planning (MRP) -Customer Relations Management(CRM) - Total Quality Management (TQM) - Six Sigma Concept -Supply Chain Management(SCM)-Enterprise Resource Planning(ERP)-Performance Management- Business Process Outsourcing (BPO) - Business Process Re-engineering and Bench Marking -Balanced Score Card -Knowledge Management.

Course Outcomes:

- Understand the concepts &principles of management and designs of organization in a practical world
- Apply the knowledge of Work-study principles & Quality Control techniques in industry
- Analyze the concepts of HR Min Recruitment, Selection and Training& Development.
- Evaluate PERT/CPM Techniques for projects of an enterprise and estimate time &cost of project & to analyze the business through SWOT.
- Create Modern technology in management science.

Textbooks:

- A.R.Aryasri,"Management Science", TMH,2013
- Stoner,Freeman,Gilbert, Management,PearsonEducation, NewDelhi,2012.

References:

- Koontz&Weihrich, "Essentials of Management", 6th edition, TMH, 2005.
- Thomas N.Duening&John M.Ivancevich,"Management Principles and Guidelines", Biztantra Kanishka Bedi, "Production and Operations Management", oxford University Press, 2004.
- Samuel C.Certo, "Modern Management", 9th edition, PHI, 2005

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(EC20ASC701) IOT AND INDUSTRIAL AUTOMATION

Course Objectives:

1. Introduce the fundamental concepts of IoT and physical computing
2. Expose the student to a variety of embedded boards and IoT Platforms
3. Create a basic understanding of the communication protocols in IoT communications.
4. Familiarize the student with application program interfaces for IoT.
5. Enable student's to create simple IoT applications.

UNIT-I

Overview of IoT:

The Internet of Things: An Overview, The Flavour of the Internet of Things, The "Internet" of "Things", The Technology of the Internet of Things, Enchanted Objects, Who is Making the Internet of Things?

Design Principles for Connected Devices: Calm and Ambient Technology, Privacy, Web Thinking for Connected Devices, Affordances.

Prototyping: Sketching, Familiarity, Costs Vs Ease of Prototyping, Prototypes and Production, Open source Vs Close source, Tapping into the community.

- Explain IoT architecture.[L2]
- Interpret the design principles that govern connected devices[L2]

UNIT-II

Embedded Devices:

Electronics, Embedded Computing Basics, Arduino, RaspberryPi, Mobile phones and tablets, Plug Computing: Always-on Internet of Things

- Explain the basics of microcontrollers [L2]
- Outline the architecture of Arduino [L2]

UNIT-III

Communication in the IoT:

Internet Communications: An Overview, IP Addresses, MAC Addresses, TCP and UDP Ports, Application Layer Protocols

Prototyping Online Components:

Getting Started with an API, Writing a New API, Real-Time Reactions, Other Protocols Protocol

- Interpret different protocols and compare them [L2]
- Select which protocol can be used for a specific application [L3]

Practice Exercises:

Any 10 experiments are to be done (Any Software 6 +4 Hardware)

1. Data acquisition using MyDAQ. Select any one development board (Eg., Arduino or Raspberry Pi) and control LED using the board.
2. Using the same board as in (1), read data from a sensor. Experiment with both analog and digital sensors.
3. Control any two actuators connected to the development board using Bluetooth.
4. Read data from sensor and send it to a requesting client. (using socket communication)
Note: The client and server should be connected to same local area network.
5. Create any cloud platform account, explore IoT services and register a thing on the platform. Push sensor data to cloud.
6. Control an actuator through cloud.
7. Accesses the data pushed from sensor to cloud and apply any data analytics or visualization services.
8. Create a mobile app to control an actuator.
9. Design an IoT based air pollution control system which monitors the air pollution by measuring carbon monoxide, ammonia, etc and gives alarm or sends message when the pollution level is more than permitted range.
10. Design an IoT based system which measures the physical and chemical properties of the water and displays the measured values.
11. Identify a problem in your local area or college which can be solved by integrating the things you learned and create a prototype to solve it (Mini Project).
12. Design a business model canvas for a digital display

Course outcomes:

CO1: Choose the sensors and actuators for an IoT application (L1)

CO2: Select protocols for a specific IoT application (L2)

CO3: Utilize the cloud platform and APIs for IoT applications (L3)

CO4: Experiment with embedded boards for creating IoT prototypes (L3)

CO5: Design a solution for a given IoT application (L6)

Text Books:

1. Adrian McEwen, Hakim Cassimally- Designing the Internet of Things, Wiley Publications, 2012.
2. Alexander Osterwalder, and Yves Pigneur – Business Model Generation – Wiley, 2011.

Reference Books:

1. Arshdeep Bahga, Vijay Madisetti- Internet of Things: A Hands-On Approach, Universities Press, 2014.
2. The Internet of Things, Enabling technologies and use cases – Pethuru Raj, Anupama C. Raman, CRC Press.

Reference sites:

1. <https://www.arduino.cc/>
2. <https://www.raspberrypi.org/>

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B. Tech- V Sem

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(EC20AOE501) BASIC VLSI DESIGN

Course Objectives:

1. Learn about the various processing steps involved in the fabrication of a nMOS, pMOS and CMOS transistors.
2. Learn about the various Design rules and Layout of MOS transistors.
3. Enable the students to learn about the Scaling Models and Scaling factors of MOS transistors.
4. Study the various examples of structured design.
5. Learn about the Testing concepts in VLSI Chip design.

Unit I

Review of Microelectronics and Introduction to MOS technology:

The IC era, Basic MOS transistors- Enhancement mode and Depletion mode transistor action, nMOS fabrication, CMOS fabrication-P-Well, N-Well and Twin-tub process, Drain-to-Source Current versus Voltage V_{DS} relationships, MOS transconductance, output conductance and Figure of Merit.

Unit II

MOS circuits and Design process:

The Pass transistor, nMOS inverter, Pull-up to Pull-down ratio of different cases, CMOS inverter and Latch-up in CMOS circuits, MOS layers, Stick diagrams-nMOS and CMOS design styles, Design rules and Layout- Lambda-based design rules, Contact cuts.

Unit III

Circuit Concepts and Scaling of MOS circuits:

Sheet resistance concept, Area Capacitance of layers and calculations, The Delay unit, Inverter delay, Driving large capacitance loads, Propagation delays and Wiring capacitances, Scaling Models and Scaling factors, Scaling factors for various device parameters and its summary.

Unit IV

Subsystem Design:

Architectural issues, Switch logic, Gate restoring logic-The inverter, Two-input nMOS, CMOS and BiCMOS NAND and NOR gates and Other forms of CMOS logic.

Unit V

Test and Testability:

System partitioning, Layout and Testability, Reset/Initialization, Design for Testability, Testing Combinational Logic and Sequential Logic, Practical Design for Test guidelines, Scan Design Techniques and Built-In-Self-Test (BIST).

Text Books:

1. K.Eshraghian, D.A. Pucknell and S.Eshraghian, "Essentials of VLSI Circuits and Systems", Third Edition, PHI Learning Pvt. Ltd., 2019.
2. W.Wolf "Modern VLSI Design IP based design" Fourth edition, PHI Learning Pvt. Ltd., 2020.

References:

1. Mead, C.A and Conway, L.A., "Introduction to VLSI Systems", Addison -Wesley, USA, 1980.
2. Neil H. E. Weste & D.M.Harris, "CMOS VLSI Design-A Circuits and Systems Perspective", Fourth edition, Pearson Edition, 2020.

Course Outcomes:

- C01:** Outline the processing steps in the fabrication of a nMOS, pMOS and CMOS structure.
- C02:** Illustrate the Layout procedure of simple MOS circuit using Lambda based design rules.
- C03:** Summarize the scaling effects of various key parameters of MOSFET devices.
- C04:** Design various MOS based logic circuits.
- C05:** Develop algorithms for automatic test generation for combinational and sequential circuits.

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B. Tech- V Sem

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(EC20AOE502) DIGITAL ELECTRONICS

Course Objectives:

1. To introduce basic postulates of Boolean algebra and the methods for simplifying Boolean expressions
2. To learn about Gate Minimization techniques.
3. To illustrate the concepts and study the procedures for the analysis and design of Combinational circuits.
4. To study the procedures for the analysis and design of Sequential circuits.
5. To introduce the concepts of programmable logic devices.

UNIT I

Number System & Boolean Algebra:

Digital Systems, Binary Numbers, Number base conversions, Complements of numbers, Signed binary numbers, Binary codes.

Boolean Algebra-Basic definition, Basic theorems and properties, Boolean Functions, Canonical & Standard forms, other logic operations & Logic gates.

UNIT II

Gate Level Minimization:

The map method, four variable & Five variable K-map, POS & SOP Simplification, Don't care conditions, NAND & NOR Implementation, Other two level Implementation, Ex-or Function, Tabular Method- Simplification of Boolean function using tabulation Method.

UNIT III

Combinational Logic Circuits:

Combinational circuits, Analysis & Design procedure, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude comparator, Decoder, Encoders, Multiplexers.

UNIT IV

Sequential Logic Circuits:

Sequential Circuits, Latches, Flips-Flops - RS, JK, Master-Slave JK, D & T flip flops, Analysis of Clocked sequential circuits, State Reduction & Assignment, Design procedure, Registers &

Counters – Registers, Shift Registers, Ripple Counters, Synchronous counters, and Asynchronous counters.

UNIT V

Programmable Devices:

Memory organization, classification of semiconductor memories, ROM, PROM, DROM, EPROM, EEPROM, RAM, expansion of memory, CCD, Flash memories, content addressable memory and Programmable logic devices-PROM, Programmable logic array (PLA) and Programmable array logic (PAL), field programmable gate array (FPGA).

Text Books:

1. M.Morris Mano & Michel D. Ciletti, "Digital Design", 5th Edition, Pearson education.
2. Zvi Kohavi and Nirah K.Jha, "Switching theory and Finite Automata Theory", 3rd Edition Cambridge.

References:

1. Subratha Goshal, "Digital Electronics", Cambridge Publishers.
2. Comer, "Digital & State Machine Design", Third Indian edition, OXFORD publishers.

Course Outcomes:

- C01:** Apply basic postulates of Boolean Algebra in the design of design systems.
- C02:** Design digital logic circuits using K-Map minimization technique.
- C03:** Develop an Arithmetic Logic Unit using different Combinational circuits.
- C04:** Design Sequential circuits.
- C05:** Compare various Programmable logic devices.

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B. Tech- VI Sem

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(EC20AOE601) ELECTRONIC INSTRUMENTATION & MEASUREMENTS

Course Objectives:

1. To understand various measurement metrics for performance analysis and basic principles of various measurements like voltage, current, Resistance
2. To familiarize the characteristics, operations, calibrations and applications of the different oscilloscopes.
3. To explain principles of operation and working of different electronic instruments like signal generators, wave analyzers etc.
4. Understand the basic principle of various DC/AC bridges for the measurement of unknown passive elements like R, L and C.
5. To provide exposure to working principles of different sensors and transducers.

UNIT-I

Performance characteristics of Instruments: Static characteristics, Accuracy, Precision, Resolution, Sensitivity, static and dynamic calibration, Errors in Measurement, and their statistical analysis, dynamic characteristics-speed of Response, fidelity, Lag and dynamic error. DC ammeters, DC voltmeters-multirange, range extension/solid state and differential voltmeters, AC voltmeters –multirange, range extension. Thermocouple type RF ammeter, ohm meters, series type, shunt type, multimeter for voltage, current and resistance measurements.

Learning Outcomes:

- Define different terms used for characterizing the performance of an instrument/measurement system (L1)
- Understand the principle of operation of various meters (L1)

UNIT-II

Oscilloscopes-I: Standard specifications of CRO,CRT features, vertical and horizontal amplifiers, horizontal and vertical deflection systems, sweep trigger pulse, delay line, sync selector circuits, probes for CRO – active, passive, and attenuator type,

Learning Outcomes:

- Understand the basic blocks of analog CROs (L1)
- Measure amplitude and frequency utilizing oscilloscopes (L2)

UNIT-III

Oscilloscopes-II: Dual trace/beam CRO, Principles of sampling oscilloscope, storage oscilloscope, and digital storage oscilloscope, Digital frequency counters, time & Period measurements.

Learning Outcomes:

- Understand the basic blocks of digital CROs (L1)
- Measure amplitude and frequency utilizing oscilloscopes (L2)

UNIT-IV

Signal generators & Analyzers: Specifications & principles of working (Block diagram approach) Signal generators-fixed and variable, AF oscillators, function generators, pulse, random noise, sweep, and Wave analyzers, Harmonic distortion analyzers, Spectrum analyzers.

Learning Outcomes:

- Understand the basic principle of various signal generators and analyzers (L1)
- Describe characteristics of signal generators and analyzers (L2)

UNIT-V

Review of DC Bridges: Wheatstone bridge, Kelvin Bridge, errors and precautions in using bridges.

AC bridges: Measurement of inductance-Maxwell's bridge, Anderson Bridge. Measurement of capacitance- Schering Bridge. Measurement of frequency- Wein Bridge, Q-meter.

Learning Outcomes:

- Understand principles of measurements associated with different DC/AC bridges(L2)
- Ability to derive balance condition of various bridges to find unknown values (L2)

TEXT BOOKS:

1. A.D. Helfrick and W.D. Cooper, "Modern Electronic Instrumentation and Measurement Techniques", PHI, 5th Edition, 2002.
2. H.S.Kalsi, "Electronic instrumentation", second edition, Tata McGraw Hill, 2004.
3. K. Lal Kishore, "Electronic Measurements & Instrumentations", Pearson Education, 2009.

REFERENCES:

1. Robert A. Witte, "Electronic Test Instruments, Analog and Digital Measurements", Pearson Education, 2nd Ed., 2004.
2. David A. Bell, "Electronic Instrumentation & Measurements", PHI, 2nd Edition, 2003.

Course Outcomes:

- CO 1:** Describe the basic principles involved in the meters for measuring voltage, current, resistance and frequency (L2).
- CO 2:** Analyze CRO for measuring signal characteristics (L4).
- CO3:** Analyze different waveforms using advanced instruments such as signal generators, logic analyzer & Spectrum analyzer (L4).
- CO4:** Apply the principles of various DC/AC bridges to solve various measurement parameters (L3).
- CO5:** Analyze various parameters using sensors and transducers (L4).

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B. Tech- VI Sem

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(EC20AOE602) SIGNAL PROCESSING

Course Objectives:

1. To introduce students to the basic idea of signal and system analysis and its characterization in time and frequency domains.
2. To present Fourier tools through the analogy between vectors and signals.
3. To teach concept of sampling and reconstruction of signals.
4. To analyze characteristics of linear systems in time and frequency domains.
5. To understand Laplace and z-transforms as mathematical tool to analyze continuous and discrete-time signals and systems.

UNIT I

SIGNALS & SYSTEMS:

Definition and classification of Signal and Systems (Continuous time and Discrete time), Elementary signals such as Dirac delta, unit step, ramp, sinusoidal and exponential and operations on signals. Analogy between vectors and signals-orthogonality-Mean Square error-Fourier series: Trigonometric & Exponential and concept of discrete spectrum

UNIT II

CONTINUOUS TIME FOURIER TRANSFORM:

Definition, Computation and properties of Fourier Transform for different types of signals. Statement and proof of sampling theorem of low pass signals.

UNIT III

SIGNAL TRANSMISSION THROUGH LINEAR SYSTEMS:

Linear system, impulse response, Response of a linear system, linear time-invariant (LTI) system, linear time variant (LTV) system, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, Relationship between bandwidth and rise time. Energy and Power Spectral Densities

UNIT IV

DISCRETE TIME FOURIER TRANSFORM:

Definition, Computation and properties of Fourier Transform for different types of signals.

UNIT V

LAPLACE TRANSFORM:

Definition-ROC-Properties-Inverse Laplace transforms-the S-plane and BIBO stability-Transfer functions-System Response to standard signals-Solution of differential equations with initial conditions.

The Z-TRANSFORM: Derivation and definition-ROC-Properties- Inverse Z-Transform-System analysis-Transfer function-BIBO stability-System.

TEXT BOOKS:

1. B. P. Lathi, "Linear Systems and Signals", Second Edition, Oxford University press.
2. A.V. Oppenheim, A.S. Willsky and S.H. Nawab, "Signals and Systems", Pearson, 2nd Edition.
3. A. Ramakrishna Rao, "Signals and Systems", 2008, TMH.

REFERENCES:

1. Simon Haykin and Van Veen, "Signals & Systems", Wiley, 2nd Edition.
2. B.P. Lathi, "Signals, Systems & Communications", 2009,BS Publications.

Course Outcomes:

- CO1:** Understand the mathematical description and representation of continuous-time and discrete-time signals and systems. Also understand the concepts of various transform techniques.
- CO2:** Apply sampling theorem to convert continuous-time signals to discrete-time signals and reconstruct back, different transform techniques to solve signals and system related problems.
- CO3:** Analyze the frequency spectra of various continuous-time signals using different transform methods.
- CO4:** Analyze the systems based on their properties and determine the response of them.
- CO5:** Analyze the frequency spectra of various discrete-time signals using different transform methods.

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B.Tech-VII Sem

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(EC20AOE701) IC APPLICATIONS

Course Objectives:

1. To introduce the basic building blocks of Opamp
2. To explain linear and nonlinear applications of opamp
3. To introduce the concept of IC 555 and PLL
4. To study working principle of data converters
5. To illustrate combinational & sequential circuits

UNIT I:

LINEAR INTEGRATED CIRCUITS

Introduction, Classification of ICs, Ideal and Practical Op-Amp, Op-amp characteristics-DC and AC Characteristics. 741 Op-Amp and its Features, Modes of operation-inverting, non-inverting, differential.

Linear Applications of Op-Amp, adder ,subtractor, AC Amplifier, V to I and I to V Converters, Differentiators and Integrators.

Learning outcomes:

1. Understand ideal and practical Op-Amps (L2)
2. Understand internal blocks and characteristics of Op-Amp (L2)

UNIT II:

OSCILLATORS& WAVEFORM GENERATORS

Comparators, Schmitt Trigger. Multivibrators-Astable and monostable Principle of Operation and Types of Oscillators – RC, Wien Bridge.

Waveform Generators - Triangular. Saw Tooth, Square Wave.

Learning outcomes:

1. Illustrate the applications using Op-Amp (L3)
2. Demonstrate waveform generators using Op-Amp (L3)

UNIT III:

TIMERS & PHASE LOCKED LOOPS

Introduction to 555 Timer, Functional Diagram, Monostable and Astable Operations and Applications, Schmitt Trigger, PLL- Introduction, Block Schematic, Principles and Description of individual Blocks of 565.

Learning outcomes:

1. Describe internal circuit operation of 555 timer (L2)
2. Illustrate the concept of PLL (L3)

UNIT IV:

D-A AND A- D CONVERTERS

Introduction, Basic DAC Techniques - Weighted Resistor Type. R-2R Ladder Type, inverted R-2R Type. Different types of ADCs - Parallel Comparator Type. Counter Type. Successive Approximation Register Type and Dual Slope Type DAC and ADC Specifications.

Learning outcomes:

1. Explain operation principles of different A/D & D/A converters (L2)
2. Demonstrate different types of A /D & D/A converter circuits (L3)

UNIT V:

COMBINATIONAL & SEQUENTIAL LOGIC DESIGN

COMBINATIONAL CIRCUIT ICs: Use of TTL-74XX Series-Logic gates using 74XX ICs, adders, Comparator, multiplexers, encoders, Decoders, Demultiplexers, Priority Encoders(Pin Diagram, Function table)

SEQUENTIAL CIRCUIT ICs: Commonly Available 74XX ICs -Latches, Flip flops- RS, JK, D and T-Type Flip-Flops, Binary counter, Decade counter. Shift Registers & applications.

Learning outcomes:

1. Describe internal circuit operation of different Combinational I Cs(L2)
2. Demonstrate Sequential circuits using 74XX ICs (L3)

TEXT BOOKS:

1. Linear Integrated Circuits -D. Roy Chowdhury, New Age International (p)Ltd, 3rd Ed., 2008.
2. Wakerly J.F. Digital Design: Principles and Practices, 4th Edition, Pearson India, 2008.

REFERENCE BOOKS:

1. R. P. Jain, Modern Digital Electronics, McGraw Hill Education (India Private Limited), 4th edition, 2012.
2. Op-Amps & Linear ICs - Ramakanth A. Gayakwad, PHI, 1987.

Course Outcomes:

CO1: Understand the basic building blocks of Op-Amp.

CO2: Illustrate waveform generators and oscillators using Op-Amp.

CO3: Analyze concept of 555 timer and PLL.

CO4: Analyze the operation & characteristics of data converters.

CO5: Study the design of various 74XX ICs, Combinational & sequential.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech-VII Sem

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(EC20AOE702) PRINCIPLES OF COMMUNICATION ENGINEERING

Course Objectives:

1. To understand the concept of various modulation schemes and multiplexing.
2. To apply the concept of various modulation schemes to solve engineering problems.
3. To analyze various modulation schemes.
4. To evaluate various modulation scheme in real time applications.

UNIT I

Amplitude Modulation

Introduction, An overview of Electronic Communication Systems. Need for Frequency Translation, classification of modulation schemes, Amplitude Modulation: DSB-FC, DSB-SC, SSB-SC and VSB, Modulators and demodulators. The Superheterodyne Receiver.

UNIT II

Angle Modulation

Basic definitions, Frequency Modulation: Narrow Band FM, Wide Band FM, Transmission bandwidth of FM Signals, Generation of FM Signals, Demodulation of FM Signals, FM Stereo Multiplexing, Phase modulation, AM vs PM.

UNIT III

Pulse Modulation

Sampling Theorem, Quantization, Pulse Amplitude Modulation, Pulse Width Modulation, Pulse position modulation, Pulse code modulation.

Concept of Time Division Multiplexing, Frequency Division Multiplexing.

UNIT IV

Digital Modulation

Digital Representation of Analog Signals. Phase shift keying-Binary Amplitude Shift Keying, Binary Phase Shift Keying, Differential phase shift keying, and Quadrature Phase Shift Keying, Frequency Shift Keying— Comparison.

UNIT V

MULTI-USER RADIO COMMUNICATION

Global System for Mobile Communications (GSM), Mobile & Cellular communication

Concept – Overview of Multiple Access Schemes – Code division multiple access (CDMA), Frequency division multiple access (FDMA), Satellite Communication – Bluetooth. (Block diagram approach only).

Note: The main emphasis is on qualitative treatment. Complex mathematical treatment may be avoided.

Textbooks:

1. Herbert Taub, Donald L Schilling and Goutam Saha, "Principles of Communication Systems", 3rd Edition, Tata McGraw-Hill Publishing Company Ltd., 2008.
2. Simon Haykin, "Communication Systems", 4th Edition, John Wiley & Sons, 2004

References:

1. B. P. Lathi, Zhi Ding and Hari M. Gupta, "Modern Digital and Analog Communication Systems", 4th Edition, Oxford University Press, 2017.
2. K. Sam Shanmugam "Digital and Analog Communication Systems", Wiley India Edition, 2008.
3. Martin S. Roden, "Analog and Digital Communication System", 3rd Edition, Prentice Hall of India, 2002.

Course Outcomes:

- CO1.** Analyze and design of various continuous wave modulation and demodulation techniques.
- CO2.** Attain the knowledge about angle modulation and FM Transmitters and Receivers.
- CO3.** Analyze and design the various Pulse Modulation Techniques.
- CO4.** Understand the concepts of Digital Modulation Techniques and Baseband transmission.
- CO5.** Comprehend the principles of radio communication systems like GSM, CDMA, Bluetooth, Mobile and satellite communications etc.,

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B. Tech- VII Sem

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(EC20AOE703) SENSORS AND SYSTEMS

Course Objectives:

1. To learn about the characterization of sensors.
2. To understand about the working of Electromechanical, Thermal, Magnetic and radiation sensors
3. To understand the concepts of Electro analytic and smart sensors.
4. To learn about the various characteristics of radiation sensors.
5. To learn about the usage of different sensors in various real time applications.

UNIT I

Sensors / Transducers:

Principles, Classification, Parameters, Characteristics, Environmental Parameters (EP), Characterization Electromechanical Sensors: Introduction, Resistive Potentiometer, Strain Gauge, Resistance Strain Gauge, Semiconductor Strain Gauges -Inductive Sensors: Sensitivity and Linearity of the Sensor -Types-Capacitive Sensors: Electrostatic Transducer, Force/Stress Sensors Using Quartz Resonators, Ultrasonic Sensors.

UNIT II

Thermal Sensors-I:

Introduction ,Gas thermometric Sensors ,Thermal Expansion Type Thermometric Sensors ,Acoustic Temperature Sensor ,Dielectric Constant and Refractive Index thermo sensors ,Helium Low Temperature Thermometer ,Nuclear Thermometer and Magnetic Thermometer.

UNIT III

Magnetic sensors:

Introduction, Sensors and the Principles Behind, Magneto-resistive Sensors, Anisotropic Magneto resistive Sensing, Semiconductor Magneto resistors, Hall Effect and Sensors, Inductance and Eddy Current Sensors, Angular/Rotary Movement Transducers and Synchros.

UNIT IV

Radiation Sensors:

Introduction, Basic Characteristics, Types of Photo resistors/ Photo detectors, X-ray and Nuclear Radiation Sensors, Fiber Optic Sensors Electro analytical Sensors: The Electrochemical Cell, The Cell Potential – Standard Hydrogen Electrode (SHE), Liquid Junction and Other Potentials, Polarization, Concentration Polarization, Reference Electrodes, Sensor Electrodes, Electro ceramics in Gas Media.

UNIT V

Smart Sensors:

Introduction, Primary Sensors, Excitation, Amplification, Filters, Converters, Compensation, Information Coding/Processing – Data Communication, Standards for Smart Sensor Interface, the Automation Sensors -Applications: Introduction, On-board Automobile Sensors (Automotive Sensors), Home Appliance Sensors, Aerospace Sensors, Sensors for Manufacturing and Environmental Monitoring.

Text Books:

1. Sensors and Actuators, D. Patranabis, 2nd Ed., PHI, 2013.
2. Introduction to sensors- John Veteline, Aravindraghu, CRC press, 2011.

References:

1. Sensors handbook- Sabrie soloman, 2nd Ed. TMH, 2009
2. Make sensors: Terokarvinen, kemo, karvinen and Villey valtokari, 1st edition, maker media, 2014.

Course Outcomes:

CO1: Understand Classification and Characterization of Sensors.

CO2: Explore the working of Electromechanical, Thermal, Magnetic, radiation and Electro analytic sensors.

CO3: Analyze and Model various losses occurring in Magnetic sensors.

CO4: Compare the working performance of various radiation sensors.

CO5: Design a complete system for monitoring of environmental parameters.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B. Tech- VII Sem

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(EC20AOE704) INTERNET OF THINGS

Course Objectives:

1. Understand IOT design requirements.
2. Understand various technologies and protocols.
3. Understand storage and intelligent analytics.
4. Analyze security requirements along with threat model.
5. Create and Design various applications.

UNIT 1

Introduction to IoT: Architectural overview, Design principles and needed capabilities, IoT Applications, Sensing, Actuation, Basics of Networking, M2M and IoT Technology Fundamentals- Devices and gateways, Data management, Business processes in IoT, Role of cloud in IoT.

UNIT II

Elements of IoT: Hardware components – computing (Arduino, Raspberry Pi), communication, Sensing, Actuation, I/O interfaces Software Components- Programming APIs (Using Python/Arduino) for communication protocols-MQTT, Zigbee, Bluetooth, CoAP, UDP and TCP.

UNIT III

Sensing and Actuation: Definition of Sensor, Sensor features, Resolution, Classes, Different types of sensors, Actuator, Different types of Actuators, purpose of Sensors and Actuators in IoT.

UNIT IV

IoT Application Development: Solution frame work for IoT Applications-Implementation of Device integration, Data acquisition and Integration, Device data storage on cloud/local server, Authentication, authorization of Devices.

UNIT V

IoT Case Studies: IoT Case studies and mini projects based on industrial Automation, Transportation, Agriculture, Healthcare and Home Automation.

Textbooks:

1. Vijay Madiseti, Arshdeep Bahga, "Internet of Things a Hands-On- Approach",2014.
2. Dr SRN Reddy, Rachit Thukral and Manasi Mishra , " Introduction to Internet of Things": A practical Approach" ETI Labs

References:

1. Raj Kamal, "Internet of Things: Architecture and Design", McGraw Hill Education.
2. Adrian McEwen, "Designing the Internet of Things", Wiley Publishers, 2013.

Course Outcomes:

CO1: Understand the concepts of Internet of Things.

CO2: Identify hardware and software components of Internet of Things.

CO3: Analyze basic communication protocols.

CO4: Discuss various techniques related to authorization of Devices.

CO5: Design IoT applications in different domain and be able to analyze their performance.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech- VII Sem

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(EC20AOE705)INTRODUCTION TO IMAGE PROCESSING

Course Objectives:

1. To introduce fundamentals of Image Processing
2. To expose various relationships between pixels
3. To describe various intensity transformations in spatial domains.
4. To describe various spatial and frequency domain filters.
5. To disseminate various segmentation and compression techniques for image processing.

Unit I

Fundamentals of Image Processing – I:

Introduction, A simple image model, Components of image processing system, Fundamental Steps in digital image processing, image sensing and acquisition, Applications of image processing.

Unit II

Fundamentals of Image Processing – II:

Image sampling and quantization, basic relationships between pixels – neighbourhood, adjacency, connectivity, distance measures, mathematical operations in image processing.

Unit III

Image Enhancement in spatial domain:

Introduction to gray level transformations, Point processing - Image negative, contrast stretching, intensity slicing, Bit plane slicing and gray level slicing, Histogram Processing, Histogram equalization and Specifications.

Unit IV

Image Enhancement in frequency domain:

Spatial Filtering, Smoothing filters, Sharpening filters, Enhancement in Frequency domain –image smoothing, image sharpening and Homomorphic filtering.

Unit V

Image Segmentation and compression:

Point, Line and Edge Detection, Fundamentals of Compression, Image compression model, Types of Redundancy – Coding, Inter pixel and Psycho visual, Lossless compression – Huffman coding, Shannon-Fano coding.

Text Books:

1. Rafael C. Gonzalez, Richard E woods and Steven L. Eddins, "Digital Image processing using MATLAB", Tata McGraw Hill, 2010.
2. S. Jayaraman, S.Esakkirajan, T.Veerakumar, "Digital Image processing", Tata McGraw Hill.

References:

1. Milan Sonka, Vaclav Hlavac, Roger Boule, Image Processing, Analysis, and Machine Vision, Third Edition, Cengage Learning, 2016.
2. William K. Pratt, "Digital Image Processing", John Wiley, 3rd Edition, 2004

Course Outcomes:

- CO1:** Understand fundamentals of digital image processing and apply engineering mathematics in processing of digital image.
- CO2:** Compute the relationship between the pixels in image processing
- CO3:** Analyze different image enhancement techniques in spatial domain.
- CO4:** Describe various image spatial filters and Analyze different image enhancement techniques in frequency domain
- CO5:** Analyze various techniques in image segmentation and apply various algorithms to perform image compression.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech-VII Sem

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(EC20AOE706) MICROCONTROLLER AND APPLICATIONS

Course Objectives:

4. To introduce architectural concepts of 8051 microcontroller.
5. To impart knowledge on addressing modes and instruction set of 8051.
6. To describe timers, counters and serial communication in 8051.
7. To explain interfacing concepts of 8051.

UNIT I

Microprocessor Vs Microcontroller, Embedded Systems, Embedded Microcontrollers, 8051 Architecture- Registers, I/O ports functions, Internal Memory organization, External Memory, 8051 Pin diagram.

UNIT II

8051 - Addressing Modes, instruction set. Simple Assembly language programs.

UNIT III

8051 - Stack, Timers and Counters – Operation and Assembly language programming to generate a pulse using Mode-1 and a square wave using Mode- 2 on a port pin.

UNIT-IV

8051 Serial Communication- Basics of Serial Data Communication, RS- 232 standard, Simple Serial Port programming in C to transmit a message and to receive data serially. 8051 - Interrupts, Assembly language programming to generate an external interrupt using a switch.

UNIT-V

Interfacing 8051 with LCD, Stepper Motor Interfacing, PWM generation using 8051.

Text Books:

1. Muhammad Ali Mazidi and Janice Gillespie Mazidi and Rollin D. McKinlay; "The 8051 Microcontroller and Embedded Systems – using assembly and C", PHI, 2006 / Pearson, 2006.
2. Kenneth J. Ayala, "The 8051 Microcontroller", 3rd Edition, Thomson/Cengage Learning.

References:

1. Manish K Patel, "The 8051 Microcontroller Based Embedded Systems", McGraw Hill, 2014, ISBN: 978-93-329-0125-4.
2. Raj Kamal, "Microcontrollers: Architecture, Programming, Interfacing and System Design", Pearson Education, 2005.

Course Outcomes:

CO1: Understand the architecture of 8051 microcontroller.

CO2: Develop 8051 assemble language programming.

CO3: Develop assembly language programs based on timers and counters of 8051 .

CO4: Understand the serial communication basics of 8051 microcontroller.

CO5: Describe 8051 Microcontroller interfacing with I/O devices.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech IV Sem

L T P C

(EC20AHO401) ELECTRONICS PACKAGING

4 0 0 4

(Honors)

Unit 1

Introduction and Role of Packaging:

Integrated Circuits, IC Packaging, Semiconductor Roadmap, IC Packaging Challenges, Summary and Future Trends, Role of Packaging in the Computer Industry, Telecommunication Industry, Automotive Systems, Medical Electronics, Consumer Electronics and MEMS Products

Unit 2

Design for Reliability and Thermal Management:

What Is Design for Reliability, Microsystems Failures and Failure Mechanisms, Fundamentals of Design for Reliability, Thermomechanically-Induced Failures, Electrically-Induced Failures, Chemically-Induced Failures.

Introduction to thermal management, Cooling Requirements for Microsystems, Thermal Management Fundamentals, Thermal Management of IC and PWB Packages, Electronic Cooling Methods.

Unit 3

Single Chip Packaging and Multichip Packaging:

Single Chip Package: Introduction and Functions, Types and Fundamentals, Materials, Processes, Properties and Characteristics of Single Chip Packages.

Multichip Packaging: Functionality, Multichip, Advantages, Multichip Modules at the System Level, Types of Multichip Module Substrates, Multichip Module Design, Multichip Module Technology Comparisons.

Unit 4

IC Assembly and Wafer-Level Packaging:

IC Assembly: Introduction and Purpose, Requirements, IC Assembly Technologies Wire bonding, Tape Automated Bonding and Introduction to Flip Chip.

Wafer-Level Packaging: Introduction, Various Technologies, Reliability and Wafer-level Burn-in and Test.

Unit 5

Sealing and Encapsulation:

Introduction and Fundamentals of Encapsulation and Sealing, Encapsulation Requirements, Encapsulant Materials, Encapsulation Processes and Hermetic Sealing.

Text Books:

1. Rao. R. Tummala, "Fundamentals of Microsystems Packaging", McGraw Hill, 3rd edition, 2019.
2. William D. Brown, "Advanced Electronic Packaging", Second edition, IEEE Press, 2011.

References:

1. Walter C Bosshart, "Printed Circuit Boards: Design and Technology", TMGH 1998.
2. Glenn R.Blackwell, "The Electronic Packaging Handbook", CRC Press, 2010.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech IV Sem

L T P C

4 0 0 4

(EC20AHO402)STRUCTURED DIGITAL SYSTEM DESIGN (HONORS)

Course Objectives:

1. To study about structural functionality of different Digital blocks (Both combinational and Sequential).
2. To provide an exposure to ASM charts, their notations and their realizations.
3. To provide an exposure to VHDL and different styles of modelling using VHDL.
4. To introduce concept of micro programming and study issues related to micro programming.

UNIT-1

BUILDING BLOCKS FOR DIGITAL DESIGN: Multiplexer, Demultiplexer, Decoder, Encoder, Comparator, Adder, ALU, Carry-look-ahead adder.

BUILDING BLOCKS WITH MEMORY: Clocked building blocks, register building blocks, RAM, ROM, PLA, PAL, Timing devices.

UNIT -II

DESIGN METHODS: Elements of design style, top-down design, separation of controller and architecture, refining architecture, and control algorithm, Algorithmic State Machines, ASM chart notations.

UNIT-III

REALISING ASMS - Traditional synthesis from ASM chart, multiplexer controller method, one-shot method, ROM based method.

ASYNCHRONOUS INPUTS AND RACES - Asynchronous ASMs, Design for testability, test vectors, fault analysis tools.

UNIT-IV

MICROPROGRAMMED DESIGN: Classical Microprogramming with Modern Technology; Enhancing the Control Unit; The 2910 Microprogram Sequencer; Choosing a Microprogram Memory; A Development System for Microprogramming; Designing a Microprogrammed Minicomputer

UNIT-V

MODELLING WITH VHDL: CAD tools, simulators, schematic entry, synthesis from VHDL.

DESIGN CASE STUDIES: Single pulse, system clock, serial to parallel data conversion, traffic light controller.

TEXT BOOKS:

1. Franklin P. Prosser and David E. Winkel, "The Art of Digital Design", Prentice Hall.
2. Roth, "Digital System Design using VHDL", McGraw Hill, 2000.

REFERENCE BOOKS:

1. William Fletcher, An Engineering Approach to Digital Design, 1st Edition, Prentice-Hall India, 1997.
2. William J Dally and John W Poulton, Digital Systems Engineering, Cambridge University Press, 2008.
3. Jayaram Bhasker, A VHDL Primer, 3rd edition, Prentice-Hall India, 2009.
4. Kevin Skahill, VHDL for Programmable Logic, Cypress Semiconductors.

Course Outcomes:

CO1: Understand structural functionality of different digital blocks.

CO2: Represent and Realize their designs in ASM charts.

CO3: Represent their designs in different modelling styles by using VHDL.

CO4: Understand concept of Micro program and issues related to microprogramming.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech - V Sem

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(EC20AHO501) MEMS TECHNOLOGY (HONORS)

UNIT I

Introduction: Introduction to MEMS & Microsystems, Introduction to Microsensors, Evaluation of MEMS, Microsensors, Market Survey, Application of MEMS, MEMS Materials and its Properties.

UNIT II

Microelectronic Technology for MEMS: Microelectronic Technology for MEMS, Micromachining Technology for MEMS, Micromachining Process, Etch Stop Techniques and Microstructure, Surface and Quartz Micromachining, Fabrication of Micromachined Microstructure and Microstereolithography.

UNIT III

Micro Sensors: MEMS Microsensors, Thermal Microsensors, Mechanical Micromachined Microsensors, MEMS Pressure Sensor, MEMS Flow Sensor, Micromachined Flow Sensors, MEMS Inertial Sensors, MEMS Gyro Sensor.

UNIT IV

MEMS Accelerometers: Micromachined Micro accelerometers for MEMS, MEMS Accelerometers for Avionics, Temperature Drift and Damping Analysis, Piezoresistive Accelerometer Technology, MEMS Capacitive Accelerometer and its design process, MEMS for Space Applications.

UNIT V

MEMS Applications: Polymer MEMS & Carbon Nano Tubes CNT, Wafer Bonding & Packaging of MEMS, Interface Electronics for MEMS, Introduction to Bio-MEMS and Micro Fluidics, Introduction to Bio-Nano Technology, Bio-Sensors, Fluidics, MEMS for Biomedical Applications (Bio-MEMS).

Text Books:

1. Nadim Maluf Kirt Williams "An Introduction to Microelectromechanical Systems Engineering", Second Edition, Artech House, Inc. Boston London, International Standard Book Number: 1-58053-590-9.
2. G. K. Ananthasuresh, K. J. Vinoy, S. Gopalakrishnan, K. N. Bhat and V. K. Atre,

"Micro and smart systems", Wiley India, 2010.

References:

1. M.J. Usher, "Sensors and Transducers", McMillian Hampshire, second edition, 2014.
2. R.S. Muller, Howe, Senturia and Smith, "Micro sensors", IEEE Press.

Course Outcomes:

- CO1:** Understand the Basic concept of MEMS Fabrication Technologies, Piezo-resistance Effect, Piezo electricity and Piezoresistive Sensor.
- CO2:** Explain Mechanics of Beam and Diaphragm Structures.
- CO3:** Understand the Basic concept of Air Damping and Basic Equations for Slide-film Air Damping, Couette-flow Model, Stokes-flow Model.
- CO4:** Analyze the modeling of Electrostatic Actuation.
- CO5:** Analyze various applications of MEMS in RF.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech-V Sem

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4	0	0	4

(EC20AH0502) MODERN COMMUNICATION SYSTEMS (HONORS)

Unit I:

Digital Communication Systems

Introduction to communications systems, digital communication systems, review of digital modulation techniques, PCM, BPSK, QPSK, GMSK, Delta Modulation, Adaptive Delta Modulation, Sigma Delta Modulation, Basic principles of orthogonality, Single vs Multicarrier Systems, OFDM block diagram and its Explanations, Shannon- Fano Coding, Huffman Coding, Hamming Coding.

Unit II:

Stochastic Process

Introduction, Mathematical definition of a stochastic process, Mean-Square Stochastic Integrals, Mean-Square Stochastic Differential Equations, Markov process, Poisson process, Ergodic Process.

Unit III:

Optimum Receivers

Optimum receivers for signals corrupted by additive white gaussian noise, Correlation demodulator, Optimum detector. ML sequence detector, Probability of error for binary modulation techniques.

Unit IV:

Software Defined Radio

Need for software radio, general structure for transceiver for SDR, third generation SDR system architecture, trends in SDR, cognitive radio, spectrum sensing in cognitive radio.

Unit V:

MIMO Systems

Introduction, space diversity and systems based on space diversity, MIMO based system architecture, MIMO channel modeling, MIMO channel measurement, MIMO channel capacity.

Text Books:

1. U. Dalal, "Wireless Communication", Oxford University Press, fifth edition, 2012.
2. H. Stark and J. Woods, "Probability, Statistics, and Random Processes for Engineers", 4th Edition, Pearson, 2012.

References:

1. John G. Proakis, "Digital Communication", 5/e, McGraw Hill Education, 2014.
2. W. Tomasi, "Advanced Communication Systems", Pearson Education.
3. S. Haykin "Digital Communication Systems", John Wiley & sons, 2013.

Course Outcomes:

- CO1:** Discuss about the concept of Multicarrier Modulation.
- CO2:** Analyze errors in system using optimum receivers and detectors.
- CO3:** Comprehend the concepts of related to stochastic processes.
- CO4:** Contribute in the areas of software defines radio and cognitive radio.
- CO5:** Understand MIMO systems and channel modeling.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech VI Sem

L	T	P	C
4	0	0	4

(EC20AH0601) ADVANCED COMPUTER ARCHITECTURE

(Honors)

UNIT-I:

Pipeline and vector processing:

Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processors.

UNIT-II:

Computer Arithmetic:

Addition and Subtraction, Hardware Implementation, Multiplication Algorithms and Hardware Implementation, Division Algorithms and Hardware Implementation, Floating Point Arithmetic Operations.

UNIT-III:

Parallel Computer Models:

Evolution of Computer Architecture, System Attributes to Performance, Shared Memory Multiprocessors, Distributed Memory Multicomputers, Vector Super Computers, SIMD Super Computers.

UNIT-IV:

Processors and Memory Hierarchy:

Advanced Processor Technology: Design Space of Processors, Instruction-Set Architectures, CISC scalar Processors, RISC scalar Processors, Super Scalar and Vector Processors: Superscalar Processors.

UNIT-V:

Pipelining and Superscalar Techniques:

Linear Pipeline Processors: Asynchronous and Synchronous models, Clocking and Timing Control, Speedup, Efficiency and Throughput, Pipeline Schedule Optimization, Instruction Pipeline Design: Instruction Execution Phases, Mechanisms for Instruction Pipelining, Dynamic Instruction Scheduling, Branch Handling Techniques.

Text Books:

1. Computer System Architecture, Morris M. Mano, 3rd edition, Pearson/Prentice Hall India.
2. Advanced Computer Architecture, Kai Hwang, McGraw-Hill, India.

References:

1. Computer Organization and Architecture, William Stallings ,8th edition, PHI.
2. Computer Organization, Carl Hamacher, Z. Vranesic, S. Zaky, 5th edition, McGraw Hill.

Course Outcomes:

- CO1:** Understand the Concept of Parallel Processing and its applications.
- CO2:** Implement the Hardware for Arithmetic Operations.
- CO3:** Analyze the performance of different scalar Computers.
- CO4:** Develop the Pipelining Concept for a given set of Instructions.
- CO5:** Distinguish the performance of pipelining and non-pipelining environment in a processor.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech VI Sem

L	T	P	C
4	0	0	4

(EC20AH0602) DIGITAL SPEECH PROCESSING

(HONORS)

UNIT-I:

Fundamentals of Digital Speech Processing

Anatomy & Physiology of Speech Organs, The process of Speech Production, Acoustic Phonetics, Articulatory Phonetics, The Acoustic Theory of Speech Production- Uniform lossless tube model, effect of losses in vocal tract, effect of radiation at lips, Digital models for speech signals.

UNIT-II:

Time Domain Models for Speech Processing

Introduction- Window considerations, Short time energy and average magnitude Short time average zero crossing rate, Speech Vs Silence discrimination using energy and zero crossing, Pitch period estimation using a parallel processing approach, The short time autocorrelation function, The short time average magnitude difference function, Pitch period estimation using the autocorrelation function.

UNIT-III:

Linear Predictive Coding (LPC) Analysis:

Basic principles of Linear Predictive Analysis: The Autocorrelation Method, The Covariance Method, Solution of LPC Equations: Cholesky Decomposition Solution for Covariance Method, Durbin's Recursive Solution for the Autocorrelation Equations, Comparison between the Methods of Solution of the LPC Analysis Equations, Applications of LPC Parameters: Pitch Detection using LPC Parameters, Formant Analysis using LPC Parameters.

UNIT-IV:

Homomorphic Speech Processing:

Introduction, Homomorphic Systems for Convolution: Properties of the Complex Cepstrum, Computational Considerations, The Complex Cepstrum of Speech, Pitch Detection, Formant Estimation, The Homomorphic Vocoder. Speech Enhancement:

Nature of interfering sounds, Speech enhancement techniques: Single Microphone Approach : spectral subtraction, Enhancement by re-synthesis, Comb filter, Wiener filter, Multi microphone Approach.

UNIT-V:

Automatic Speech & Speaker Recognition:

Basic pattern recognition approaches, Parametric representation of speech, Evaluating the similarity of speech patterns, Isolated digit Recognition System, Continuous digit Recognition System. Hidden Markov Model (HMM) for Speech: Hidden Markov Model (HMM) for speech recognition, Viterbi algorithm, Training and testing using HMMS. Speaker Recognition: Recognition techniques, Features that distinguish speakers, Speaker Recognition Systems: Speaker Verification System, Speaker Identification System.

Text Books:

1. L.R. Rabiner and S. W. Schafer, "Digital Processing of Speech Signals", 2nd Ed., Pearson Education.
2. Douglas O'Shaughnessy, "Speech Communications: Human & Machine", 2nd Ed., Wiley India, 2000.

References:

1. Thomas F. Quateri, "Discrete Time Speech Signal Processing: Principles and Practice", 1st Edition., PE.
2. Ben Gold & Nelson Morgan, "Speech & Audio Signal Processing", 1st Edition, J.Wiley

Course Outcomes:

- CO1:** Express the speech signal in terms of its time domain and frequency domain representations and the different ways in which it can be modeled.
- CO2:** Derive expressions for simple features used in speech classification applications.
- CO3:** Discuss the operation of example algorithms covered in lectures, and discuss the effects of varying parameter values within these.
- CO4:** Synthesize block diagrams for speech applications, explain the purpose of the various blocks, and describe in detail algorithms that could be used to implement them.
- CO5:** Deduce the behavior of previously unseen speech processing systems and hypothesize about their merits.

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(Autonomous)

B.Tech VII Sem

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(EC20AH0701) DIGITAL VIDEO PROCESSING (ECE)

UNIT-I:

Introduction and Fundamentals:

Representation of video, analog video, spatio-temporal sampling, sampling of analog and digital video, sampling of 3-D structures, reconstruction from samples.

UNIT-II:

Video Motion Estimation-I:

Real versus apparent motion, spatial-temporal constraint methods (optical flow equation), general methodologies-Block matching algorithm, Deformable block matching algorithm.

UNIT-III:

Video Motion Estimation-II:

Mesh based motion estimation, Global motion estimation, Region based motion estimation, Multiresolution motion estimation Feature based Motion Estimation and Direct motion Estimation.

UNIT-IV:

Video Coding:

Content dependent video coding, Region based video coding, Object based video coding, Knowledge based video coding, Semantic video coding, Scalable video coding, Applications of motion estimator in video coding.

UNIT-V:

Digital Video Compression Standards:

Inter-frame and intra-frame compression, Lossy and Loss less compression techniques, MPEG-1 and MPEG-2 Standard, H.265/HEVC.

Text Books:

1. M.Tekalp, Digital Video Processing, Prentice Hall, 2nd Edition, 2018.
2. Alan C. Bovik, The Essential Guide to Video Processing, Elsevier Science, 2nd Edition, 2016.

References:

- 1.Y.Wang, J. Ostermann and Y.-Q. Zhang, Video Processing and Communications. Signal Proc. Series, Prentice Hall, 2012.
2. J. Watkinson, The Art of Digital Video, 3rd edition, Focal Press, 2014.

Course Outcomes:

- CO1:** Understand the video sampling and reconstruction.
- CO2:** Describe algorithms of video motion estimation.
- CO3:** Interpret video coding and segmentation algorithms.
- CO4:** Analyze various applications of motion estimator in video coding.
- CO5:** Familiarize with video compression standards.

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B.Tech VII Sem

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(EC20AHO702) TESTING & TESTABILITY (HONORS)

UNIT-I:

Need for testing, the problems in digital Design testing, the problems in Analog Design testing, the problems in mixed analog/digital design testing, design for test, printed-circuit board (PCB) testing, software testing, Fault in Digital Circuits: General Introduction, Controllability and Observability, Fault Models, stuck at faults, bridging faults, CMOS technology considerations, intermittent faults.

UNIT-II:

General Introduction to test pattern generation, Test Pattern generation for combinational logic circuits, Manual test pattern generation, automatic test pattern generation, Boolean difference method, Roth's D- algorithm, Developments following Roth's D-algorithm, Pseudorandom test pattern generation.

UNIT-III:

Pseudorandom test pattern generators, Design of test pattern generator using Linear feedback shift registers (LFSRs) and Cellular Automata (CAs).

UNIT-IV:

Design for Testability for combinational circuits: Basic Concepts of testability, controllability and observability, the Reed Muller's expansion techniques, use of control logic and syndrome testable designs.

UNIT-V:

Making sequential circuits testable, testability insertion, full scan DFT technique-Full scan insertion, flip- flop structures, Full scan design and test, scan architectures-full scan design, shadow register DFT, partial scan methods, multiple scan design, other scan designs.

Text Books:

1. Digital Systems Testing and Testable Design-Miron Abramovici, Melvin A. Breuer

and Arthur D. Friedman, IEEE, Wiley-Interscience, 2008.

2. Michael. L. Bushnell, and Vishwani. D. Agrawal, "Essentials of Electronic Testing For Digital, Memory And Mixed Signal VLSI Circuits" Kluwer Academic Publishers, Third Edition, 2012.

References:

1. H. Fujiwara, "Logic Testing and Design for testability" MIT Press, 1985.
2. Chris Spear, "System Verilog for Verification," Springer Publications, second edition 2008.

Course Outcomes:

- CO1:** Model the digital circuits at logic level and register level.
- CO2:** Identify the problems associated with testing of semiconductor circuits at earlier design levels so as to significantly reduce the testing costs.
- CO3:** Analyze various Trade-Offs and Techniques for Testability.
- CO4:** Explain the concepts of built-in-self-test.
- CO5:** Illustrate the Memory Test Architectures and Techniques.

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B.Tech IV Sem

L	T	P	C
4	0	0	4

(EC20AMI401) COMMUNICATION SYSTEMS-I

(Minor)

UNIT-I:

Amplitude Modulation

Time-Domain Description, Frequency domain description, Generation of AM waves, Detection of AM waves, AM/DSB, Time-Domain Description, Frequency domain description Generation of DSBSC waves, Coherent Detection of DSBSC Modulated waves, Costas loop, Quadrature Carrier multiplexing, Comparison of amplitude modulation techniques, frequency translation, FDM.

UNIT-II:

Angle Modulation

Basic Concepts, Frequency Modulation, Spectrum Analysis Of sinusoidal FM wave, NBFM,WBFM, Constant Average power, Transmission bandwidth of FM waves, Generation of FM waves, Direct FM, demodulation of FM waves, frequency discriminator, ZCD, phase locked loop (1st order) comparison of AM and FM.

UNIT-III:

Noise in Analog Modulation Systems

Signal-to-noise ratios, AM receiver model, DSBSC receiver, noise in AM receivers using envelope detection, threshold effect, FM receiver model, noise in FM reception, FM threshold effect, pre-emphasis and de-emphasis in FM systems.

UNIT-IV:

Pulse Modulation

Sampling theorem for low-pass and band-pass signal, statement and proof, PAM, Channel Bandwidth for a PAM signal, natural sampling, flat-top sampling, signal recovery through holding, quantization of signals, quantization error, PCM, electrical representations of binary digits, PCM systems, DPCM , delta Modulation, Adaptive delta modulation.

UNIT-V:

Digital Modulation

Introduction, Binary Shift Keying, DPSK, QPSK, QPSK transmitter, QPSK receiver, signal space representation, BFSK, spectrum, receiver for BFSK, line codes, TDM. Application of analog/digital communication in Instrumentation and Automation.

Text Books:

- 1.H Taub, D L Schilling, G Saha, "Principles of Communication Systems" 3/e, TMH 2017.
2. S. Haykin "Digital Communications" John Wiley 2015.

References:

1. B.P.Lathi, "Modern Digital and Analog Communication Systems", 3rd edition, Oxford University Press, 2017.
2. H P Hsu, "Analog and Digital Communications", Schaum's Outline Series TMH 2016.

Course Outcomes:

- CO1:** Define, understand and explain the concept of modulation, demodulation, figure of merit ,sampling, quantization, multiplexing.
- CO2:** Apply the knowledge of basic systems to articulate the building blocks of the given analog/digital communication system and derive figure of merit for the system.
- CO3:** Analyze interaction among various blocks of a given analog/digital communication system to obtain waveform at different points for given specifications and obtain noise performance parameters.
- CO4:** Design and decide the modulators, demodulators, sampling rate, type of encoding for given specifications of analog/digital communication systems.
- CO5:** Design the modulator-demodulator for the given analog/digital communication system using modern tools.

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B.Tech IV Sem

L	T	P	C
4	0	0	4

(EC20AMI402)ELECTRONIC INSTRUMENTATION

(Minor)

Course Objectives:

1. Understand the measurement of electrical parameters such as voltage, current, resistance.
2. Apply the basic concepts signals to illustrate working of CRO and signal generators
3. Design of Ammeters, Voltmeter and Multimeters
4. Analyze the working of Display Devices and Recorders in practical fields.
5. Learn the different measurement techniques for non-physiological parameters.

UNIT 1

Measurements: Introduction, Functions of instruments and measurement systems, Applications of measurement systems. Static & dynamic characteristics. Measurement Errors: Introduction Gross errors and systematic errors, Absolute and relative errors, Measurement error combinations. Basic concepts of accuracy, Precision, Resolution and Significant figures.

UNIT 2

Ammeters, Voltmeter and Multimeters: Introduction, DC ammeter principle only, DC voltmeter, Multi-range voltmeter, Extending voltmeter ranges, Loading. Digital Voltmeters: Introduction, Ramp type, Dual slope integrating type (V-T), integrating type (V-F) and Successive approximation type (relevant problems). Digital Instruments: Introduction, Block diagram of a Basic Digital Multimeter. Digital frequency meters.

UNIT 3

Oscilloscopes: Introduction, Basic principles, CRT features, Block diagram and working CRO, Typical CRT connections, Dual beam and dual trace CROs, Special Oscilloscopes: Analog storage oscilloscopes, Digital storage oscilloscopes Sampling Oscilloscope.

Signal Generators: Introduction, Fixed and variable AF oscillator, Standard signal generator, Modern laboratory signal generator, AF sine and Square wave generator, Function generator, Square and Pulse generator.

UNIT 4

Display Devices and Recorders: Introduction, Segmental Displays: Seven segmental display, dot matrices, LED, LCD, decade counting assemblies, display systems. Recorders: Recording requirements, analog recorders- Graphic recorders, strip chart recorders & its types, X-Y recorder.

Sensors and Transducers - Active and passive transducers: Measurement of displacement (Resistance, capacitance, inductance; LVDT) Force (strain gauges) Pressure (piezoelectric transducers) Temperature (resistance thermometers, thermocouples, and thermistors).

UNIT 5

Biomedical Measurements:

Bio signals characteristics – frequency and amplitude ranges. ECG – Einthovens triangle, standard lead system, Principles of EEG, EMG- unipolar and bipolar mode. Recording of ERG, EOG and EGG.

Biochemical sensors – pH, pO₂ and pCO₂, Ion selective Field effect Transistor (ISFET), Immunologically sensitive FET (IMFET), Blood glucose sensors, Blood gas analyzers - colorimeter, Sodium Potassium Analyser, spectrophotometer, blood cell counter, auto analyzer (simplified schematic description) – Bio Sensors – Principles – amperometric and voltometric techniques.

Text books:

1. "Electronic Instrumentation", H. S. Kalsi, TMH, 2004.
2. "Electronic Instrumentation and Measurements", David A Bell, PHI / Pearson Education 2006 / Oxford Higher Education, 2013.
3. Electrical and Electronic Measurements and Instrumentation – A. K. Sawhney, 17th Edition (Reprint 2004), Dhanpat Rai & Co. Pvt. Ltd., 2004.
4. Leslie Cromwell, Biomedical Instrumentation and measurement, 2nd edition, Prentice hall of India, New Delhi, 2015.

Reference Books:

1. "Modern Electronic Instrumentation and Measuring Techniques", Cooper D & A D Helfrick, PHI, 1998.
2. Joseph J. Carr and John M. Brown, Introduction to Biomedical Equipment Technology, Pearson Education, 2004.
3. Khandpur R.S, Handbook of Biomedical Instrumentation, 3rd edition, Tata McGraw-Hill New Delhi, 2014

Course Outcomes:

- CO1:** Understand instrument characteristics, errors and generalized measurement system.
- CO2:** Analyze and use the circuits for the measurement of R, L, C, F, I, V etc.
- CO3:** Use of Ammeters, Voltmeter and Multimeters and CRO for measurement.
- CO4:** Interpret different signal generator circuits for the generation of various waveforms.
- CO5:** Demonstrate different biochemical measurement techniques.

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(Autonomous)

B.Tech V Sem

L	T	P	C
4	0	0	4

(EC20AMI501) AUTOMOTIVE ELECTRONICS

(Minor)

UNIT-I:

Fundamentals of Automotive Electronics

Components for electronic engine management system, open and closed loop control strategies, PID control, Lookup tables, introduction to modern control strategies like Fuzzy logic and adaptive control. Parameters to be controlled in SI and CI engines.

UNIT-II:

Sensors & Actuators

Hall Effect, hot wire, thermistor, piezo electric, piezoresistive, based sensors. Introduction, basic sensor arrangement, types of sensors, oxygen concentration sensor, lambda sensor, crankshaft angular position sensor, cam position sensor, Mass air flow (MAF) rate, Manifold absolute pressure (MAP), Throttle plate angular position, engine oil pressure sensor, vehicle speed sensor, stepper motors, relays, detonation sensor and emission sensors.

UNIT-III:

Digital Engine Control System

Open loop and close loop control system, engine cooling and warm up control, idle speed control, acceleration and full load enrichment, deceleration fuel cutoff. Fuel control maps, open loop control of fuel injection and closed loop lambda control exhaust emission control, on-board diagnostics, diagnostics, future automotive electronic systems, Electronic dash board instruments – Onboard diagnosis system.

UNIT-IV:

SI Engine Management

Feedback carburetor system, throttle body injection and multi point fuel injection system, injection system controls, advantage of electronic ignition systems, three way catalytic converter, conversion efficiency versus lambda. Working of the fuel system components. Advantages of electronic ignition systems. Types of solid state ignition systems and their principle of operation, Contactless electronic ignition system and Electronic spark timing control.

UNIT-V:

CI Engine Management

Fuel injection system, parameters affecting combustion, noise and emissions in CI engines. Pilot, main, advanced, post injection and retarded post injection. Working of components like fuel injector, fuel pump, rail pressure limiter, flow limiter, EGR valve control in electronically controlled systems.

Text Books:

1. Automobile Electrical & Electronic Equipments - Young, Griffiths - Butterworths, London.
2. Understanding Automotive Electronics, William B. Ribbens, 5th Edition, Newnes, Butterworth-Heinemann.

References:

1. Fundamentals of Automotive Electronics - V.A.W. Hilliers - Hatchin, London.
2. Automotive Computer & Control System – Tom Wather J. R., Cland Hunter, Prentice Inc. NJ.

Course Outcomes:

- CO1:** Acquire an overview of automotive components, subsystems, and basics of Electronic Engine Control in today's automotive industry.
- CO2:** Gain fundamental knowledge to develop electronic controls for automotive subsystems.
- CO3:** Use available automotive sensors and actuators while interfacing with microcontrollers / microprocessors during automotive system design.
- CO4:** Understand the networking of various modules in automotive systems, communication protocols and diagnostics of the sub systems.
- CO5:** Design and implement the electronics that attribute the reliability, safety, and smartness to the automobiles, providing add-on comforts and get fair idea on future Automotive Electronic Systems.

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(Autonomous)

B.Tech V Sem

L	T	P	C
4	0	0	4

(EC20AMI502) COMMUNICATION SYSTEMS-II

(Minor)

UNIT I

Optical Fiber Transmission Media:

Introduction, History of optical fiber communications, Optical Fibers vs metallic cable facilities, electromagnetic spectrum, block diagram of an optical fiber communication system, optical fiber types, light propagation, optical fiber configurations, optical fiber classifications, losses in optical fiber cables, light sources, optical sources, light detectors, lasers, optical fiber system link budget.

UNIT II

Microwave Radio Communications and System Gain

Introduction, Advantages and Disadvantages of Microwave radio, Analog vs digital microwave, frequency vs amplitude modulation, frequency modulated microwave radio system, FM microwave radio repeaters, diversity, protection switching arrangements, FM microwave radio stations, microwave repeater station, line of sight path characteristics, microwave radio system gain.

UNIT III

Digital Telephone Transmission:

Pulse Modulation, PCM, PCM Sampling, Signal to Quantization Noise ratio, linear vs nonlinear pcm codes, idle channel noise, coding methods, companding, vocoders, pcm line speed, delta modulation pcm, adaptive delta modulation pcm, differential pcm, pulse transmission, signal power in binary digital signals. Time division multiplexing, frequency division multiplexing, Public Telephone Network: Telephone transmission system environment, public telephone network, instruments, local loops, trunk circuits and exchanges.

UNIT IV

Cellular Telephone Concepts

Mobile Telephone Service, evolution of cellular telephone, cellular telephone,

frequency reuse, interference, cell splitting, sectoring, segmentation and dualization, cellular system topology, roaming and handoffs, cellular telephone network components, cellular telephone call processing.

UNIT V

Cellular Telephone Systems

Introduction, First generation analog cellular telephone, personal communications, system, second generation cellular telephone systems, Digital Cellular telephone, interim standard 95 (IS-95), Global system for mobile communications, personal satellite communication systems.

Text Books:

1. W. Tomasi, Advanced Electronic Communication Systems, 6/e, Pearson, 2019.
2. Theodore S. Rappaport: Wireless communication principles and practice, 2/e, Pearson Education, 1990.

References:

1. George Kennedy, Electronic Communication systems, TMGH, 2016.
2. John Bellamy, Digital Telephony, Wiley Publications, 2015.

Course Outcomes:

- CO1:** Appreciate the importance of microwave signal and learn important microwave devices.
- CO2:** Describe the working principle of different RADAR systems and their applications.
- CO3:** Understand the Satellite fundamentals and types of satellite.
- CO4:** Analyze the working of a Satellite communication system and its inner modules.
- CO5:** Explain the working principle of Mobile communication and GSM Services.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech VI Sem

L	T	P	C
4	0	0	4

(EC20AMI601) DIGITAL INTEGRATED CIRCUITS (ECE)

Course Objectives:

1. Learn the modeling of MOS transistors
2. Learn about the use resistive Load inverter circuits in VLSI.
3. Learn about the calculation of delay times in MOS inverter circuits.
4. Learn about the working principle of two, three and four input CMOS logic circuits.
5. Study the working cycles of DRAM and SRAM cells.

Unit I

Modeling of MOS Transistors using SPICE:

Basic Concepts, The LEVEL 1 Model Equations, The LEVEL 2 Model Equations, The LEVEL 3 Model Equations, Capacitance Models and Comparison of the SPICE MOSFET Models.

Unit II

MOS Inverters: Static Characteristics

Introduction, Resistive-Load Inverter, Inverters with n-Type MOSFET Load and CMOS Inverter.

Unit III

MOS Inverters: Switching Characteristics:

Introduction, Delay-Time Definitions, Calculation of Delay Times, Inverter Design with Delay Constraints.

Unit IV

Combinational and Sequential MOS Logic Circuits:

MOS logic circuits with Depletion nMOS loads, CMOS logic circuits, Complex logic circuits, Behavior of Bistable elements, SR Latch circuit, Clocked latch and Flip-Flop circuits, CMOS D-Latch and Edge-Triggered Flip-Flop.

Unit V

Semiconductor Memories:

Overview of Semiconductor memories, RAM array organization, DRAM-Cell types, Operation of Three-Transistor DRAM cell and One-Transistor DRAM cell, Leakage

currents and Refresh operation, SRAM- Various configurations, Full CMOS SRAM cell, Memory structure of SRAM Cell array and Leakage currents.

Text Books:

1. S.M.Kang & Y.Leblicci, "CMOS Digital Integrated Circuits-Analysis and Design" Third edition, McGraw Hill Education (India) Pvt. Ltd., 2020.
2. Neil H. E. Weste & D.M.Harris, "CMOS VLSI Design-A Circuits and Systems Perspective", Fourth edition, Pearson Edition, 2020.

References:

1. T.C.Carusone, D.A.Johns & K.W.Martin, "Analog Integrated Circuit Design", Second Edition, John Wiley & Sons, Inc., 2019.
2. Kiat Seng Yeo and Kaushik Roy, "Low- Voltage, Low-Power VLSI Subsystems", McGraw Hill Professional Engineering Education, 2018.

Course Outcomes:

- CO1:** Interpret the various Modelling effects encountered in a MOSFET
- CO2:** Analyze CMOS inverter circuits using different loads.
- CO3:** Design a inverter for a specified delay.
- CO4:** Design two, three and four input CMOS logic circuits.
- CO5:** Illustrate the working cycles of DRAM and SRAM cells.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech VI Sem

L	T	P	C
4	0	0	4

(EC20AMI602) NANOTECHNOLOGY

(Minor)

Unit-I:

Introduction: History and Scope, Can Small Things Make a Big Difference? Classification of Nanostructured Materials, Fascinating Nanostructures, Applications of Nanomaterials, Nature: The Best of Nanotechnologist, Challenges and Future Prospects.

Unit-II:

Unique Properties of Nanomaterials:

Microstructure and Defects in Nanocrystalline Materials: Dislocations, Twins, stacking faults and voids, Grain Boundaries, triple and disclinations, Effect of Nano-dimensions on Materials Behavior: Elastic properties, Melting Point, Diffusivity, Grain growth characteristics, Enhanced solid solubility, Magnetic Properties: Softmagnetic nanocrystalline alloy, Permanent magnetic nanocrystalline materials, Giant Magnetic Resonance, Electrical Properties, Optical Properties, Thermal Properties and Mechanical Properties.

Unit-III:

Synthesis Routes:

Bottom up approaches: Physical Vapor Deposition, Inert Gas Condensation, Laser Ablation, Chemical Vapor Deposition, Molecular Beam Epitaxy, Sol-gel method, Self-assembly, Top down approaches: Mechanical alloying, Nano-lithography, Consolidation of Nanopowders: Shock wave consolidation, Hot isostatic pressing and Cold isostatic pressing Spark plasma sintering.

UNIT-IV:

Tools to Characterize nanomaterials:

X-Ray Diffraction (XRD), Small Angle X-ray scattering (SAXS), Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), Atomic Force Microscopy (AFM), Scanning Tunneling Microscope (STM), Field Ion Microscope (FEM).

UNIT-V:

Applications of Nanomaterials:

Nano-electronics, Micro- and Nanoelectromechanical systems (MEMS/NEMS), Nanosensors, Nanocatalysts, Food and Agricultural Industry, Cosmetic and Consumer Goods, Structure and Engineering, Automotive Industry, Water- Treatment and the environment, Nano-medical applications, Textiles, Paints, Energy, Defence and Space Applications, Concerns and challenges of Nanotechnology.

Text Books:

1. Text Book of Nano Science and Nano Technology – B.S. Murthy, P. Shankar, Baldev Raj, B.B. Rath and James Munday, University Press IIM.
2. Introduction to Nanotechnology – Charles P. Poole, Jr., and Frank J. Owens, Wiley India Edition, 2018.

References:

1. Nano: The Essentials by T.Pradeep, McGraw- Hill Education.
2. Nanomaterials, Nanotechnologies and Design by Michael F. Ashby, Paulo J. Ferreira and Daniel L. Schodek.

Course Outcomes:

- CO1:** Explain the fundamental principles of nanotechnology and their application to biomedical engineering.
- CO2:** Apply engineering and physics concepts to the nano-scale and non-continuum domain.
- CO3:** Identify and compare state-of-the-art nanofabrication methods and perform a critical analysis of the research literature.
- CO4:** Design processing conditions to engineer functional nanomaterials.
- CO5:** Apply and transfer interdisciplinary systems engineering approaches to the field of bio and nanotechnology projects.

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B.Tech VII Sem

L	T	P	C
4	0	0	4

(EC20AMI701) DIGITAL IMAGE AND VIDEO PROCESSING

(Minor)

UNIT-I:

Introduction and Image Enhancement:

Digital image fundamentals, Concept of pixels and gray levels, Applications of image processing, Introduction to image enhancement, spatial domain methods: point processing – intensity transformations, histogram processing, image averaging, image subtraction, Spatial filtering- smoothing filters, sharpening filters, Frequency domain methods: low pass filtering, high pass filtering, Homomorphic filtering.

UNIT-II:

Image Restoration:

Introduction to Image restoration, Degradation model, Restoration in the presence of Noise only-Spatial Filtering, Periodic Noise reduction by Frequency domain Filtering, Algebraic approaches- Inverse filtering, Wiener filtering, Constrained Least squares restoration. Color Image Processing: Introduction, Fundamentals of Color image processing: Color models- RGB, CMY, YIQ, HSI, Pseudo color image processing – intensity slicing, gray level to color transformation, Basics of Full Color image processing.

UNIT-III:

Image Compression:

Introduction, Need for image compression, Redundancy in images, Classification of redundancy in images, image compression scheme, Classification of image compression schemes, Huffman coding, Arithmetic coding, Predictive coding, Transformed based compression, Image compression standards, Wavelet-based image compression.

UNIT-IV:

Image Segmentation:

Introduction to image segmentation, Detection of discontinuities -point, line and edge and combined detection; Edge linking and boundary description - local and

global processing using Hough transform, Thresholding, Region oriented segmentation – basic formulation, region growing by pixel aggregation, region splitting and merging.

UNIT-V:

Digital Video & Coding:

Basics of Video, Time-varying Image formation Models, Spatio Temporal Sampling, Optical flow, General methodologies, Overview of coding systems, Video Compression Standards.

Text Books:

1. R. Gonzalez, R.E.Woods, "Digital Image Processing", 3rd Edition, Pearson Education, India, 2019.
2. M. Tekalp, "Digital Video Processing", Prentice-Hall, 2015.

References:

1. Rafael C. Gonzalez, Richard E Woods and Steven L. Eddins, "Digital Image Processing using MAT LAB", Pearson Edu., 2018.
2. Bovik, "Handbook of Image & Video Processing", Academic Press, 2016.

Course Outcomes:

- CO1:** Comprehend the image processing fundamentals and enhancement techniques in spatial and frequency domain.
- CO2:** Describe the color image fundamentals, models and various restoration techniques.
- CO3:** Design and Analyze the image compression systems.
- CO4:** Outline the various image segmentation operations.
- CO5:** Comprehend the basics of video processing and video coding.

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B.Tech VII Sem

L	T	P	C
4	0	0	4

(EC20AMI604) EMBEDDED SYSTEM DESIGN

(Minor)

UNIT-I:

Embedded Systems Basics:

Introduction to Embedded systems, Examples of embedded systems, Typical Hardware, Gates, Timing Diagrams, Memory, Microprocessors, Buses, Direct Memory Access, Interrupts, Microprocessor Architecture, and Interrupt Basics.

UNIT-II:

8051 Architecture:

Introduction, 8051 Micro controller Hardware, Input/output Pin Ports and Circuits, External Memory, Serial data Input/output, Interrupts.

UNIT-III:

Basic Assembly Language Programming Concepts:

The Assembly Language Programming Process, Programming Tools and Techniques, Programming the 8051.

UNIT-IV:

Moving Data:

Introduction, Addressing Modes, External Data Moves, Code Memory Read Only Data Moves, Push and Pop Opcodes, Data Exchanges.

Basic Design Using a Real-Time Operating System:

Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management, Interrupt Routines in an RTOS Environment.

UNIT-V:

Applications:

Introduction, keyboards, Human Factor, Key Switch Factors, Keyboard Configurations, Displays, Seven-Segment Numeric Display, D/A and A/D Conversions.

Embedded Software Development Tools:

Host and Target machines, Linker/Locators for Embedded Software, Getting Embedded Software into the Target System; Debugging Techniques: Testing on Host Machine, Using Laboratory Tools, An Example System.

Text Books:

1. An Embedded Software Primer, David E. Simon, Pearson Education.
2. The 8051 Microcontroller, Third Edition, Kenneth J. Ayala, Thomson.

References:

1. 8051 Microcontrollers, Satish Shah, Oxford Higher Education.
2. Embedded Microcomputer Systems Real Time Interfacing, Jonathan W. Valvano, Cengage Learning.

Course Outcomes:

- C01:** Understand the microprocessor architecture and its components used in embedded systems.
- C02:** Write the 8051 assembly language code for specific purposes.
- C03:** Implement code for interfacing various devices.
- C04:** Develop simple embedded systems for real time operations.
- C05:** Compose simple embedded system with error free software to obtain target system.

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B.Tech IV Sem

L	T	P	C
4	0	0	4

(EC20AMI403) INTRODUCTION TO SIGNAL PROCESSING

(Minor)

Unit I

Signals & Systems:

Basic definitions and classification of Signals and Systems (Continuous time and discrete time), operations on signals, Concepts of Convolution and Correlation of signals, Fourier series: Trigonometric & Exponential, concept of discrete spectrum, Illustrative Problems.

Unit II

Continuous Time Fourier Transform:

Definition, Computation and properties of Fourier transform for different types of signals and systems, Inverse Fourier transform. Statement and proof of sampling theorem of low pass signals, Illustrative Problems.

Unit III

Discrete Time Fourier Transform:

Definition, Computation and properties of Discrete Time Fourier transform for different types of signals and systems, Illustrative Problems.

Unit IV

Laplace Transform:

Definition, ROC, Properties, Inverse Laplace transforms, the S-plane and BIBO stability, Transfer functions.

Z-Transform:

Definition, ROC, Properties, Poles and Zeros in Z-plane, The inverse Z- Transform, System analysis, Transfer function, Solution of difference equations with initial conditions, Illustrative Problems.

Unit V

Discrete Fourier Transform:

Discrete Fourier series, Properties of Discrete Fourier series, Discrete Fourier Transform (DFT), The DFT as a linear transformation, Properties of DFT.

Fast Fourier Transforms:

Efficient computation of DFT algorithms - Radix 2-Decimation-in-Time & Decimation-in-Frequency algorithms, Inverse FFT, Illustrative problems.

Text Books:

- 1 A.V. Oppenheim, A.S. Willsky and S.H. Nawab, "Signals and Systems", 2nd Edition, PHI, 2009.
- 2 John G. Proakis, Dimitris G. Manolakis, "Digital signal processing, principles, Algorithms and applications," Pearson Education/PHI, 4th ed., 2007.

References:

- 1 B P Lathi, "Principles of Linear Systems and Signals", 2nd Edition, Oxford University Press, 015.
- 2 Simon Haykin and Van Veen, "Signals & Systems", 2nd Edition, Wiley, 2005.
- 3 Avtar Singh and S. Srinivasan, "Digital Signal Processing," Thomson Publications, 2004.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech IV Sem

L	T	P	C
4	0	0	4

(EC20AMI402)ELECTRONIC INSTRUMENTATION

(Minor)

Course Objectives:

1. Understand the measurement of electrical parameters such as voltage, current, resistance.
2. Apply the basic concepts signals to illustrate working of CRO and signal generators
3. Design of Ammeters, Voltmeter and Multimeters
4. Analyze the working of Display Devices and Recorders in practical fields.
5. Learn the different measurement techniques for non-physiological parameters.

UNIT 1

Measurements: Introduction, Functions of instruments and measurement systems, Applications of measurement systems. Static & dynamic characteristics. Measurement Errors: Introduction Gross errors and systematic errors, Absolute and relative errors, Measurement error combinations. Basic concepts of accuracy, Precision, Resolution and Significant figures.

UNIT 2

Ammeters, Voltmeter and Multimeters: Introduction, DC ammeter principle only, DC voltmeter, Multi-range voltmeter, Extending voltmeter ranges, Loading. Digital Voltmeters: Introduction, Ramp type, Dual slope integrating type (V-T), integrating type (V-F) and Successive approximation type (relevant problems). Digital Instruments: Introduction, Block diagram of a Basic Digital Multimeter. Digital frequency meters.

UNIT 3

Oscilloscopes: Introduction, Basic principles, CRT features, Block diagram and working CRO, Typical CRT connections, Dual beam and dual trace CROs, Special Oscilloscopes: Analog storage oscilloscopes, Digital storage oscilloscopes Sampling Oscilloscope.

Signal Generators: Introduction, Fixed and variable AF oscillator, Standard signal generator, Modern laboratory signal generator, AF sine and Square wave generator, Function generator, Square and Pulse generator.

UNIT 4

Display Devices and Recorders:

Introduction, Segmental Displays: Seven segmental display, dot matrices, LED, LCD, decade counting assemblies, display systems. Recorders: Recording requirements, analog recorders- Graphic recorders, strip chart recorders & its types, X-Y recorder.

Sensors and Transducers –

Active and passive transducers: Measurement of displacement (Resistance, capacitance, inductance; LVDT) Force (strain gauges) Pressure (piezoelectric transducers) Temperature (resistance thermometers, thermocouples, and thermistors).

UNIT 5

Biomedical Measurements:

Bio signals characteristics – frequency and amplitude ranges. ECG – Einthovens triangle, standard lead system, Principles of EEG, EMG- unipolar and bipolar mode. Recording of ERG, EOG and EGG.

Biochemical sensors –

pH, pO₂ and pCO₂, Ion selective Field effect Transistor (ISFET), Immunologically sensitive FET (IMFET), Blood glucose sensors, Blood gas analyzers -colorimeter, Sodium Potassium Analyser, spectrophotometer, blood cell counter, auto analyzer (simplified schematic description) – Bio Sensors – Principles – amperometric and voltometric techniques.

Text books:

1. Electronic Instrumentation, H. S. Kalsi, TMH, 2004.
2. Electronic Instrumentation and Measurements, David A Bell, PHI / Pearson Education 2006 / Oxford Higher Education, 2013.
3. Electrical and Electronic Measurements and Instrumentation – A. K. Sawhney, 17th Edition (Reprint 2004), Dhanpat Rai & Co. Pvt. Ltd., 2004.
4. Leslie Cromwell, Biomedical Instrumentation and measurement, 2nd edition, Prentice hall of India, New Delhi, 2015.

Reference Books:

1. "Modern Electronic Instrumentation and Measuring Techniques", Cooper D & A D Helfrick, PHI, 1998.
2. Joseph J. Carr and John M. Brown, Introduction to Biomedical Equipment Technology, Pearson Education, 2004.
3. Khandpur R.S, Handbook of Biomedical Instrumentation, 3rd edition, Tata McGraw-Hill New Delhi, 2014

Course Outcomes:

- CO1:** Understand instrument characteristics, errors and generalized measurement system.
- CO2:** Analyze and use the circuits for the measurement of R, L, C, F, I, V etc.
- CO3:** Use of Ammeters, Voltmeter and Multimeters and CRO for measurement.
- CO4:** Interpret different signal generator circuits for the generation of various waveforms.
- CO5:** Demonstrate different biochemical measurement techniques.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech V SEM

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(EC20AMI401) COMMUNICATION SYSTEMS-I

(Minor)

UNIT-I:

Amplitude Modulation

Time-Domain Description, Frequency domain description, Generation of AM waves, Detection of AM waves, AM/DSB, Time-Domain Description, Frequency domain description Generation of DSBSC waves, Coherent Detection of DSBSC Modulated waves, Costas loop, Quadrature Carrier multiplexing, Comparison of amplitude modulation techniques, frequency translation, FDM.

UNIT-II:

Angle Modulation

Basic Concepts, Frequency Modulation, Spectrum Analysis Of sinusoidal FM wave, NBFM,WBFM, Constant Average power, Transmission bandwidth of FM waves, Generation of FM waves, Direct FM, demodulation of FM waves, frequency discriminator, ZCD, phase locked loop (1st order) comparison of AM and FM.

UNIT-III:

Noise in Analog Modulation Systems

Signal-to-noise ratios, AM receiver model, DSBSC receiver, noise in AM receivers using envelope detection, threshold effect, FM receiver model, noise in FM reception, FM threshold effect, pre-emphasis and de-emphasis in FM systems.

UNIT-IV:

Pulse Modulation

Sampling theorem for low-pass and band-pass signal, statement and proof, PAM, Channel Bandwidth for a PAM signal, natural sampling, flat-top sampling, signal recovery through holding, quantization of signals, quantization error, PCM, electrical representations of binary digits, PCM systems, DPCM , delta Modulation, Adaptive delta modulation.

UNIT-V:

Digital Modulation

Introduction, Binary Shift Keying, DPSK, QPSK, QPSK transmitter, QPSK receiver, signal space representation, BFSK, spectrum, receiver for BFSK, line codes, TDM. Application of analog/digital communication in Instrumentation and Automation.

Text Books:

- 1.H Taub, D L Schilling, G Saha, "Principles of Communication Systems" 3/e, TMH 2017.
2. S. Haykin "Digital Communications" John Wiley 2015.

References:

1. B.P.Lathi, "Modern Digital and Analog Communication Systems", 3rd edition, Oxford University Press, 2017.
2. H P Hsu, "Analog and Digital Communications", Schaum's Outline Series TMH 2016.

Course Outcomes:

- CO1:** Define, understand and explain the concept of modulation, demodulation, figure of merit ,sampling, quantization, multiplexing.
- CO2:** Apply the knowledge of basic systems to articulate the building blocks of the given analog/digital communication system and derive figure of merit for the system.
- CO3:** Analyze interaction among various blocks of a given analog/digital communication system to obtain waveform at different points for given specifications and obtain noise performance parameters.
- CO4:** Design and decide the modulators, demodulators, sampling rate, type of encoding for given specifications of analog/digital communication systems.
- CO5:** Design the modulator-demodulator for the given analog/digital communication system using modern tools.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech V SEM

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(EC20AMI504) MATLAB PROGRAMMING

(Minor)

UNIT-I:

Introduction to MATLAB

MATLAB Interactive Sessions, Menus and the toolbar, computing with MATLAB, Script files and the Editor Debugger, MATLAB Help System, Programming in MATLAB.

UNIT-II:

Arrays

Arrays, Multidimensional Arrays, Element by Element Operations, Polynomial Operations Using Arrays, Cell Arrays, Structure Arrays.

UNIT-III:

Functions & Files:

Elementary Mathematical Functions, User Defined Functions, Advanced Function Programming, Working with Data Files.

UNIT-IV:

Programming Techniques:

Program Design and Development, Relational Operators and Logical Variables, Logical Operators and Functions, Conditional Statements, Loops, the Switch Structure, Debugging Mat Lab Programs.

Plotting :XY- plotting functions, Subplots and Overlay plots, Special Plot types, Interactive plotting, Function Discovery, Regression, 3-D plots.

UNIT-V:

Linear Algebraic Equations:

Elementary Solution Methods, Matrix Methods for (Linear Equations), Cramer's Method, Undetermined Systems, Order Systems.

Text Books:

1. G. H. Golub and C. F. Van Loan, Matrix Computations, 3rd Ed., Johns Hopkins University Press, 2014.
2. Delores M. Etter, David C. Kuncicky, Holly Moore, "Introduction to MATLAB 7.0", Pearson, 2018.

References:

1. RudraPratap, "Getting Started with MATLAB", OXFORD University Press, 2017.
2. Agam Kumar Tyagi, "MATLAB and Simulink for Engineers", University Press, 2019.

Course Outcomes:

- CO1:** Use MATLAB Tool and help system to solve problems.
- CO2:** Analyze the concepts of Arrays and examine the Operations in MATLAB.
- CO3:** Develop various Functions and Files in MATLAB Programming.
- CO4:** Develop MATLAB programming techniques using logical and conditional operators.
- CO5:** Solve Linear Equations using MATLAB.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech VI SEM

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(EC20AMI604) EMBEDDED SYSTEM DESIGN

(Minor)

UNIT-I:

Embedded Systems Basics:

Introduction to Embedded systems, Examples of embedded systems, Typical Hardware, Gates, Timing Diagrams, Memory, Microprocessors, Buses, Direct Memory Access, Interrupts, Microprocessor Architecture, and Interrupt Basics.

UNIT-II:

8051 Architecture:

Introduction, 8051 Micro controller Hardware, Input/output Pin Ports and Circuits, External Memory, Serial data Input/output, Interrupts.

UNIT-III:

Basic Assembly Language Programming Concepts:

The Assembly Language Programming Process, Programming Tools and Techniques, Programming the 8051.

UNIT-IV:

Moving Data:

Introduction, Addressing Modes, External Data Moves, Code Memory Read Only Data Moves, Push and Pop Opcodes, Data Exchanges.

Basic Design Using a Real-Time Operating System:

Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management, Interrupt Routines in an RTOS Environment.

UNIT-V:

Applications:

Introduction, keyboards, Human Factor, Key Switch Factors, Keyboard Configurations, Displays, Seven-Segment Numeric Display, D/A and A/D Conversions.

Embedded Software Development Tools:

Host and Target machines, Linker/Locators for Embedded Software, Getting Embedded Software into the Target System; Debugging Techniques: Testing on Host Machine, Using Laboratory Tools, An Example System.

Text Books:

1. An Embedded Software Primer, David E. Simon, Pearson Education.
2. The 8051 Microcontroller, Third Edition, Kenneth J. Ayala, Thomson.

References:

1. 8051 Microcontrollers, Satish Shah, Oxford Higher Education.
2. Embedded Microcomputer Systems Real Time Interfacing, Jonathan W. Valvano, Cengage Learning.

Course Outcomes:

- C01:** Understand the microprocessor architecture and its components used in embedded systems.
- C02:** Write the 8051 assembly language code for specific purposes.
- C03:** Implement code for interfacing various devices.
- C04:** Develop simple embedded systems for real time operations.
- C05:** Compose simple embedded system with error free software to obtain target system.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B. Tech- VI Sem

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(EC20AMI605) INTRODUCTION TO CMOS VLSI DESIGN (Minor)

Course Objectives:

1. Learn about the various MOSFET models.
2. Learn about the implementation of logic functions using CMOS.
3. Study the design principles involved in the design of Combinational circuits.
4. Study the design principles involved in the design of Sequential circuits.
5. Learn about the Testing concepts in VLSI Chip design.

UNIT 1

MOS Transistor Theory: Introduction, Long-Channel I-V Characteristics and C-V Characteristics, Simple MOS Capacitance Models, Detailed MOS Gate Capacitance Model, Detailed MOS Diffusion Capacitance Model, Non-ideal I-V Effects, Mobility Degradation and Velocity Saturation, Channel Length Modulation, Threshold Voltage Effects, Leakage, Temperature Dependence and Geometry Dependence.

UNIT II

CMOS Logic and Fabrication: CMOS Logic - The Inverter, The NAND Gate, CMOS Logic Gates, The NOR Gate, Compound Gates, Pass Transistors and Transmission Gates, Tristates, Multiplexers, and Sequential Circuits.

CMOS Fabrication-Inverter Cross-Section and Fabrication Process.

UNIT III

Combinational circuit design: Introduction, Circuit Families- Static CMOS, Ratioed Circuits, Cascode Voltage Switch Logic, Dynamic Circuits and Pass-Transistor Circuits.

UNIT IV

Sequential circuit design: Circuit Design of Latches and Flip-Flops, Conventional CMOS Latches, Conventional CMOS Flip-Flops, Pulsed Latches, Resettable Latches and Flip-Flops, Enabled Latches and Flip-Flops, Incorporating Logic into Latches, Klass Semi-dynamic Flip-

Flop (SDFF), Differential Flip-Flops, Dual Edge-Triggered Flip-Flops, Radiation-Hardened Flip-Flops, True Single-Phase-Clock (TSPC) Latches and Flip-Flops.

UNIT V

Testing and Verification: Introduction- Logic Verification and Manufacturing Tests , Testers and Test Fixtures, Test Programs, and Handlers, Test Vectors, Test benches and Harnesses and Regression Testing.

Manufacturing Test Principles- Fault Models, Observability, Controllability, Repeatability, Survivability, Fault Coverage, Automatic Test Pattern Generation and Delay Fault Testing.

Design for Testability: Ad Hoc Testing, Scan Design, Built-In Self-Test (BIST) and IDDQ Testing.

Text Books:

1. Neil H. E. Weste & D.M.Harris, "CMOS VLSI Design-A Circuits and Systems Perspective", Fourth edition, Pearson Edition, 2020.
2. K.Eshraghian, D.A. Pucknell and S.Eshraghian, "Essentials of VLSI Circuits and Systems", Third Edition, PHI Learning Pvt. Ltd., 2019.

References:

1. Mead, C.A and Conway, L.A., "Introduction to VLSI Systems", Addison -Wesley, USA, 1980.
2. W.Wolf "Modern VLSI Design IP based design" Fourth edition, PHI Learning Pvt. Ltd., 2020.

Course Outcomes:

- CO1:** Summarize the modeling effects of MOSFET.
- CO2:** Implement various logic functions using CMOS logic.
- CO3:** Design CMOS based Switching circuits.
- CO4:** Design CMOS based Flip-flops.
- CO5:** Develop algorithms for automatic test generation for combinational and sequential circuits.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech VII SEM

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(EC20AMI501) AUTOMOTIVE ELECTRONICS

(Minor)

UNIT-I:

Fundamentals of Automotive Electronics

Components for electronic engine management system, open and closed loop control strategies, PID control, Lookup tables, introduction to modern control strategies like Fuzzy logic and adaptive control. Parameters to be controlled in SI and CI engines.

UNIT-II:

Sensors & Actuators

Hall Effect, hot wire, thermistor, piezo electric, piezoresistive, based sensors. Introduction, basic sensor arrangement, types of sensors, oxygen concentration sensor, lambda sensor, crankshaft angular position sensor, cam position sensor, Mass air flow (MAF) rate, Manifold absolute pressure (MAP), Throttle plate angular position, engine oil pressure sensor, vehicle speed sensor, stepper motors, relays, detonation sensor and emission sensors.

UNIT-III:

Digital Engine Control System

Open loop and close loop control system, engine cooling and warm up control, idle speed control, acceleration and full load enrichment, deceleration fuel cutoff. Fuel control maps, open loop control of fuel injection and closed loop lambda control exhaust emission control, on-board diagnostics, diagnostics, future automotive electronic systems, Electronic dash board instruments – Onboard diagnosis system.

UNIT-IV:

SI Engine Management

Feedback carburetor system, throttle body injection and multi point fuel injection system, injection system controls, advantage of electronic ignition systems, three way catalytic converter, conversion efficiency versus lambda. Working of the fuel

system components. Advantages of electronic ignition systems. Types of solid state ignition systems and their principle of operation, Contactless electronic ignition system and Electronic spark timing control.

UNIT-V:

CI Engine Management

Fuel injection system, parameters affecting combustion, noise and emissions in CI engines. Pilot, main, advanced, post injection and retarded post injection. Working of components like fuel injector, fuel pump, rail pressure limiter, flow limiter, EGR valve control in electronically controlled systems.

Text Books:

1. Automobile Electrical & Electronic Equipments - Young, Griffiths - Butterworths, London.
2. Understanding Automotive Electronics, William B. Ribbens, 5th Edition, Newnes, Butterworth-Heinemann.

References:

1. Fundamentals of Automotive Electronics - V.A.W. Hilliers - Hatchin, London.
2. Automotive Computer & Control System – Tomwather J. R., Cland Hunter, Prentice Inc. NJ.

Course Outcomes:

- CO1:** Acquire an overview of automotive components, subsystems, and basics of Electronic Engine Control in today's automotive industry.
- CO2:** Gain fundamental knowledge to develop electronic controls for automotive subsystems.
- CO3:** Use available automotive sensors and actuators while interfacing with microcontrollers / microprocessors during automotive system design.
- CO4:** Understand the networking of various modules in automotive systems, communication protocols and diagnostics of the sub systems.
- CO5:** Design and implement the electronics that attribute the reliability, safety, and smartness to the automobiles, providing add-on comforts and get fair idea on future Automotive Electronic Systems.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B. Tech- VII SEM

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(EC20AMI702) INTRODUCTION TO IoT (Minor)

Course Objectives:

1. Study about the genesis and impact of IoT applications, architectures in real world.
2. Learn about the diverse methods of deploying smart objects and connect them to network.
3. Study different Application protocols for IoT.
4. Study the role of Data Analytics and Security in IoT.
5. Learn about the sensor technologies for sensing real world entities and understand the role of IoT in various domains of Industry

UNIT 1

What is IoT, Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges, IoT Network Architecture and Design, Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack.

UNIT II

Smart Objects- The “Things” in IoT, Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart Objects, Communications Criteria, IoT Access Technologies.

UNIT III

IP as the IoT Network Layer, The Business Case for IP, The need for Optimization, Optimizing IP for IoT, Profiles and Compliances, Application Protocols for IoT, The Transport Layer, IoT Application Transport Methods.

UNIT IV

Data and Analytics for IoT, An Introduction to Data Analytics for IoT, Machine Learning, Big Data Analytics Tools and Technology, Edge Streaming Analytics, Network Analytics, Securing IoT, A Brief History of OT Security, Common Challenges in OT Security, How IT and OT Security Practices and Systems Vary, Formal Risk Analysis Structures: OCTAVE and FAIR, The Phased Application of Security in an Operational Environment.

UNIT V

IoT Physical Devices and Endpoints - Arduino UNO: Introduction to Arduino, Arduino UNO, Installing the Software, Fundamentals of Arduino Programming. IoT Physical Devices and Endpoints - RaspberryPi: Introduction to RaspberryPi, About the RaspberryPi Board: Hardware Layout, Operating Systems on RaspberryPi, Configuring RaspberryPi, Programming RaspberryPi with Python, Wireless Temperature Monitoring System Using RaspberryPi Pi, DS18B20 Temperature Sensor, Connecting Raspberry Pi via SSH, Accessing Temperature from DS18B20 sensors, Remote access to RaspberryPi, Smart and Connected Cities, An IoT Strategy for Smarter Cities, Smart City IoT Architecture. Smart City Security Architecture, Smart City Use-Case Examples.

Textbooks:

1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", 1st Edition, Pearson Education (Cisco Press Indian Reprint). (ISBN: 978-9386873743)
2. Srinivasa K G, "Internet of Things", CENGAGE Learning India, 2017.

References:

1. Vijay Madiseti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014. (ISBN: 978-8173719547)
2. Raj Kamal, "Internet of Things: Architecture and Design Principles", 1st Edition, McGraw Hill Education, 2017. (ISBN: 978-9352605224)

Course Outcomes:

- CO1:** Interpret the impact and challenges posed by IoT networks leading to new architectural models.
- CO2:** Compare and contrast the deployment of smart objects and the technologies to connect them to network.
- CO3:** Appraise the role of IoT protocols for efficient network communication.
- CO4:** Elaborate the need for Data Analytics and Security in IoT.
- CO5:** Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.



Jawaharlal Nehru Technological University Anantapur

(Established by Govt. of A.P., Act. No. 30 of 2008)

Ananthapuramu–515 002 (A.P) India

B.Tech. in Computer Science & Engineering Course Structure and Syllabi under R19 Regulations

JNTUA Curriculum
Computer Science & Engineering B. Tech Course Structure

S.No.	Course Name	Category	L-T-P-C
1.	Physical Activities -- Sports, Yoga and Meditation, Plantation	MC	0-0-6-0
2.	Career Counselling	MC	2-0-2-0
3.	Orientation to all branches -- career options, tools, etc.	MC	3-0-0-0
4.	Orientation on admitted Branch -- corresponding labs, tools and platforms	EC	2-0-3-0
5.	Proficiency Modules & Productivity Tools	ES	2-1-2-0
6.	Assessment on basic aptitude and mathematical skills	MC	2-0-3-0
7.	Remedial Training in Foundation Courses	MC	2-1-2-0
8.	Human Values & Professional Ethics	MC	3-0-0-0
9.	Communication Skills -- focus on Listening, Speaking, Reading, Writing skills	BS	2-1-2-0
10.	Concepts of Programming	ES	2-0-2-0

Semester - I (Theory - 3, Lab - 4)					
S.No	Course No	Course Name	Category	L-T-P	Credits
1.	19A54101	Algebra and Calculus	BS	3-1-0	4
2.	19A51102T	Chemistry	BS	3-0-0	3
3.	19A05101T	Problem Solving & Programming	ES	3-1-0	4
4.	19A03102	Engineering Graphics Lab	ES	1-0-4	3
5.	19A03101	Engineering Workshop	LC	0-0-2	1
6.	19A51102P	Chemistry Lab	BS	0-0-3	1.5
7.	19A05101P	Problem Solving & Programming Lab	ES	0-0-3	1.5
Total					18

Semester - II (Theory - 5, Lab - 5)					
S.No	Course No	Course Name	Category	L-T-P	Credits
1.	19A02201T	Basic Electrical and Electronics Engineering	ES	3-0-0	3
2.	19A54202	Probability and Statistics	BS	3-1-0	4
3.	19A56101T	Applied Physics	BS	3-0-0	3
4.	19A05201T	Data Structures	ES	3-0-0	3
5.	19A52101T	Communicative English - I	HS	2-0-0	2
6.	19A05202	Computer Science and Engineering Workshop	LC	0-0-2	1
7.	19A52101P	Communicative English - I Lab	HS	0-0-2	1
8.	19A02201P	Basic Electrical & Electronics Engineering Lab	ES	0-0-3	1.5
9.	19A56101P	Applied Physics Lab	BS	0-0-3	1.5
10.	19A05201P	Data Structures Lab	ES	0-0-3	1.5
Total					21.5

Semester – III (Theory - 7, Lab – 3, MC-1)					
S.No	Course No	Course Name	Category	L-T-P	Credits
1.	19A54303	Mathematical Foundations of Computer Science	BS	3-0-0	3
2.	19A05301	Digital Logic Design	PC	3-0-0	3
3.	19A99304	Design Thinking	ES	2-0-0	2
4.	19A05302T	Database Management Systems	PC	3-0-0	3
5.	19A05303T	Object Oriented Programming Through Java	PC	3-0-0	3
6.	19A05304T	Python Programming	PC	2-1-0	3
7.	19A52301	Universal Human Values	HS	2-0-0	2
8.	19A05302P	Database Management Systems Lab	PC	0-0-3	1.5
9.	19A05303P	Object Oriented Programming Through Java Lab	PC	0-0-3	1.5
10.	19A05304P	Python Programming Lab	PC	0-0-3	1.5
11.	19A99301	Environmental Science	MC	3-0-0	0
				Total	23.5

Semester - IV (Theory - 6, Lab – 2, MC-1)					
S.No	Course No	Course Name	Category	L-T-P	Credits
1.	19A54401	Number Theory and Applications	BS	3-0-0	3
2.	19A05401	Computer Organization	PC	3-0-0	3
3.	19A05402T	Design and Analysis of Algorithms	PC	3-0-0	3
4.	19A52401	Entrepreneurship	HS	3-0-0	3
5.	19A05403T	Operating Systems	PC	3-0-0	3
6.	19A05404T	Software Engineering	PC	3-0-0	3
7.	19A05403P	Operating Systems Lab	PC	0-0-3	1.5
8.	19A05404P	Software Engineering Lab	PC	0-0-3	1.5
9.	19A99302	Biology For Engineers	MC	3-0-0	0
				Total	21

Semester – V (Theory - 6, Lab - 3)					
S.No.	Course No	Course Name	Category	L-T-P	Credits
1.	19A05501	Formal Languages and Automata Theory	PC	3-0-0	3
2.	19A05502T	Artificial Intelligence	PC	3-0-0	3
3.	19A05503T	Object Oriented Analysis Design & Testing	PC	2-0-0	2
4.	19A05504T	Computer Networks	PCC	3-0-0	3
5.	19A05505a 19A05505b 19A05505c	Professional Elective-I Data warehousing and Data mining Web Technologies Mobile Application Development	PE	3-0-0	3
6.	19A01506a 19A01506b 19A02506a 19A03506a 19A03506b 19A04506a 19A04506b 19A27506a 19A27506b 19A54506a 19A52506a 19A51506a	Open Elective-I Experimental stress analysis. Building Technology Electrical Engineering Materials Introduction to Hybrid and Electric Vehicles Rapid Prototyping Analog Electronics Digital Electronics Brewing Technology Computer Applications in Food Technology Optimization Techniques Technical Communication and Presentation Skills Chemistry of Energy Materials	OE	3-0-0	3
7.	19A05502P	Artificial Intelligence Laboratory	PCC	0-0-3	1.5
8.	19A05504P	Computer Networks Laboratory	PCC	0-0-3	1.5
9.	19A05503T	Object Oriented Analysis Design & Testing Lab	PCC	0-0-2	1.0
10.	19A05507	Socially Relevant Project	PR	-----	0.5
11.	19A99501	Mandatory course: Constitution of India	MC	3-0-0	0
				Total	21.5

Semester – VI (Theory - 6, Lab - 2)					
S.No.	Course No	Course Name	Category	L-T-P	Credits
1.	19A05601	Cryptography & Network Security	PC	2-1-0	3
2.	19A05602T	Big Data Analytics	PCC	3-0-0	3
3.	19A52601T	English Communication	HS	3-0-0	3
4.	19A05603a 19A05603b 19A05603c 19A05603d 19A05603e	Professional Elective-II (MOOCS) Compiler Design Introduction to Machine Learning Real Time Systems Advance Computer Architecture Computer Vision	PE	3-0-0	3
5.	19A01604a 19A01604b 19A02604a 19A02604b 19A03604a 19A03604b 19A04604a 19A04604b 19A27604a 19A27604b 19A54604a 19A52604a 19A51604a	Open Elective-II Industrial waste and wastewater management Building Services & Maintenance Industrial Automation System Reliability Concepts Introduction to Mechatronics Optimization techniques through MATLAB Basics of VLSI Principles of Communication Systems Food Toxicology Food Plant Equipment Design Wavelet Transforms & its applications Soft Skills Chemistry of Polymers and Its Applications	OE	3-0-0	3
6.	19A52602a 19A52602b 19A52602c 19A52602d 19A52602e	Humanities Elective-I Entrepreneurship & Incubation Managerial Economics and Financial Analysis Business Ethics and Corporate Governance Enterprise Resource Planning Supply Chain Management	HE	3-0-0	3
7.	19A05602P	Big Data Analytics Laboratory	PCC	0-0-3	1.5
8.	19A52601P	English Communication lab	HS	0-0-3	1.5
9.	19A05605	Socially Relevant Project	PR	-----	0.5
10.	19A99601	Mandatory Course: Research Methodology	MC	3-0-0	0
11.	19A05606	Comprehensive online examination		-	0
Total					21.5

Semester – VII (Theory - 5, Lab -2)					
S.No.	Course No	Course Name	Categ ory	L-T-P	Credits
1.	19A05701T	Internet of Things	PC	2-1-0	3
2.	19A05702T	Software Testing	PC	2-1-0	3
3.	19A05703a 19A05703b 19A05703c	Professional Elective-III Cloud Computing Natural Language Processing Agile Methodologies	PE	3-0-0	3
4.	19A01704a 19A01704b 19A02704a 19A02704b 19A03704a 19A03704b 19A04704a 19A04704b 19A27704a 19A27704b 19A54704a 19A51704a	Open Elective-III Air pollution and control. Basics of civil Engineering Renewable Energy Systems Electric Vehicle Engineering Finite element methods Product Marketing Introduction to Microcontrollers & Applications Principles of Digital Signal Processing Corporate Governance in Food Industries Process Technology for Convenience & RTE Foods Numerical Methods for Engineers (ECE, CSE, IT & CE) Chemistry of Nanomaterials and Applications	OE	3-0-0	3
5.	19A52701a 19A52701b 19A52701c 19A52701d 19A52701e	Humanities Elective-II Organizational Behavior Management Science Business Environment Strategic Management E-Business	HS	3-0-0	3
6.	19A05702P	Software Testing Lab	PC	0-0-3	1.5
7.	19A05701P	Internet of Things Lab	PC	0-0-3	1.5
8.	19A05705	Industrial Training/Skill Development/Research Project*	PR	-----	2
Total					20

Semester – VIII (Theory - 2)					
S.No.	Course No	Course Name	Category	L-T-P	Credits
1.	19A05801a 19A05801b 19A05801c	Professional Elective-IV Dev Ops Deep Learning Adhoc & Sensor Networks	PE	3-0-0	3
2.	19A01802a 19A01802b 19A02802a 19A02802b 19A03802a 19A03802b 19A04802a 19A04802b 19A04802c 19A04802d 19A27802a 19A27802b 19A54802a 19A51802a	Open Elective-IV Disaster Management. Global Warming and climate changes IoT Applications in Electrical Engineering Smart Electric Grid Energy conservation and management Non - destructive testing Introduction to Image Processing Principles of Cellular and Mobile Communications Industrial Electronics Electronic Instrumentation Food Plants Utilities & Services Nutraceuticals & Functional Foods Mathematical Modeling & Simulation Green Chemistry and Catalysis for Sustainable Environment	OE	3-0-0	
3.	19A05803	Project	PR	-----	7
Total					13

Honours Degree in CSE

S.No.	Course No.	Course Name	L	T	P	Credits
1.	19A05H01	Secure Software Engineering	3	0	0	4
2.	19A05H02	Multicore Architecture & Programming	3	0	0	4
3.	19A05H03	Reinforcement Learning	3	0	0	4
4.	19A05H04	Trusted Network Systems	3	0	0	4
5.	19A05H05	Parallel Database Systems	3	0	0	4
					Total	20

Minor Degree in CSE

S.No.	Course No.	Course Name	L	T	P	Credits
1.	19A05402T	Design and Analysis of Algorithms	3	0	0	3
2.	19A05302T	Database Management Systems	3	0	0	3
3.	19A05404T	Software Engineering	3	0	0	3
4.	19A05403T	Operating Systems	3	0	0	3
5.	19A05502T	Artificial Intelligence	3	0	0	3
6.	19A05M01	Mini Project				5
					Total	20

SRI VENKATESWARA COLLEGE OF ENGINEERING (AUTONOMOUS)

Karakambadi Road Tirupati-517 507



Department of Computer Science & Engineering

Course Structure for I, II, III & IV Years R 20 Regulations

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

Karakambadi Road, TIRUPATI – 517507

Computer Science & Engineering

B.Tech I Semester

S.No	CourseNo	CourseName	Category	L-T-P	Credits
1.	MA20ABS101	Linear Algebra and Calculus	BS	3-0-0	3
2.	CH20ABS103	Chemistry	BS	3-0-0	3
3.	CS20AES101	Problem Solving using C	ES	3-0-0	3
4.	EE20AES101	Basic Electrical& Electronics Engineering	ES	3-0-0	3
5.	ME20AES101	EngineeringWorkshop	ES	0-0-3	1.5
6.	CS20AES103	ITWorkshop	ES	0-0-3	1.5
7.	CH20ABS104	ChemistryLab	BS	0-0-3	1.5
8.	CS20AES102	ProblemSolvingusingCLab	ES	0-0-3	1.5
9.	EE20AES102	BasicElectrical&Electronics EngineeringLab	ES	0-0-2	1.5
10.	EG20AMC101	Speech&OralCommunication	MC	2-0-0	0
Total					19.5

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(Autonomous)
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Computer Science & Engineering

B.Tech II Semester

S.No	CourseNo	CourseName	Category	L-T-P/D	Credits
1.	MA20ABS201	Differential Equations and Vector Calculus	BS	3-0-0	3
2.	PH20ABS103	Applied Physics	BS	3-0-0	3
3.	EG20AHS101	Communicative English	HS	3-0-0	3
4.	CS20AES201	Data Structures	ES	3-0-0	3
5.	ME20AES102	Engineering Drawing	ES	1-0-0/2	2
6.	ME20AES103	Engineering Graphics Lab	ES	0-0-2	1
7.	EG20AHS102	Communicative English Lab	HS	0-0-3	1.5
8.	PH20ABS104	Applied Physics Lab	BS	0-0-3	1.5
9.	CS20AES202	Data Structures Lab	ES	0-0-3	1.5
10.	BA20AMC201	Universal Human Values	MC	3-0-0	0
11	BA20AHS201	Mandatory course (AICTE Suggested): Universal Human Values	HS	3-0-0	*3
12.	MA20AMC101	Logical Skills for Professionals – I	MC	2-0-0	0
Total					19.5

*UHV is considered as Credit Based Course From 2021 Batch

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

Karakambadi Road, TIRUPATI-517507

Computer Science and Engineering

B. Tech III Semester

S. No	Course No	Course Name	Category	L-T-P	Credits
1	MA20ABS303	Discrete Mathematics & Graph Theory	BS	3-0-0	3
2	EC20AES301	Digital Electronics & Microprocessors	ES	3-0-0	3
3	CS20APC305	Software Engineering	PC	3-0-0	3
4	CS20APC303	Database Management Systems	PC	3-0-0	3
5	IT20APC301	Python Programming	PC	3-0-0	3
6	EC20AES302	Digital Electronics & Microprocessors Lab	ES	0-0-3	1.5
7	CS20APC304	Database Management Systems Lab	PC	0-0-3	1.5
8	IT20APC302	Python Programming Lab	PC	0-0-3	1.5
9	AM20ASC301	Skill oriented course-I Linux Administration	SC	1-0-2	2
10	CH20AMC201	Mandatory non-credit course-II Environmental Science	MC	2-0-0	0
11	EG20AMC302	Enhancing English Language Skills (Lateral Entry Students Only)	MC	2-0-0	0
12	BA20AHS201	Mandatory course (AICTE Suggested): Universal Human Values(Lateral Entry Students Only)	HS	3-0-0	*3
Total					21.5

***UHV** is considered as Credit Based Course From 2021 Batch

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Computer Science and Engineering

B. Tech IV Semester

S. No	Course No	Course Name	Category	L-T-P	Credits
1	MA20ABS401	Numerical Methods, Probability and Statistics	BS	3-0-0	3
2	CS20APC401	Object Oriented Programming Through Java	PC	3-0-0	3
3	CS20APC301	Computer Organization and Architecture	PC	3-0-0	3
4	AM20APC301	Design and Analysis of Algorithms	PC	3-0-0	3
5	BA20AHS301	Humanities Elective-I Managerial Economics and Financial Analysis	HS	3-0-0	3
	BA20AHS302	Business Environment			
	BA20AHS303	Organizational Behavior			
6	CS20APC402	Object Oriented Programming Through Java Lab	PC	0-0-3	1.5
7	CS20APC302	Computer Organization and Architecture Lab	PC	0-0-3	1.5
8	AM20APC302	Algorithms Lab	PC	0-0-3	1.5
9	IT20ASC401	Skill Oriented Course-II Exploratory Data Analysis With R	SC	1-0-2	2
10	CS20AMC401	Mandatory non-credit course-III Design Thinking for Innovation	MC	2-0-0	0
11	SH20AAC401	NSS/YOGA/Cultural Activities/Sports	AC	0-0-2	0
12	MA20AMC401	Engineering Mathematics (Lateral Entry Students Only)	MC	2-0-0	0.0
				Total	21.5
Internship 1 Months (Mandatory) during summer vacation					
Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)				0-0-2	0

SRI VENKATESWARA COLLEGE OF ENGINEERING

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KarakambadiRoad, TIRUPATI-517507

Computer Science and Engineering

B. Tech V Semester

IIIB. Tech-I Semester(Theory-5,lab-2,SOC-1MC-3)					
S. No	Course No	Course Name	Category	L-T-P	Credits
1	CS20APC501	Computer Networks	PC	3-0-0	3
2	CS20APC502	Formal Languages and Compiler Design	PC	3-0-0	3
3	CS20APC504	Operating Systems	PC	3-0-0	3
4	CE20AOE501 EC20AOE501 EE20AOE501 ME20AOE502	Open Elective-I Basics of civil engineering Basic VLSI Design Introduction to control Systems Solar and wind energy systems	OE	3-0-0	3
5	CS20APE501 CS20APE502 CS20APE503 CS20APE504 CS20APE505	Professional Elective-I Advanced Computer Architecture Data Warehousing and Data mining Digital Image Processing Object Oriented Analysis Design & Testing Principles of Programming Languages	PE	3-0-0	3
6	CS20APC503	Computer Networks Lab	PC	0-0-3	1.5
7	CS20APC505	Operating Systems Lab	PC	0-0-3	1.5
8	EG20ASC301	Skill Oriented Course-III Soft Skills	SC	1-0-2	2
9	BA20AMC502	Mandatory non-credit course-IV Intellectual Property Rights	MC	2-0-0	0
10	CH20AMC301	Mandatory non-credit course-V Biology for Engineers	MC	2-0-0	0
11	CS20AIP501	Evaluation of Summer Internship (4 Weeks)	IP		1.5
12	CS20ATS501	Technical SeminarPresentation- I	TS		0.5
13	IT20AMC501	Problem Solving and Programming (Lateral Entry Students only)	MC	2-0-0	0
				Total	22
14	Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)			4-0-0	4
15	Honors/Minor courses (NPTEL/MOOCs)			2-0-0	2

SRI VENKATESWARA COLLEGE OF ENGINEERING

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Karakambadi Road, TIRUPATI-517507

Computer Science and Engineering (CSE)

B.Tech VI Semester

IIIB.Tech-IISemester(Theory-5,lab-3,SOC-1MC-2)					
S. No	Course No	Course Name	Category	L-T-P	Credits
1	CS20APC601	Cryptography and Network Security	PC	3-0-0	3
2	CS20APC603	Machine Learning	PC	3-0-0	3
3	CS20APC605	Web and Internet Technologies	PC	3-0-0	3
4	CS20APE601 CS20APE602 CS20APE603 CS20APE604 CS20APE605	Professional Elective-II Artificial Intelligence Big Data Analytics Computer Vision Internet of Things Software Testing	PE	3-0-0	3
5	ME20AOE501 EE20AOE503 EC20AOE602 CE20AOE603	Open Elective-II Introduction to Automation Renewable Energy Resources Signal Processing Water Resources Planning & Management	OE	3-0-0	3
6	CS20APC602	Cryptography and Network Security Lab	PC	0-0-3	1.5
7	CS20APC604	Machine Learning Lab	PC	0-0-3	1.5
8	CS20APC606	Web and Internet Technologies Lab	PC	0-0-3	1.5
9	CS20ASC601	Skill Oriented Course-V Dev Ops	SC	1-0-2	2
10	BA20AMC501	Mandatory non-credit course-V Constitution of India	MC	2-0-0	0
11	CS20ATS601	Technical Seminar Presentation- II	TS		0.5
12	AM20AMC601	AI Tools Techniques & Applications for LE	MC	2-0-0	0
13.	MA20AMC301	Logical Skills for Professionals - II	MC	2-0-0	0

Industrial/Research/Mini Project (Mandatory) 1 Month during summer vacation			
			Total
			22
13	Honors / Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)	4-0-0	4
14	Honors/Minor courses (NPTEL/MOOCs)	2-0-0	2

SRI VENKATESWARA COLLEGE OF ENGINEERING

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KarakambadiRoad, TIRUPATI-517507

Computer Science and Engineering (CSE)

B. Tech VII Semester

IVB.Tech-ISEmester(Theory-6,lab-0,SOC-1)					
S. No	Course No	Course Name	Category	L-T-P	Credits
1	CS20APE701 CS20APE702 CS20APE703 CS20APE704 CS20APE705	Professional Elective-III Block Chain Technologies Data Science Data Visualization Techniques Distributed Computing Service oriented Architecture	PE	3-0-0	3
2	CS20APE706 CS20APE707 CS20APE708 CS20APE709 CS20APE710	Professional Elective-IV Advanced Language Processors Cyber Security Deep Learning Full Stack Development Software Project Management	PE	3-0-0	3
3	CS20APE711 CS20APE712 CS20APE713 CS20APE714 CS20APE715	Professional Elective-V Agile Methodologies Cloud Computing Malware Analysis Natural language processing Reinforcement Learning	PE	3-0-0	3
4	CE20AOE701 EE20AOE603 ME20AOE602 EC20AOE702	Open Elective-III Air Pollution and Quality Control Optimization Techniques Through MATLAB Power Generation Techniques Principles of Communication Engineering	OE	3-0-0	3
5	EE20AOE701 EC20AOE705 CE20AOE705 ME20AOE702	Open Elective-IV Embedded Systems Introduction to Image Processing Low Cost Housing Techniques Robotics in Industrial Engineering	OE	3-0-0	3

6	BA20AHS701 BA20AHS705 BA20AHS706	Humanities Elective-II Business Ethics and Corporate Governance Management Science Strategic Management	HS	3-0-0	3
7	CS20ASC701	Skill Oriented Course-V MOOC-2 (NPTEL)/Digital Marketing	SC	1-0-2	2
8	CS20AIP701	Industrial/Research Internship 1 Month Evaluation Mini Project	IP	0-0-0	3
9	CS20APW701	Project Work Stage-I	PW		2
10	CS20ATS701	Technical SeminarPresentation- III	TS		0.5
				Total	25.5
11	Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)			4-0-0	4

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Computer Science and Engineering

B. Tech VIII Semester

S. No	Course No	Course Name	Category	L-T-P	Credits
1	CS20APW801	Project Work Stage – II / Full Internship in Industry	PW	0-0-0	8.5
	Total				8.5

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech-I Sem

L	T	P	C
3	0	0	3

(MA20ABS101) LINEAR ALGEBRA & CALCULUS

(Common to All Branches)

Course Objectives:

- This course will illuminate the students in the concepts of calculus and linear algebra.
- To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real-world problems and their applications.

Unit -1:

Matrices

Rank of a matrix by echelon form, normal form. Solving system of homogeneous and non-homogeneous linear equations. Eigen values and Eigen vectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, Diagonalisation of a matrix.

Learning Outcomes:

At the end of this unit, the student will be able to

- Solve systems of linear equations, using technology to facilitate row reduction determine the rank, eigen values and eigen vectors. (L3)

- Identify special properties of a matrix, such as positive definite, etc., and use this information to facilitate the calculation of matrix characteristics. (L3)

Unit -2:

Mean Value Theorems

Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof) related problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Translate the given function as series of Taylor's and Maclaurin's with remainders. (L3)
- Analyze the behavior of functions by using mean value theorems. (L3)

Unit -3:

Multivariable Calculus

Partial derivatives, total derivatives, chain rule, change of variables, Jacobian, maxima and minima of functions of two variables, method of Lagrange multipliers.

Learning Outcomes:

At the end of this unit, the student will be able to

- Find partial derivatives numerically and symbolically and use them to analyze and interpret the way a function varies. (L3)
- Acquire the Knowledge maxima and minima of functions of several variables. (L1)

Utilize Jacobian of a coordinate transformation to deal with the problems in change of variables. (L3)

Unit -4:

Multiple Integrals

Double integrals, change of order of integration, change of variables. Evaluation of triple integrals, change of variables between Cartesian, Cylindrical and Spherical polar coordinates.

Learning Outcomes:

At the end of this unit, the student will be able to

- Evaluate double integrals of functions of several variables in two dimensions using Cartesian and polar coordinates. (L5)
- Apply double integration techniques in evaluating areas bounded by region. (L4)
- Evaluate multiple integrals in Cartesian, cylindrical and spherical geometries. (L5)

Unit -5:

Beta and Gamma functions

Beta and Gamma functions and their properties, relation between beta and gamma functions,

Evaluation of definite integrals using beta and gamma functions. Evaluation of double and triple integrals using Beta and Gamma functions.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand Beta and Gamma functions and its relations. (L2)
- Conclude the use of Special function in evaluating definite integrals. (L4)

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.

Reference Books:

1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
3. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.
4. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education.
5. H. k Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand.
6. N. Bali, M. Goyal, C. Watkins, Advanced Engineering Mathematics, Infinity Science Press.

Course Outcomes:

At the end of the course, the student will be able to

- Develop the use of matrix algebra techniques that is needed by engineers for practical applications. (L6)
- Utilize mean value theorems to real life problems. (L3)
- Familiarize with functions of several variables which are useful in optimization. (L3)
- Apply multiple integrals to find the area and volumes for different functions. (L3)
- Analyze the concepts of Beta and Gamma special function for different functions. (L4)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech I Sem

L	T	P	C
3	0	0	3

(CH20ABS103) CHEMISTRY
(ECE, EEE, CSE, CSE (AI & ML), IT)

Course Objectives:

- To impart the concept of soft and hard waters, softening methods of hard water.
- To familiarize engineering chemistry and its applications.
- To train the students on the principles and applications of electrochemistry.
- To determine the polymer molecular weights and various applications of polymers.
- To introduce instrumental methods.

Unit 1: Water Technology

Introduction –Soft Water and hardness of water, Estimation of hardness of water by EDTA Method, Estimation of Dissolved Oxygen by Winkler's method -Boiler troubles–Priming, foaming, scale and sludge, Caustic embrittlement, Domestic treatment of water, specifications for drinking water, Bureau of Indian Standards (BIS) and World Health Organization (WHO) standards, Industrial water treatment, ion-exchange processes - desalination of brackish water, reverse osmosis.

Learning Outcomes:

At the end of this unit, the students will be able to

- List the differences between temporary and permanent hardness of water. (L1)
- Explain the principles of reverse osmosis and electrodialysis. (L2)

- Compare quality of drinking water with BIS and WHO standards. (L2)
- Illustrate problems associated with hard water - scale and sludge. (L2)
- Explain the working principles of different Industrial water treatment processes. (L2)

Unit 2: Modern Engineering materials

Understanding of materials: Crystal field theory – salient features – splitting in octahedral and tetrahedral geometry. Properties of coordination compounds-Oxidation state, coordination, magnetic and colour.

Semiconductor materials, super conductors- basic concept, band diagrams for conductors, semiconductors and insulators, Effect of doping on band structures. Super capacitors: Introduction, Basic Concept-Classification – Applications.

Nano chemistry: Introduction, classification of nanomaterials, properties and applications of Fullerenes, carbon nano tubes and Graphene's nanoparticles.

Learning Outcomes:

At the end of this unit, the students will be able to

- Explain splitting in octahedral and tetrahedral geometry of complexes. (L2)
- Discuss the magnetic behavior and colour of coordination compounds. (L3)
- Explain the band theory of solids for conductors, semiconductors and insulators. (L2)
- Demonstrate the application of Fullerenes, carbon nano tubes and Graphines nanoparticles. (L2)

Unit 3: Electrochemistry and Applications

Introduction to Electrochemistry: Electrodes – concepts, reference electrodes (Calomel electrode, Ag/AgCl electrode and glass electrode); Electrochemical cell, Nernst equation, cell potential calculations and numerical problems,

P^H metry, Potentiometry- potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations).

Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples.

Primary cells – Zinc-air battery, Secondary cells – Nickel-Cadmium (NiCad), and lithium ion batteries- working of the batteries including cell reactions; Principles and applications of Fuel cells: hydrogen-oxygen, methanol fuel cells

Learning Outcomes:

At the end of this unit, the students will be able to

- Apply Nernst equation for calculating electrode and cell potentials. (L3)
- Differentiate between P^h metry, potentiometric and conductometric titrations. (L2)
- Explain the theory of construction of battery and fuel cells. (L2)
- Solve problems based on cell potential. (L3)

Unit 4: Polymer Chemistry

Introduction to polymers, functionality of monomers, types of polymerization, chain growth and step growth polymerization, coordination polymerization, copolymerization (stereospecific polymerization) with specific examples and mechanisms of polymer formation. Calculation of weight average molecular mass of polymers, polydispersity index (PDI).

Plastics - Thermoplastics and Thermosettings, Preparation, properties and applications of – PVC, Teflon, Bakelite, Nylon-6,6, carbon fibres.

Elastomers–Buna-S, Buna-N–preparation, properties and applications.

Conducting polymers–polyacetylene, polyaniline, polypyrroles–mechanism of conduction and applications.

Learning Outcomes:

At the end of this unit, the students will be able to

- Explain the different types of polymers and their applications. (L2)
- Explain the preparation, properties and applications of Bakelite, Nylon-6,6, and carbon fibres. (L2)
- Describe the mechanism of conduction in conducting polymers. (L2)
- Discuss Buna-S and Buna-N elastomers and their applications. (L2)

Unit 5: Instrumental Methods and Applications

Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. Principle, instrumentation and applications of UV-Visible, IR Spectroscopies.

Learning outcomes:

After completion of Unit IV, students will be able to:

- Explain the different types of spectral series in electromagnetic spectrum. (L2)
- Understand the principles of different analytical instruments. (L2)

- Explain the different applications of analytical instruments. (L2)

Text Books:

1. Jain and Jain, Engineering Chemistry, 16/e, Dhanpat Rai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

Reference Books:

1. G.V.Subba Reddy, K.N.Jayaveera and C. Ramachandraiah, Engineering Chemistry, Mc Graw Hill, 2020.
2. D.Lee, Concise Inorganic Chemistry, 5/e, Oxford University Press, 2008.
3. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.

Course Outcomes:

At the end of the course, the students will be able to:

- Estimate the amount of hardness and DO present in water. (L2)
- Compare the materials of construction for battery and electrochemical sensors. (L2)
- Explain the preparation, properties, and applications of thermoplastics & thermosetting, elastomers & conducting polymers. (L2)
- Explain the principles of spectrometry. (L2)
- Apply the principle of Band diagrams in application of conductors and semiconductors. (L3)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech-I Sem

L	T	P	C
3	0	0	3

(CS20AES101) PROBLEM SOLVING USING C

(Common to All Branches of Engineering)

Course Objectives:

- To learn how to solve a given problem.
- To illustrate the basic concepts of C programming language.
- To discuss the concepts of Functions, Arrays, Pointers and Structures.
- To familiar with Dynamic memory allocation concepts.
- To apply concepts of structures and files to solve real word problems.

UNIT-1:

Introduction to Problem Solving: Problem Solving Aspect, Problem Identification, Problem Understanding, Algorithm Development, Solution Planning, Flowcharts, flowgorithm.

Overview of C: History Of C, C Language Elements, Basic Structure of C Program,C Tokens-Variables and Data Types, Operators,Expressionsand Type Conversions.

Learning Outcomes:

The students will be able to

- Develop solution through problem understanding and decomposition (L6).
- Develop basic flowcharts for performing input and output and computations (L3).

- Solve Numerical Problems using Flowgorithm (L3).
- Use C basic concepts to write simple C programs (L3).

UNIT-2:

Control Statements: Selection Statements- if and switch statements.

Iterative Statements: for, while and do-while statements.

Jump Statements: break and continue statements.

Learning Outcomes:

The students will be able to

- Implement C program using Conditional statements (L2).
- Implement C program using Iterative statements (L2).

UNIT-3:

Arrays: Declaration, accessing array elements, Storing values, Operations on arrays, Multi-dimensional arrays.

Functions: Introduction, Using Functions, Function declaration, Function definition and Function call, Parameter passing, Passing arrays to functions, Recursion, Storage classes.

Learning Outcomes: The students will be able to

- Writing Structured programs using Functions (L5).
- Apply arrays concepts on real time applications (L6).

UNIT-4:

Pointers: Declaration and Initialization of pointer variables, Pointer arithmetic, Pointers and arrays, Pointer to pointer, Array of pointers, Pointers and functions, Dynamic Memory Allocation.

Strings: Introduction to Strings, String handling functions, Preprocessor Directives.

Learning Outcomes: The students will be able to

- Use pointers to write c Programs (L3).
- Understand the concepts of preprocessors (L2).
- Apply Dynamic Memory Allocation concepts on real time applications (L6).

UNIT-5:

Structures: Introduction, Nested Structures, Array of Structures, Structures and Functions, Unions.

Files in C: Using Files in C, Read data from Files, Writing data to Files, Random access to files, Command-line Arguments

Learning Outcomes:

The students will be able to

- Use the concepts of Structures and Unions to write C programs (L3).
- Apply various operations on Files (L6).

Text Books:

1. Reema Thareja, Programming in C, Oxford University Press, AICTE Edition, 2018.
2. R.G. Dromey, "How to Solve it by Computer". 2014, Pearson.

Reference Books:

1. Jeri R. Hanly, Elliot B. Koffman, Problem Solving and Program Design in C, 5/e, Pearson
2. B. A. Forouzan and R. F. Gilberg, Computer Science: A Structured Programming Approach Using C, 3/e, Cengage Learning, 2007.
3. Brian W Kernighan and Dennis M Ritchie, The C Programming Language, Second Edition, Prentice Hall Publication.
4. Paul Deitel, Harvey Deitel -C How to Program with an introduction to C++, Eighth Edition

Course Outcomes:

At the end of the course, the students will be able to:

- Solve computational problems (L3).
- Select the features of C language appropriate for solving a problem (L4)
- Design computer programs for real world problems (L6)
- Organize the data which is more appropriated for solving a problem (L6).

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech-I Sem

L	T	P	C
3	0	0	3

(EE20AES101) BASIC ELECTRICAL & ELECTRONICS ENGINEERING

Part A: BASIC ELECTRICAL ENGINEERING

(Civil, Mechanical, CSE, CSE (AI&ML) and IT)

Course Objectives:

- To introduce basics of electric circuits.
- To teach DC and AC electrical circuit analysis.
- To explain working principles of transformers and electrical machines.
- To impart knowledge on low voltage electrical installations

Unit-1: DC & AC Circuits

Electrical circuit elements (R - L and C) - Kirchhoff laws - Series and parallel connection of resistances with DC excitation. Nodal and Mesh analysis. Superposition Theorem - Representation of sinusoidal waveforms –average and rms values - phasor representation - real power - reactive power - apparent power - power factor - Analysis of single-phase ac circuits consisting of RL - RC - RLC series circuits.

Learning Outcomes:

The student will be able to

- Recall Kirchhoff laws (L2)
- Analyze simple electric circuits with DC excitation (L4)
- Apply network theorems to simple circuits (L3)
- Analyze single phase AC circuits consisting of series RL - RC - RLC combinations (L4)

Unit-2: DC & AC Machines

Construction and working Principle of DC Generator - EMF equations - OCC characteristics of DC generator – principle and operation of DC Motor – Performance Characteristics of DC Motor - Speed control of DC Motor – Construction and working Principle of Single Phase Transformer - OC and SC test on transformer - principle and operation of Induction Motor and Synchronous Generator.

Learning Outcomes:

The student will be able to

- Explain principle and operation of DC Generator & Motor.
- Perform speed control of DC Motor (L2)
- Explain operation of transformer and induction motor. (L2)
- Explain construction & working of induction motor - DC motor

Unit-3: Basics of Power Systems

Layout & operation of Hydro, Thermal, Nuclear Stations - Solar & wind generating stations – Typical AC Power Supply scheme – Elements of Transmission line – Types of Distribution Systems: Primary & Secondary distribution systems.

Learning Outcomes:

The student will be able to

- Understand working operation of various generating stations (L1)
- Explain the types of Distribution systems (L2)

Text Books:

1. D. P. Kothari and I. J. Nagrath - "Basic Electrical Engineering" - Tata McGraw Hill - 2010.
2. V.K. Mehta & Rohit Mehta, "Principles of Power System" – S.Chand – 2018.

References:

1. L. S. Bobrow - "Fundamentals of Electrical Engineering" - Oxford University Press - 2011.
2. E. Hughes - "Electrical and Electronics Technology" - Pearson - 2010.

3. C.L. Wadhwa – “Generation Distribution and Utilization of Electrical Energy”, 3rd Edition, New Age International Publications.

Course Outcomes:

- Apply concepts of KVL/KCL in solving DC circuits (L3)
- Choose correct rating of a transformer for a specific application (L5)
- Illustrate working principles of induction motor - DC Motor (L3)
- Identify type of electrical machine based on their operation. (L1)
- Describe working principles of protection devices used in electrical circuits. (L2)

Part 'B'- ELECTRONICS ENGINEERING

Course Objectives:

- Understand principles and terminology of electronics.
- Familiar with the construction, and operation and applications of electronic devices.
- Learn about biasing of BJTs and FETs.
- Understand the concept of logic gates.

Unit-1:

Diodes and Applications: Construction, Operation and VI characteristics of PN Junction diode, Diode as a Switch & Rectifier, Construction and Operation of Half Wave and Full Wave Rectifiers with and without Filters; Operation and VI characteristics of zener diode, zener as voltage regulator; Wave shaping circuits –clippers and clampers, peak detector, voltage doubler, LED, Photo Diode, Varactor diode.

Learning Outcomes:

At the end of this unit, the student will be able to

- Remember and understand the basic characteristics of semiconductor diode. (L1)
- Understand principle of operation of Zener diode and other special semiconductor diodes. (L1)
- Analyze the operation of diode circuits in different applications such as rectifier, wave shaping circuits, etc.

Unit-2:

Transistor Characteristics: Bipolar Junction Transistor (BJT) – Construction, different modes of Operation, Input and Output characteristics of BJT in Common Base, Common Emitter and Common Collector Configurations, Field Effect Transistor (FET) – Classification, Construction, Symbols, Characteristics of JFET, MOSFET,

Applications: Transistor as an amplifier, switch.

Digital Electronics: Number Systems, Logic Gates, Adders- Half Adder, Full Adder; Flip Flops.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand principle of operation of BJT in different configurations. (L2)
- Understand principle of operation of JFET, MOSFET. (L2)
- Understand the different applications of transistors. (L2)
- Explain the functionality of logic gates. (L2)

Unit-3:

Operational Amplifiers and Applications: Introduction to Op-Amp, Differential Amplifier Configurations, Characteristics of Ideal Op-Amp, Concept of Virtual Ground; Op-Amp Applications - Inverting, Non- Inverting, Summing and Difference Amplifiers, Voltage Follower, Comparator, Differentiator, Integrator.

Communication Systems: Introduction, Elements of communications systems, EM spectrum, Examples of communication systems: Satellite, Fibre Optic, Mobile communication (block diagram approach).

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe operation of Op-Amp based linear application circuits, converters, amplifiers and non-linear circuits. (L2)
- Analyze Op-Amp based comparator, differentiator and integrator circuits. (L3)
- Understand the basic principles of different communication systems. (L2)

Text Books:

1. D.P. Kothari, I.J. Nagrath, Basic Electrical and Electronics Engineering, McGraw Hill Education (India) Private Limited, 2014.

2. S.K. Bhattacharya, Basic Electrical and Electronics Engineering, 2nd Edition, Pearson India Private Limited.
3. R.L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2007.

Reference Books:

1. Ramakanth A. Gayakwad, Op-Amps & Linear ICs, 4th Edition, Pearson, 2017.
2. R. P. Jain, Modern Digital Electronics, 3rd Edition, Tata McGraw Hill, 2003.

Course Outcomes:

1. Explain the theory, construction, and operation of electronic devices. (L2)
2. Apply the concept of science and mathematics to explain the working of diodes and its applications, working of transistor and to solve the simple problems based on the applications. (L2)
3. Analyze small signal amplifier circuits to find the amplifier parameters (L5)
4. Design small signal amplifiers using proper biasing circuits to fix up proper Q point. (L5)
5. Distinguish features of different active devices including Microprocessors. (L3)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech I Sem

L	T	P	C
0	0	3	1.5

(ME20AES101) ENGINEERING WORKSHOP

(Common to all Branches)

Course Description:

This course will provide students with a hands-on experience on various basic engineering practices. This course will also provide an opportunity to the students to experience the various steps involved in the industrial product fabrication.

Course Objectives:

- To familiarize students with basic engineering applications in day-to-day life.

Wood Working: (Any 2)

To familiarize with different types of wood and tools used in wood working and make following joints;

1. Planning and Sawing of Wood
2. Half – Lap Joint
3. Mortise and Tenon Joint
4. Dovetail Joint or Bridle Joint

Sheet Metal Working: (Any 2)

To familiarize with different types of tools used in sheet metal working, developments of following sheet metal job from GI sheets;

- 1) Rectangular tray
- 2) Conical funnel
- 3) Open scoop

Fitting: (Any 1)

To familiarize with different types of tools used in fitting and do the following fitting exercises;

1) V-fit

2) Square fit

3) Dovetail fit

Electrical Wiring: (Any 2)

To familiarize with different types of basic electrical circuits and make the following connections;

1) Parallel and series 2) Two-way switch 3) Godown lighting 4) Soldering of wires.

Foundry Practice: (Any 1)

To familiarize with different types of tools used in Foundry and do the following exercises;

1. Preparation of a green sand mould using single piece pattern
2. Preparation of a green sand mould using split piece pattern with core and demonstration of casting.

Welding Practice: (Any 1)

To familiarize with different types of tools used in Welding and do the following exercises;

1. Lap joint, butt joint and T joint using arc welding.
2. Lap joint using resistance spot welding
3. Lap and butt joints using gas welding

Assembling/Disassembling Practice: (Any 1)

To familiarize with different types of tools used in Assembling/Disassembling and do the following exercises;

1. Bicycle
2. Clutch and carburetor
3. Two-wheeler engine parts

Manufacture of a Plastic Component (Any 1)

To familiarize with different types of tools used in Manufacture of a Plastic Component and do the following exercises;

1. Use of injection moulding machine
2. FRP composite preparation using hand layup method
3. Joining of plastic components

Reference Books/Laboratory Manuals:

1. P. Kannaiah and K. L. Narayana, Workshop Manual, SciTech Publishers, 2009.
2. K. Venkata Reddy, Workshop Practice Manual, BS Publications, 2008.
3. V. Ramesh Babu, Engineering Workshop Practice, V R B Publishers Private Limited, 2009.

Additional Learning Resources:

1. R. K. Jain, Production Technology, Khanna Publishers, 17th edition, 2012.

2. Kalpakjain, Serope, Manufacturing Engineering and Technology, Pearson Education, 7th edition, 2014.

Course Outcomes:

After completion of this lab the student will be able to

1. Identify tools, work material, measuring instruments useful for domestic applications (L3).
2. Apply wood working skills in real world applications. (L3)
3. Build different parts with metal sheets in real world applications. (L3)
4. Apply fitting operations in various applications for good strength. (L3)
5. Analyze different types of basic electric circuit connections. (L4)
6. Demonstrate soldering and brazing in joining circuits. (L2)
7. Make moulds for sand casting using standard equipment. (L3)
8. Develop different weld joints for various metals. (L3)
9. Inspect various parts of machine components. (L4)
10. Make plastic components using proper raw material. (L3)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech I Sem

(CS20AES103) IT Workshop
(Common to All Branches of Engineering)

L	T	P	C
0	0	3	1.5

Course Objectives:

- To make the students to know about the internal parts of computer, Generation of Computers
- To make the students to know how to assemble and disassemble a computer from its parts
- To make the students to install Operating system for a computer.
- To provide technical training to the students on productivity tool like Word Processor, Spread Sheets, Presentations and LaTeX
- To learn about networking of computers and use Internet facility for browsing and searching

Task 1:

Learn about Computer Hardware -1: Identifying the internal parts of computer with its peripherals, Block diagram of Computer, Generations of Computers. Write specifications for each part of a computer including peripherals and specifications of a system. Submit it in the form of report.

Task 2:

Learn about Computer Hardware-2: Assemble and disassemble the Personal Computer, Internal and external connections of the computer, Troubleshoot the computer by

identifying working and non-working parts. Submit a report about the working and non-working parts in a computer.

Task 3:

Installation of Operating System: Linux, Windows 7/8/10 Installation, install both the operating system in a computer and make the system as Dual boot. Student should record the entire installation process.

Task 4:

Installation of Device drivers: install supported device drivers for the system- printer drivers, audio and video drivers, Graphic card drivers, USB drivers, install new application software and record the process of installations.

Task 5:

Networking: Connecting computers directly using a cable or wireless connectivity and share information, connecting computers using switch/hub or Local Area Network connection and share information, Wide Area Network Connection, crimping activity, logical configuration. The entire process has to be documented.

Task 6:

Introduction to Web Design: Introduction to Web Design, Introduction to HTML tags, Cascading Style sheets and Applications using HTML and CSS.

Task 7:

Introduction to Virus and Antivirus: Types of Virus, virus engine, Antivirus- download freely available Anti-virus software, install it and use it to check for the threats to the computer being used. Student should submit information about the features of the installation process and antivirus used.

Task 8:

Introduction to Microsoft Office-1: Microsoft word, Operations on text data in word- inserting, deleting, Aligning, header, footer, font style, font type, bulleting and numbering, hyperlinking, inserting images, page setup, inserting images, writing equations, formatting Paragraphs, spell checking etc. Student should submit a user manual of the word processor

Task 9:

Introduction to Microsoft Office-2: Microsoft Excel, Operation on data in Excel- creating, opening, saving the document as per the requirement, inserting, deleting the cell data, format the cell, creation of pivot table, applying the formulas and functions, preparing charts, converting .xls to csv, etc., Student should submit a user manual of the Spreadsheet.

Task 10:

Introduction to Microsoft Office-3: Microsoft PowerPoint Presentation, creating, opening, saving the presentations, inserting and deleting the slides, styles for slides, formatting the slides with different fonts, colours, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyper linking, running the slideshow, Setting the timing for slide show. Student should submit a user manual of the PowerPoint presentation.

Task 11:

Introduction to LaTeX: LaTeX and its installation and different IDEs, Creating the document using Latex, content into sections using article and book class of Latex.

Styling Pages: Reviewing and customizing different paper sizes and formats. Formatting text, creating basic table, adding simple and dashed border, merging rows and columns, referencing and indexing. Student should submit a user manual of the LaTeX.

References:

1. Introduction to Computers, Peter Norton, McGraw Hill
2. PC Hardware, Maintenance & Troubleshooting In-Depth, Reddy N.S.
3. MOS study guide for Word, Excel, PowerPoint & Outlook Exams, Joan Lambert, Joyce Cox, PHI
4. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
5. Networking your computers and devices, Rusen, PHI
6. Lamport L. LaTeX: a document preparation system: user's guide and reference manual. Addison-Wesley: 1994

Course Outcomes:

- Identify the Internal parts of computers and Generation of Computers. (L1)
- Assemble and disassemble a computer from its parts and prepare the computer ready to use.(L3)
- Installation process of different types Operating system for a computer by their own.(L3)
- Interconnect two or more computers for information sharing.(L4)
- Access the Internet and browse it for required information.(L1)
- Prepare the documents using Word Processor, prepare spread sheets for calculations using Excel, and documents for LaTeX.(L3)
- Prepare slide presentation using the presentation tool.(L4)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech I Sem

L	T	P	C
0	0	3	1.5

(CH20ABS104) CHEMISTRY LAB

(ECE, EEE, CSE, CSE (AI & ML), IT)

Course Objectives:

- Verify the fundamental concepts with experiments

Note: In the following list, out of 12 experiments, any 10 experiments must be performed in a semester

List of Chemistry Experiments:

1. Determination of Hardness of a groundwater sample.
2. Estimation of Dissolved Oxygen by Winkler's method.
3. Conductometric titration of (i) strong acid vs. strong base, (ii) weak acid vs. strong base.
4. Determination of cell constant and conductance of solutions.
5. Potentiometry - determination of redox potentials and emfs.
6. Determination of Strength of an acid in Pb-Acid battery.
7. Preparation of Bakelite

8. Verify Lambert-Beer's law.
9. Thin layer chromatography.
10. Identification of simple organic compounds by IR.
11. Preparation of nano material's by precipitation.
12. Estimation of Ferrous Iron by Dichro metry.
13. P^H metric titration of (i) strong acid vs. strong base, (ii) weak acid vs. strong base

Reference Books:

1. Vogel's Text book of Quantitative Chemical Analysis, Sixth Edition – Mendham J et al, Pearson Education, 2012.
2. Chemistry Practical– Lab Manual, First edition, Chandra Sekhar KB, Subba Reddy GV and Jayaveera KN, SM Enterprises, Hyderabad, 2014.
3. Chemistry Laboratory Manual, Sri Krishna Hitech Publishing Company Pvt.Ltd, 2nd Edition, A Ravi Krishanan, B Tirumalarao, 2020-2021.

Course Outcomes:

At the end of the course, the students will be able to

- Determine the cell constant and conductance of solutions.(L3)
- Prepare advanced polymer- Bakelite. (L2)
- Measure the strength of an acid present in secondary batteries.(L3)
- Analyse the IR of some organic compounds.(L3)
- Estimate the amount of dissolved oxygen in water.(L3)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech I Sem

L	T	P	C
0	0	3	1.5

(CS20AES102) PROBLEM SOLVING USING C LAB (Common to All Branches of Engineering)

Course Objectives:

- To learn how to solve a given problem.
- To illustrate the basic concepts of C programming language.
- To discuss the concepts of Functions, Arrays, Pointers and Dynamic Memory Allocation.
- To understand and implement Structures and Unions.
- To familiarize with Files and File Operations.

Week-1: Draw flowcharts for fundamental algorithms.

Week-2: C Programs to demonstrate C-tokens.

Week-3: C Programs on usage of operators.

Week-4: C Programs to demonstrate Decision making and branching (Selection).

Week-5: C Programs to demonstrate different loops.

Week-6: C Programs to demonstrate 1-D arrays.

Week-7: C Programs to demonstrate multi-dimensional arrays.

Week-8: C Programs to demonstrate functions.

Week-9: C Programs on pointers.

Week-10: C Programs to perform operations on Strings with String handling functions and without String handling functions.

Week-11: C Programs on Structures and Unions.

Week-12: C Programs to demonstrate Files.

Text Books:

1. R.G. Dromey, How to Solve it by Computer, 1/e, Pearson Education, 2006.
2. Reema Thareja, Programming in C, Oxford University Press, AICTE Edition, 2018.

Reference Books:

1. B. A. Forouzan and R. F. Gilberg, Computer Science: A Structured Programming Approach Using C, 3/e, Cengage Learning, 2007.
2. Pradip Dey, Manas Ghosh, Programming in C, Oxford University Press, AICTE Edition,
3. B. Gottfried, Programming with C, 3/e, Schaum's outlines, McGraw Hill (India), 2017.
4. Jeri R. Hanly, Elliot B. Koffman, Problem Solving and Program Design in C, 5/e, Pearson.

Course Outcomes:

Upon successful completion of the course, the student will be able to

- Build algorithm and flowchart for simple problems.
- Use suitable control structures to solve problems.
- Use suitable iterative statements, arrays and modular programming to solve the problems.
- Implement Programs using pointers and String handling Functions.
- Develop code for complex applications using structures, unions and file handling features.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech I Sem

L	T	P	C
0	0	3	1.5

(EE20AES102) BASIC ELECTRICAL & ELECTRONICS ENGINEERING LAB

(Civil, Mechanical, CSE, CSE (AI&ML) and IT)

Part A: Electrical Engineering Lab

Course Objectives:

- To Verify Kirchoff's laws.
- To verify Superposition theorem.
- To learn performance characteristics of DC Machines.
- To perform open circuit & Short Circuit test on 1- Phase Transformer.
- To Study the I – V Characteristics of Solar PV Cell.

List of experiments: -

1. Verification of Kirchhoff laws.
2. Verification of Superposition Theorem.
3. Open circuit characteristics of a DC Shunt Generator.
4. Speed control of DC Shunt Motor.
5. OC & SC test of 1 – Phase Transformer.
6. Brake test on 1 - Phase Induction Motor.
7. I – V Characteristics of Solar PV cell
8. Brake test on DC Shunt Motor.

Course Outcomes:

Student will be able to.

- Verify Kirchoff's Laws & Superposition theorem. (L3)

- Perform testing on AC and DC Machines. (L5)
- Study I – V Characteristics of PV Cell. (L2)

Part B: Electronics Engineering Lab

Course Objectives:

- To verify the theoretical concepts practically from all the experiments.
- To analyze the characteristics of Diodes, BJT.
- To analyze the frequency response of amplifier circuits.
- Exposed to linear and digital integrated circuits.

List of Experiments:

1. PN Junction diode characteristics A) Forward bias B) Reverse bias.
2. Zener diode characteristics and Zener as voltage Regulator.
3. Full Wave Rectifier with & without filter.
4. Wave Shaping Circuits. (Clippers & Clampers)
5. Input & Output characteristics of Transistor in CB / CE configuration.
6. Frequency response of CE amplifier.
7. Inverting and Non-inverting amplifiers using Op-AMPs.
8. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs.
9. Verification of Truth Tables of S-R, J-K& D flip flops using respective ICs.

Tools / Equipment Required:

DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices.

Course outcomes:

- Learn the characteristics of basic electronic devices like PN junction diode, Zener diode & BJT.

- Construct the given circuit in the lab.
- Analyze the application of diode as rectifiers, clippers and clampers and other circuits.
- Design simple electronic circuits and verify its functioning.

Note: Minimum Six Experiments to be performed in each section.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech I Sem

L	T	P	C
2	0	0	0

(EG20AMC101) SPEECH AND ORAL COMMUNICATION (Mandatory Course)
(Common to All Branches)

Course Objectives:

- To improve the language proficiency of the students in English by practicing with his/her peers.
- To impart creative skills for professional development.
- To develop the communication skills of the students in both formal and informal situations.
- To develop extensive speaking skills and comprehension for career growth.

Detailed Syllabus:

Unit-1:

Story Telling (Narrate a story)

1. Biography description (Describe a freedom fighter/politician/athlete/celebrity etc.)
2. Speech sounds
3. Formal Conversation (Enact official Telephone conversation/Telephone interview etc.)
Verb forms, Subject -Verb agreement, Vocabulary).

Unit-2:

1. Stress in Speech
2. English Puzzle solving (Finding cross words from table)
3. Fun with English (Speech through grammar-changing tense, voice of the sentences)
4. Open Talk with CM (Funny interview with class mates) Voice, Speech.

Unit-3:

1. Intonation
2. If I'm a..... What would I do? (Students enact as... and describe their choices what they would do?)
3. Language Translation (Dialogues/jokes/proverbs/quotations-Regional language to English)
4. Mock Assembly (Students enact as speaker, MLA, CM and opposition leaders in Assembly) Wh- Questions, Question tags.

Unit-4:

1. Tongue twisters / pronounce it....
2. Humorous Play (Playing jokes/Telling funny dialogues in English)
3. Celebrity Interview (Enact Play), Spotting Errors, Etiquettes

Unit-5:

News Reader (Prepare funny news and read on Dias)

1. Film Review (A critique on regional language films by students)
2. Movie Script Narration (Subject -Verb agreement, Tenses)

Reference books:

1. K.R Lakshmi Narayanan, A Course book on English, SCITECH publications Pvt. Ltd,Hyd, 2009.
2. Sanjay Kumar & Pushp Lata, Communication skills, Oxford university press, New Delhi, 2019.
3. M Ashraf Rizvi, Effective Technical Communication, Tata McGraw- Hill, New Delhi, 2017.

Additional Learning Resources:

1. <https://www.bbc.co.uk/skillswise/english>
2. <https://www.nonstopenglish.com>
3. <https://www.grammarly.com/blog/>

Course Outcomes:

- Improve the neutral accent and be free from mother tongue influence. (L6)
- Hypothesizing small talks on general topics and learn critiquing skills by participating in Conversations. (L6)
- Applying Vocabulary and using it in their day-to-day life. (L4)
- Understanding and mastering in verbal and non-verbal communication. (L2)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech II Sem

L	T	P	C
3	0	0	3

(MA20ABS201) DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

(Common to All Branches)

Course Objectives:

- To enlighten the learners in the concept of differential equations and multivariable calculus.
- To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.

Unit -1:

Differential equations

Exact, Non-Exact Linear and Bernoulli equations. Applications to Newton's law of cooling and law of natural growth and decay.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify the essential characteristics of linear differential equations with constant coefficients. (L3)
- Solve the linear differential equations with constant coefficients by appropriate method. (L3)
- Classify and interpret the solutions of linear differential equations. (L3)

Unit -2:

Linear differential equations of higher order

Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral, method of variation of parameters, Cauchy's and Legendre's linear equations. Applications to L-C-R Circuit.

Learning Outcomes:

At the end of this unit, the student will be able to

- Solve the linear differential equations with variable coefficients by appropriate method. (L3)
- Classify and interpret the solutions of linear differential equations of higher order. (L3)

- Formulate and solve the higher order differential equation by analyzing physical situations. (L3)

Unit 3:

Partial differential equations

Formation of a PDE, Linear partial differential equations of first order, non-linear PDEs of first order (standard forms). Solutions to homogenous linear partial differential equations with constant coefficients, rules for finding the complementary function and the particular integral.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply a range of techniques to find solutions of standard PDEs. (L3)
- Outline the basic properties of standard PDEs. (L2)

Unit-4:

Vector differentiation

Scalar and vector point functions, vector operator del, del applies to scalar point functions-Gradient, del applied to vector point functions-Divergence, Curl and their related properties.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply del to Scalar and vector point functions. (L3)
- Illustrate the physical interpretation of Gradient, Divergence and Curl. (L3)

Unit -5:

Vector integration

Line integral-circulation-work done by force, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof).

Learning Outcomes:

At the end of this unit, the student will be able to

- Find the work done in moving a particle along the path over a force field. (L4)
- Evaluate the rates of fluid flow along and across curves. (L4)

- Apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals. (L3)

Text Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.

Reference Books:

1. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2011.
2. Michael Greenberg, Advanced Engineering Mathematics, 2/e, Pearson, 2018
3. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
4. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
5. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education.
6. H. K. Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand.
7. N. Bali, M. Goyal, C. Watkins, Advanced Engineering Mathematics, Infinity Science Press.

Course Outcomes:

At the end of the course, the student will be able to

- Solve the differential equations related to various engineering fields. (L6)
 - Solve the linear differential equations of higher order related to various engineering fields. (L6)
 - Identify solution methods for partial differential equations that model physical processes. (L3)
 - Interpret the physical meaning of different operators such as gradient, curl and divergence. (L5)
- Estimate the work done against a field, circulation and flux using vector calculus. (L5)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech II Sem

L T P C

3 0 0 3

(PH20ABS103) APPLIED PHYSICS

(ECE, EEE, CSE, CSE (AI & ML), IT)

Course Objectives:

- To identify the importance of the optical phenomenon i.e., interference, diffraction and polarization related to its engineering applications.
- To understand the mechanisms of emission of light, the use of lasers as light sources for low and high energy applications, study of propagation of light wave through optical fibers along with engineering applications.
- To explain the significant concepts of dielectric and magnetic materials that leads to potential applications in the emerging microdevices.
- To enlighten the concepts of Quantum Mechanics and to provide fundamentals of de Broglie waves, quantum mechanical wave equation and its applications, the importance of free electron theory and band theory of solids.
- Evolution of band theory to distinguish materials, basic concepts and transport phenomenon of charge carriers in semiconductors. To give an impetus on the subtle mechanism of superconductors using the concept of BCS theory and their fascinating applications.

Unit-1:

Wave Optics

Interference- Principle of superposition – Interference of light – Interference by division of wavefront and amplitude -Interference in thin films (Reflection Geometry) – Colors in thin films – Newton's Rings – Determination of wavelength and refractive index–Applications.

Diffraction- Introduction – Fresnel and Fraunhofer diffraction – Fraunhofer diffraction due to single slit, double slit and N-slits (qualitative) – Grating spectrum–Applications.

Polarization- Introduction – Types of polarization – Polarization by reflection, refraction and double refraction - Nicol's Prism - Half wave and Quarter wave plates–Applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the need of coherent sources and the conditions for sustained interference. (L2)
- Identify engineering applications of interference. (L3)
- Analyze the differences between interference and diffraction with applications. (L4)
- Illustrate the concept of polarization of light and its applications. (L2)
- Classify ordinary polarized light and extraordinary polarized light. (L2)

Unit-2:

Lasers and Fiber optics

Lasers- Introduction – Characteristics of laser – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Lasing action – Pumping mechanisms – Nd-YAG laser–He-Ne laser– GaAs Laser – Applications of lasers.

Fiber optics- Introduction – Principle of optical fiber – Acceptance Angle – Numerical Aperture – Classification of optical fibers based on refractive index profile and modes – Propagation of electromagnetic wave through optical fibers – Attenuation – Optical fiber communication system – Applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Demonstrate the basic concepts of LASER light Sources. (L2)
- Apply the concepts to learn the types of lasers. (L3)
- Identifies the Engineering applications of lasers. (L3)
- Explain the working principle of optical fibers. (L2)
- Classify optical fibers based on refractive index profile and mode of propagation. (L2)
- Identify the applications of optical fibers in various fields. (L3)

Unit-3:

Dielectric and Magnetic Materials

Dielectric Materials- Introduction – Dielectric polarization – Dielectric polarizability,

Susceptibility and Dielectric constant – Types of polarizations: Electronic, Ionic and Orientational polarizations (Qualitative) – Lorentz internal field – Clausius-Mossottiequation- Ferro electricity- Dielectric Loss-Applications.

Magnetic Materials- Introduction – Magnetic dipole moment – Magnetization – Magnetic susceptibility and Permeability – Origin of permanent magnetic moment – Classification of magnetic materials: (Dia, Para, Ferro Ferri, & Antiferro) - Domain theory of Ferromagnetism (Qualitative), – Hysteresis – Soft and Hard magnetic materials-Applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the concept of dielectric constant and polarization in dielectric materials. (L2)
- Summarize various types of polarization of dielectrics. (L2)
- Interpret Lorentz field and Clausius-Mossottirelation in dielectrics. (L2)
- Classify the magnetic materials based on susceptibility and their temperature dependence. (L2)
- Explain the applications of dielectric and magnetic materials. (L2)
- Apply the concept of magnetism to magnetic devices. (L3)

Unit-4:

Quantum Mechanics, Free Electron Theory and Band theory of Solids

Quantum Mechanics- Dual nature of matter – de-Broglie hypothesis- Heisenberg uncertainty principle(Qualitative) – Significance of wave function- Schrodinger's time independent and dependent wave equation – Particle in a one-dimensional infinite potential well.

Free Electron Theory- Classical free electron theory (Merits and demerits) – Quantum free electron theory – Equation for electrical conductivity based on quantum free electron theory – Density of States–Fermi- Dirac distribution.

Band theory of Solids- Origin of energy bands- Classification of solids – Bloch's Theorem (Qualitative) – Kronig- Penney model (Qualitative) – E vs k diagram.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the concept of dual nature of matter. (L2)
- Explain the significance of wave function. (L2)
- Interpret the concepts of classical and quantum free electron theories. (L2)
- Explain the importance of K-Pmodel. (L2)
- Classify the materials based on band theory. (L2)

Unit-5:

Semiconductors and Superconductors

Semiconductors- Introduction – Intrinsic semiconductors – Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors – Density of charge carriers – Dependence of Fermi energy on carrier concentration and temperature – Drift and diffusion currents – Einstein's equation – Direct and indirect band gap semiconductors – Hall effect – Hall coefficient – Applications of Hall effect.

Superconductors- Introduction – Concept & Properties of superconductors – Meissner effect – Type I and Type II superconductors – BCS theory – Josephson effects (AC and DC) – High T_c superconductors – Applications of superconductors.

Learning Outcomes:

At the end of this unit, the student will be able to

- Interpret the direct and indirect band gap semiconductors. (L2)
- Identify the type of semiconductor using Hall effect. (L2)
- Identify applications of semiconductors in electronic devices. (L2)
- Explain how electrical resistivity of solids changes with temperature. (L2)
- Classify superconductors based on Meissner's effect. (L2)

Text books:

1. A text book of Engineering Physics – Dr. M.N. Avadhanulu & Dr. P.G. Kshirsagar, S. Chand and Company, 11 Edition, 2019
2. Engineering Physics – B.K. Pandey and S. Chaturvedi, Cengage Learning, 2013

Reference Books:

1. Engineering Physics – Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018
2. Engineering Physics – K. Thyagarajan, McGraw Hill Publishers, 2019
3. Engineering Physics - Sanjay D. Jain, D. Sahasrambudhe and Girish, University Press, 2010
4. Semiconductor physics and devices- Basic principle - Donald A. Neamen, McGraw Hill, 2011
5. Solid State Physics, A.J. Dekker, Macmillan Education UK, 1969
6. Kittel's Introduction to Solid State Physics, Charles Kittel, Wiley India Edition Paperback, 2019

Course Outcomes:

- Apply the different realms of physics and their applications in both scientific and technological systems through physical optics. (L3)
- understand the mechanisms of emission of light, the use of lasers as light sources for low and high energy applications. (L2)
- Understands the response of dielectric and magnetic materials to the applied electric and magnetic fields. (L2)
- Apply the quantum mechanical picture of subatomic world along with the discrepancies between the classical estimates and laboratory observations of electron transportation phenomena by free electron theory and band theory. (L3)
- Elaborate the physical properties exhibited by materials through the understanding of properties of semiconductors and superconductors. (L5)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech II Sem

L	T	P	C
3	0	0	3

(EG20AHS101) COMMUNICATIVE ENGLISH

(Common to all Branches)

Course Objectives:

- To give inputs to students regarding effective listening skills for better comprehension of academic lectures and English spoken by native speakers.
- To make students aware of reading strategies for comprehension of various academic texts and authentic materials.
- To improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations.
- To impart effective strategies for good writing and demonstrate the same in summarizing, writing well-organized essays, record and report useful information.
- To offer relevant inputs regarding grammatical structures and vocabulary and encourage their appropriate use in speech and writing.

Unit-1:

Lesson: On the Conduct of Life: William Hazlitt

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.

Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.

Reading: Skimming to get the main idea of a text; scanning to look for specific pieces of information. **Reading for Writing:** Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph.

Grammar and Vocabulary: Parts of Speech, Prepositions, Word formation-I: Introduction to Word formation, Clauses and Sentences.

Learning Outcomes:

At the end of the module, the learners will be able to

- Understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information

- Ask and answer general questions on familiar topics and introduce oneself/others
- Employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information
- Recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
- Form sentences using proper grammatical structures and correct word forms

Unit-2:

Lesson: The Brook: Alfred Tennyson

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts.

Speaking: Discussion in pairs/small groups on specific topics followed by short structured talks. **Reading:** Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

Writing: Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters.

Grammar and Vocabulary: Articles, Word formation-II: Root words from other languages, Punctuation.

Learning Outcomes:

At the end of the module, the learners will be able to

- Comprehend short talks on general topics.
- Participate in informal discussions and speak clearly on a specific topic using suitable discourse markers.
- Understand the use of cohesive devices for better reading comprehension.
- Write well-structured paragraphs on specific topics.
- Identify basic errors of grammar/ usage and make necessary corrections in short texts.

Unit-3:

Lesson: The Death Trap: Saki

Listening: Listening for global comprehension and summarizing what is listened to.

Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed.

Reading: Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.

Writing: Summarizing, Paragraph Writing.

Grammar and Vocabulary: Noun-pronoun agreement, Subject-verb agreement, Word formation-III: Prefixes & suffixes from other languages. Principles of Good writing.

Learning Outcomes:

At the end of the module, the learners will be able to

- Comprehend short talks and summarize the content with clarity and precision.
- Participate in informal discussions and report what is discussed.
- Infer meanings of unfamiliar words using contextual clues.
- Write summaries based on global comprehension of reading/listening texts
- Use correct tense forms, appropriate structures and a range of reporting verbs in speech and writing.

Unit -4:

Lesson: Muhammad Yunus

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.

Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.

Reading: Studying use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communication processes or display complicated data.

Writing: Letterwriting, Essaywriting.

Grammar and Vocabulary: Misplaced Modifiers, Synonyms and Antonyms, Essaywriting.

Learning Outcomes:

At the end of the module, the learners will be able to

- Infer and predict content of spoken discourse.
- Understand verbal and non-verbal features of communication and hold formal/informal conversations.
- Interpret graphic elements used in academic texts.
- Produce a coherent paragraph interpreting a figure/graph/chart/table.
- Use appropriate language for description and interpretation of graphical elements.

Unit-5:

Lesson: Politics and the English Language: George Orwell

Listening: Identifying key terms, understanding concepts and answering a series of relevant questions.

Speaking: Formal oral presentations on topics from academic contexts - without the use of PPT slides.

Reading: Reading for comprehension.

Writing: Summarywriting, Notemaking.

Grammar and Vocabulary: Clichés, Redundancies, Common Abbreviations, Writing a summary.

Learning Outcomes:

At the end of the module, the learners will be able to

- Take notes while listening to a talk/lecture and make use of them to answer questions.
- Make formal oral presentations using effective strategies.
- Comprehend, discuss and respond to academic texts orally and in writing.
- Produce a well-organized essay with adequate support and detail.
- Edit short texts by correcting Common Errors.

Web links

1. www.englishclub.com
2. www.easyworldofenglish.com
3. www.languageguide.org/english
4. www.bbc.co.uk/learningenglish
5. www.eslpod.com/index.html
6. www.myenglishpages.com

Text Books:

1. Language and Life: A Skills Approach- I Edition 2019, Orient Black-Swan.

Reference Books:

1. Bailey, Stephen. Academic writing: A Handbook for International Students, Routledge, 2014.
2. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking, Heinley ELT; 2nd Edition, 2018.
3. Raymond Murphy's English Grammar in Use, Fourth Edition (2012)E-book.
4. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.
5. Oxford Learners Dictionary, 12th Edition, 2011.
6. Norman Lewis Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary Goyal Reprint edition 2011.
7. Speed Reading with the Right Brain: Learn to Read Ideas Instead of Just Words by David Butler; 2nd edition 2014.

Course Outcomes:

- Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English. (L2)
- Apply grammatical structures to formulate sentences and correct word forms. (L3)
- Analyze discourse markers to speak clearly on a specific topic in informal discussions. (L4)
- Evaluate reading/listening texts and to write summaries based on global comprehension of these texts. (L5)
- Create a coherent paragraph interpreting a figure/graph/chart/table. (L6)

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B.Tech II Sem

L	T	P	C
3	0	0	3

(CS20AES201) DATA STRUCTURES

(CSE, CSE (AI&ML)and IT)

Course Objectives:

- To familiarize with basic techniques of algorithm analysis.
- To familiarize Stacks, Queues using Arrays and Linked List.
- To Understand Searching and Sorting techniques.
- To learn the concepts of different types of trees and its operations.
- To familiarize with graph algorithms.

Unit-1:

Data Structures: Introduction to Data Structures, Abstract Data Types, analysis and efficiency of algorithms, Time and Space Complexity.

Stack, Stack operations, Implementation using arrays, Applications of stack, Queue, Queue operations, Implementation using arrays, various Queue Structures, Applications of queue.

Learning Outcomes:

Student should be able to

- Analyze the given algorithm to find the time and space complexities.(L4)
- Develop the applications of stack and queue using arrays. (L3)

Unit-2:

Linked lists: Single linked list, Double linked list, Circular linked list, operations on linked lists, Applications of Linked List.

Implementation of Stack using Pointers, Implementation of Queue using Pointers.

Learning outcomes:

Student should be able to

- Implement Stack and Queues using Pointers. (L3)
- Construct the linked lists for various applications. (L4)

Unit-3:

Searching Techniques: Linear Search, Binary Search and Fibonacci Search.

Sorting Techniques: Selection Sort, Insertion sort, Merge Sort, Quick Sort, Heap sort.

Hash Tables: Hash Functions, Collision Handling Schemes, Applications.

Learning outcomes:

Student should be able to

- Select sorting technique for a given sorting.(L3)
- Construct Heap and its implementation. (L4)

Unit-4:

Trees: Vocabulary and Definitions, Binary Tree, Implementation, Binary Tree Traversal, Binary Search Tree, Implementation, Balanced Search Trees: AVL Trees, Implementation, Splay Trees, Red-Black Trees.

Learning outcomes:

Student should be able to

- Explain the concept of a tree. (L2)
- Compare different tree structures. (L4)
- Apply Trees for indexing. (L3)

Unit-5:

Graph Theory: Graphs Terminology, Graph ADT, Data Structures for Graphs- Adjacency Matrix Structure, Graph Traversals, Shortest Paths, Minimum Spanning Trees- Prim's Algorithm, Kruskal's Algorithm.

Learning outcomes:

Student should be able to

- Recognize the importance of Graphs in solving real world problems. (L2)
- Apply various graph traversal methods to applications. (L3)

- Design a minimum cost solution for a problem using spanning trees. (L4)

Text Books:

1. Data Structures and Algorithm Analysis in C, Mark Allen Weiss, Second Edition, 2002, Pearson.
2. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, Third Edition, 2010, PHI.
3. Data Structures and Algorithms Made Easy by Narasimha Karumanchi, 2020, CareerMonk Publications.

Reference Books:

1. Fundamental of Data Structures in C, Horowitz, Sahani, Anderson-Freed, Second Edition, 2008, Universities Press.
2. Classic Data Structures, Debasis Samantha, Second Edition, 2009, PHI

Course Outcomes:

- Analyze the problems using asymptotic notations. (L4)
- Apply Stack, Queues and linked list to solve different applications.(L3)
- Demonstrate suitable sorting techniques for the real world problem. (L4)
- Implement tree structures in different patterns of representation of data.(L3)
- Analyze the given problem using graph traversal techniques.(L4)

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B.Tech II Sem

L	T	P/D	C
1	0	2	2

(ME20AES102) ENGINEERING DRAWING

(Common to all Branches of Engineering)

Engineering drawing being the principal method of communication for engineers

Course Objectives:

To introduce and make the students

- To use drawing instruments and to draw polygons, engineering curves.
- To draw orthographic projections of points, lines & planes.
- To draw the projections of the various types of solids in different positions inclined to one and both the planes.
- To draw the projections of sectional views of various types of right regular solids.
- To draw the development of regular solids.

Unit-1:

Introduction to Engineering Drawing:

Principles of Engineering Drawing and its Significance-Conventions in drawing-lettering – BIS conventions.

- a) Conic sections (General Method only) including Rectangular Hyperbola.
- b) Cycloid, Epicycloid and Hypocycloid.
- c) Involute.

Learning Outcomes:

At the end of this unit the student will be able to

- Understand the significance of engineering drawing. (L2)
- Identify and draw curves obtained in different conic sections. (L3)
- Draw different curves such as cycloids and involutes. (L3)

Unit-2:

Projection of Points, Lines and Planes: Projection of Points in any quadrant, lines inclined to one or both planes, finding true lengths, angle made by line. Projections of regular plane surfaces inclined to one or both the planes.

Learning Outcomes:

At the end of this unit the student will be able to

- Understand the meaning of projection and draw the projections of points & lines. (L2)
- Differentiate between projected length and true length and find the true length of the lines. (L2)
- Draw the projection of regular plane surfaces. (L3)

Unit-3:

Projections of solids: Projections of regular solids inclined to one or both planes by rotational or auxiliary view method.

Learning Outcomes: At the end of this unit the student will be able to

- Understand the procedure to draw projection of solids. (L2)
- Draw the projection of solids inclined to one plane. (L3)
- Draw the projection of solids inclined to both the planes. (L3)

Unit-4:

Sections of solids: Section planes and sectional view of right regular solids- prism, cylinder, pyramid and cone. True shapes of the sections.

Learning Outcomes: At the end of this unit the student will be able to

- Understand different sectional views of regular solids. (L2)
- Obtain the true shapes of the sections of prism, cylinder, pyramid and cone. (L4)
- Draw the sectional views of prism, cylinder, pyramid and cone. (L3)

Unit-5:

Development of surfaces: Development of surfaces of right regular solids-prism, cylinder, pyramid, cone and their sectional parts.

Learning Outcomes:

At the end of this unit the student will be able to

- Understand the meaning of development of surfaces. (L2)
- Draw the development of regular solids such as prism, cylinder, pyramid and

cone.(L3)

- Obtain the development of sectional parts of regular shapes. (L4)

Text Books:

1. K.L. Narayana & P. Kannaiah, Engineering Drawing, 3/e, SciTech Publishers, Chennai, 2012.
2. N.D. Bhatt, Engineering Drawing, 53/e, Charotar Publishers, 2016.

Reference Books:

1. Dr K. Prahlada Rao, Dr. S. Krishnaiah, Prof. A.V.S. Prasad, Engineering Graphics, Amaravati publications.
2. Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2009.
3. Venugopal, Engineering Drawing and Graphics, 3/e, New Age Publishers, 2000.
4. Shah and Rana, Engineering Drawing, 2/e, Pearson Education, 2009.
5. K.C. John, Engineering Graphics, 2/e, PHI, 2013.
6. Basant Agarwal & C.M. Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

Course Outcomes:

After completing the course, the student will be able to

- **Draw** basic geometrical constructions, curves used in engineering practices. (L1)
- **Understand** the concept of projection and acquire visualization skills, projection of points, Lines and Planes. (L2)
- **Illustrate** the projections of solids graphically. (L3)
- **Draw** and explore the sectional views of right regular solids.(L3)
- **Draw** the development of surfaces of solids. (L3)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(ME20AES103) ENGINEERING GRAPHICS LAB
(Common to all Branches of Engineering)

Course Objectives:

- Instruct the utility of drafting & modelling packages in orthographic and isometric drawings.
- Train the usage of 2D and 3D modelling.
- Develop the graphical skills for communication of concepts, ideas and design of engineering products through technical drawings

Introduction to AutoCAD: Basic drawing and editing commands: line, circle, rectangle, erase, view, undo, redo, snap, object editing, moving, copying, rotating, scaling, mirroring, layers, templates, polylines, trimming, extending, fillets, arrays, dimensions.

Exercises:

1. Practice exercise using basic drawing commands (4 No's).
2. Practice exercise using editing commands (4 No's).

Orthographic and Isometric Projections

Orthographic Projections: Systems of projections, conventions and application to orthographic projections.

Isometric Projections: Principles of isometric projection- Isometric scale; Isometric views: lines, planes, simple solids.

Exercises:

1. Practice exercises on Orthographic Projections (4 No's).
2. Practice exercises on Isometric Projections (4 No's).

Text Books:

1. K. Venugopal, V. Prabhu Raja, Engineering Drawing + Auto Cad, New Age International Publishers.
2. Engineering Drawing, ND Bhatt, Charotar Publishing House.
3. Engineering Drawing, K.L Narayana, SciTech Publishers.

4. D. M. Kulkarni, A. P. Rastogi, A. K. Sarkar, Engineering Graphics with AutoCAD, PHI Learning Private Limited, New Delhi, Revised edition, 2010.

Course Outcomes:

After completing the course using CAD package, the student will be able to

- **Draw** the basic views related to projections of Lines, Planes. (L1)
- **Draw** the basic views related to projections of Planes. (L1)
- **Illustrate** orthographic views of simple objects. (L3)
- **Illustrate** isometric projections of simple solids. (L3)
- **Interpret** and comprehend with drafting packages for engineering practice. (L2)

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(Autonomous)

B.Tech II Sem

L	T	P	C
0	0	3	1.5

(EG20AHS102) COMMUNICATIVE ENGLISH LAB

(Common to all Branches)

Course Objectives:

- To expose students to a variety of self-instructional, learner-friendly modes of language learning.
- To give inputs on better pronunciation through stress, intonation and rhythm.
- To make students aware of the impact of mother tongue on their use of English.
- To make students aware of the skills of using effective language in Interviews, Group Discussions and Public speaking.
- To equip students with knowledge of the use of computers in resume preparation, reportwriting, and formatmaking etc.

Unit-1:

1. Phonetics (sounds symbols, transcription and Received Pronunciation (R.P), stress and intonation).
2. Describing objects/places/persons.

Unit-2:

1. Role Play/ Conversational Practice.
2. JAM.

Unit-3:

1. **Group Discussion:**Types, process, language and body language.
2. **Debate:** Arguing in favor of and against a topic- logical questioning.

Unit-4:

1. **Oral/ Poster Presentations:** Structure, preparation, visual aids and delivery.
2. **ResumeWriting:**Definition, formats and practice.

Unit-5:

1. **Interview Skills:** Basics of interviews -kinds of interviews- preparation – and performance.
2. **Film/book review:**Structure, language and practice.

Suggested Software

Orel, Walden InfoTech, Young India Films.

Reference Books

1. Bailey, Stephen. Academic writing: A Handbook for International Students, Routledge, 2014.
2. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational. 2016.
4. Hewings, Martin. Cambridge Academic English (B2). Cambridge University Press, 2012.
5. T.Balasubramaniyan, A Textbook of English Phonetics for Indian Students, 3rd edition; Laxmi publications 2017.

Web Links

1. www.esllab.com
2. www.englishmedialab.com
3. www.englishinteractive.net

Course Outcomes:

After completing the course, the students will be:

1. Develop to handle and excel in a variety of self-instructional, learner-friendly modes of language learning. (L6)
2. Develop to employ better stress and intonation patterns and utter English sounds correctly. (L6)
3. Develop to avoid the impact of mother tongue in English and neutralize their accent. (L6)
4. Develop to participate with skill and confidence in Group Discussions, Interviews and Public Speaking. (L6)
5. Utilize the technical skills to prepare resume, report-writing, and format-making etc.

(L3)

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L	T	P	C
0	0	3	1.5

(PH20ABS104) APPLIED PHYSICS LAB

(ECE, EEE, CSE, CSE (AI & ML), IT)

Course Objectives:

- Understands the concepts of interference, diffraction and their applications.
- Understand the role of optical fiber parameters in communication.
- Recognize the importance of energy gap in the study of conductivity and Hall Effect in a semiconductor.
- Illustrates the magnetic and dielectric materials applications.
- Apply the principles of semiconductors in various electronic devices.

Note: In the following list, out of 12 experiments, any 10 experiments must be performed in a semester.

List of Applied Physics Experiments:

1. Determine the thickness of the wire using wedge shape method.
2. Determination of the radius of curvature of the lens by Newton's ring method.
3. Determination of wavelength by plane diffraction grating method.
4. Determination of dispersive power of prism.
5. Determination of wavelength of LASER light using diffraction grating.
6. Determination of particle size using LASER.
7. To determine the numerical aperture of a given optical fiber its acceptance angle.
8. Determination of dielectric constant by charging and discharging method.
9. Magnetic field along the axis of a circular coil carrying current – Stewart Gee's method.
10. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).

11. To determine the energy gap of a semiconductor by temperature by Four-Probe Method.
12. Determination of thermistor negative temperature coefficient of resistance.

References:

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers,2017.
2. <http://vlab.amrita.edu/index.php> -Virtual Labs, Amrita University.

Course Outcomes:

At the end of the course, the student will be able to

- Utilize optical instruments like microscope and spectrometer. (L3)
- Determine thickness of a hair/paper with the concept of interference. (L5)
- Estimate the wavelength of different colors using diffraction grating and resolving power. (L5)
- Organize the intensity of the magnetic field of circular coil carrying current with distance. (L3)
- Evaluate the acceptance angle of an optical fiber and numerical aperture. (L5)
- Determine the resistivity of the given semiconductor using four probe method. (L5)
- Identify the type of semiconductor i.e., n-type or p-type using hall effect. (L3)
- Determine the band gap of a given semiconductor. (L5)

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B.Tech II Sem

L	T	P	C
0	0	3	1.5

(CS20AES202) DATA STRUCTURES LAB

(CSE, CSE (AI&ML) and IT)

Course Objectives:

- To strengthen the ability to identify and apply the suitable data structure for the given real-world problem.

Tasks:

1. Demonstrate recursive algorithms with examples.
2. Develop a program to perform operations of a Stack and Queue using arrays.
3. Implement and perform different operations on Single, Double and Circular Linked Lists.
4. Develop a program to perform operations of Stack and Queue using Linked Lists.
5. Develop a program to implement Stack applications.
6. Implement Circular Queues.
7. Implement various Searching techniques.
8. Develop programs for different Sorting techniques.
9. Develop a program to represent a Tree Data Structure.
10. Develop a program to demonstrate operations on Binary Search Tree.
11. Demonstrate Graph Traversal Techniques.
12. Develop a program to find Minimum Cost Spanning tree.

Text Books:

1. Data Structures and Algorithm Analysis in C, Mark Allen Weiss, Second Edition, 2002, Pearson.
2. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, Third Edition, 2010, PHI.

3. Data Structures and Algorithms Made Easy by Narasimha Karumanchi, 2020, CareerMonk Publications.

Course Outcomes:

- Demonstrate the concept of Recursion for solving a problem. (L4)
- Choose and implement linear data structure to solve problems. (L3)
- Develop programs for searching and sorting algorithms. (L3)
- Select and implement suitable nonlinear data structure for solving a problem. (L3)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech II Sem

L	T	P	C
3	0	0	3

(BA20AHS201) UNIVERSAL HUMAN VALUES(Mandatory Course)

(ME, CSE, IT, AI&ML)

Course Objectives:

The objective of the course is fourfold:

- Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
- Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence.
- Strengthening of self-reflection.
- Development of commitment and courage to act.

Unit -1:

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

- Purpose and motivation for the course, recapitulation from Universal Human Values-I.
- Self-Exploration-what is it? Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration.
- Continuous Happiness and Prosperity- A look at basic Human Aspirations.
- Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority.
- Understanding Happiness and Prosperity correctly-A critical appraisal of the current scenario.
- Methods to fulfil the above human aspirations: understanding and living in harmony at various levels.

Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking.

Unit -2:

Understanding Harmony in the Human Being - Harmony in Myself!

- Understanding human being as a co-existence of the sentient 'I' and the material 'Body'.
- Understanding the needs of Self ('I') and 'Body' - happiness and physical facility.
- Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer).
- Understanding the characteristics and activities of 'I' and harmony in 'I'.
- Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail.
- Programs to ensure Sanyam and Health.

Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease.

Unit -3:

Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

- Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship.
- Understanding the meaning of Trust; Difference between intention and competence.
- Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship.
- Understanding the harmony in the society (society being an extension of family):
- Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals.
- Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios, elicit examples from students' lives.

Unit-4:

Understanding Harmony in the Nature and Existence -Whole existence as Co-existence

- Understanding the harmony in the Nature.
- Interconnectedness and mutual fulfilment among the four orders of nature recyclability and self-regulation in nature.

- Understanding Existence as Co-existence of mutually interacting units in all pervasiveSpace.
- Holistic perception of harmony at all levels of existence.Include practice sessions to discuss human being as cause of imbalance in nature (film“Home” can be used), pollution, depletion of resources and role of technology etc.

Unit-5:

Implications of the above Holistic Understanding of Harmony on Professional Ethics

- Natural acceptance of human values.
- Definitiveness of Ethical Human Conduct.
- Basis for Humanistic Education, Humanistic Constitution and Humanistic universal order
- Competence in professional ethics: *a.* Ability to utilize the professional competence for augmenting universal human order *b.* Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, *c.* Ability to identify and develop appropriate technologies and management patterns for above production systems.
- Case studies of typical holistic technologies, management models and production systems
- Strategy for transition from the present state to Universal Human Order:
 - a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers.
 - b. At the level of society: as mutually enriching institutions and organizations
- Sum up: Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions.
E.g., To discuss the conduct as an engineer or scientist etc.

Text Books:

1. R R Gaur, R Asthana, G P Bagaria, “A Foundation Course in Human Values and Professional Ethics”, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1.
2. R R Gaur, R Asthana, G P Bagaria, “Teachers’ Manual for A Foundation Course in Human Values and Professional Ethics”, 2nd Revised Edition, Excel Books, New Delhi,2019. ISBN 978-93-87034-53-2.

Reference Books:

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantik, 1999.
2. A. N. Tripathi, "Human Values", New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. Mohandas Karamchand Gandhi "The Story of My Experiments with Truth"
5. E. F. Schumacher. "Small is Beautiful".
6. Slow is Beautiful –Cecile Andrews.
7. J C Kumarappa "Economy of Permanence".
8. Pandit Sunderlal "Bharat Mein Angreji Raj".
9. Dharampal, "Rediscovering India".
10. Mohandas K. Gandhi, "Hind Swaraj or Indian Home Rule".
11. India Wins Freedom - Maulana Abdul Kalam Azad.
12. Vivekananda - Romain Rolland (English).
13. Gandhi - Romain Rolland (English).

Course Outcomes:

By the end of the course,

- Understanding the value of education to become more aware of themselves, and their surroundings (family, society, nature). (L2)
- Utilize the concepts of human being-harmony in myself become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.(L3)
- Understanding the concepts of society-harmony in human for better critical ability.(L2)
- Understanding the human values, human relationship and human society to become sensitive to their commitment. (L2)
- Apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction. (L3)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech II Sem

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(MA20AMC101) LOGICAL SKILLS FOR PROFESSIONALS - I

(Mandatory Course)

Course Objectives:

- To learn the basic methods to find averages, percentages, Time and Distance and Time and Work concepts extended to problems on trains, Boats and Streams and different shortcut techniques to find the solution in a stipulated time.
- To understand the logic behind the series, coding- decoding, Directions, Problems on ages, Analogy concepts.

Unit-1:

Averages:

- Find the averages on some quantities.
- Find the averages on speed and distance.

Ratio and Proportions:

- Ratio between quantities of the same kind.
- Comparison of two ratios and convert into equal fractions.
- Find the 4th, 3rd terms of proportions and mean proportions.

Profit and Loss:

- Find the Profit or Loss on Selling price, cost price and market price.

Unit-2:

Partnership:

- Ratio of division of gains.
- Working and sleeping partners.

Simple Interest and Compound Interest:

- Find the Principal, Rate of interest and time.

- Find the amount of compound interest when the compound interest is Annually or half-year or quarterly or daily.
- Find the difference between the simple and compound interests

Time and Distance:

- Find the time, speed and distance by using direct formula.
- Find the time, speed and distance by using ratios and averages.

Unit-3:

Time and Work:

- The relation between days taken by individuals to complete a given work independently and to complete while working simultaneously or alternately.
- Teams of men, women, children and time taken by the teams to complete work independently or while working simultaneously.

Problems on Trains:

- Time Taken by Train to Cross any stationary Body or Platform.
- Time Taken by 2 trains to cross each other.
- Distance covered when two trains are moving in the same/opposite directions.

Boats and streams:

- Find the speed of boat in upstream and downstream.
- Find the speed of boat in still water and **averagespeed of boat.**

Unit-4:

Series:

- Alphabet series
- Number series
- Alpha-Numeric series

Coding and Decoding:

- Letter coding
- Number/symbol coding

- Substitution coding

Blood relation:

- Based dialogue or conversation
- Based on puzzles

Unit-5:**Directions:**

- The right and left directional movement
- The directional reference point
- The directions of sun rays and shadow

Problems on ages:

- Find the ages at present
- Find the ages in future
- Find the ages in past

Analogy:

- Alphabet analogy
- Number analogy

Text Books:

1. Quantitative Aptitude, 2012, Dr. R.S. Agarwal, S. Chand and Company Ltd, New Delhi.
2. A Modern Approach to Verbal and Non-Verbal Reasoning, 2012, Dr. R.S. Aggarwal, S. Chand and Company Ltd, New Delhi.

Reference Books:

1. Quantitative Aptitude for Competitive Examinations, 14/e, 2010, Abhijit Guha, Tata McGraw Hill Publishers, New Delhi.
2. Course in Mental Ability & Quantitative Aptitude, 3/e, 2012, Edgar Thorpe, Tata McGraw Hill Publishers, New Delhi.

3. Fast Track Objective Arithmetic, 2012, Rajesh Verma, Arihant Publications, Meerut.
4. Reasoning and Aptitude, 2013, Nem Singh, Made Easy Publications, New Delhi

Course Outcomes:

- Demonstrate knowledge basic mathematics to develop analytical skills to solving problems of Averages - Percentages - Ratio. (L2)
- Demonstrate knowledge basic mathematics to develop analytical skills to solving problems of Partnership - Simple Interest and Compound Interest and time and distance. (L2)
- Demonstrate knowledge basic mathematics to develop analytical skills to solving problems of time ad work, problems on trains and Boats and streams. (L2)
- Analyze the techniques in series, coding and decoding and blood relations. (L3)
- Analyze the techniques in directions, problems on ages and analogy.(L3)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B. Tech III Sem.

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(MA20ABS303) DISCRETE MATHEMATICS AND GRAPH THEORY
(CSE, AI&ML, IT)

Course Objectives:

- To describe logical sentences in terms of predicates, quantifiers, and logical connectives in theory of inference for the statement calculus. (L2)
- To demonstrate the application of basic methods of discrete mathematics in Computer Science problem solving. (L3)
- To explain about the Graph theory and Recurrence relations. (L5)
- To reveal the concepts of graph theory which is applied in addressing the problems related to computer science. (L3)
- To introduce the mathematical concepts which will be useful to study advanced courses such as Design and Analysis of Algorithms, Theory of Computation, Cryptography and Software Engineering etc. (L4)

UNIT – 1: Mathematical logic:

Statements and Notation, Connectives- Negation, Conjunction, Disjunction, Conditional and Bi-conditional, Statement formulas and Truth Tables. Well-formed formulas, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications.

Normal Forms: Disjunctive Normal Forms, Conjunctive Normal Forms, Principal Disjunctive Normal Forms (PDNF), Principal Conjunctive Normal Forms (PCNF).

The Theory of Inference for the Statement Calculus: Rules of Inference, Consistency of Premises and Indirect Method of Proof.

The predicate Calculus, and Inference theory of the Predicate Calculus: Predicates, the statement function, variables and quantifiers, predicate formulas, free and bound variables, the universe of discourse, valid formulas and equivalences, some valid formulas over finite universe, special valid formulas involving quantifiers, theory of inference for the predicate calculus.

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe logical sentences in terms of predicates, quantifiers, and logical connectives. (L2)

- Evaluate basic logic statements using truth tables and the properties of logic. (L5)
- Apply rules of inference to test the consistency of premises and validity of arguments and verify the equivalence of two formulas and their dual. (L3)
- Find the Principal Conjunctive and Principal Disjunctive Normal Forms of a statement formula. (L1)

UNIT – II: Set Theory:

Basic concepts of Set theory: Notation, inclusion and equality of sets, the power set, some operation on sets, Venn diagrams, some basic set identities, Cartesian products.

Relations and Ordering: Relations, properties of binary relations in a set, relation matrix and the graph of a relation, partition and covering of a set, equivalence relations, compatibility relations, composition of binary relations, and partial ordering, Hasse Diagram.

Functions: Definition and introduction, composition of functions, inverse functions, binary and n-ray operations, characteristic function of a set.

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe the basic concepts of set theory. (L2)
- Describe equivalence, partial order and compatible relations.(L2)
- Describe functions and composition of functions. (L2)
- Describe binary and n-ray operations. (L2)

UNIT – III: Algebraic Structures

Algebraic Systems: Examples and General Properties.

Semi Groups and Monoids: Definitions and examples, homomorphism of semi groups and Monoids, Sub semigroups and Sub Monoids.

Groups: Definition and examples, subgroups and homomorphisms, cosets and Lagrange's theorem, normal subgroups, algebraic systems with two binary operations.

Learning Outcomes:

At the end of this unit, the student will be able to

- Describes the properties of Semi groups.(L2)
- Describes the properties of Monoids.(L2)
- Describes the properties of Groups.(L2)

UNIT – IV: Recurrence Relations:

Recurrence Relations: Generating Functions of Sequences, Calculating Coefficients of Generating Functions, Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, The method of Characteristic Roots, Solution of In-homogeneous Recurrence Relations.

Learning Outcomes:

At the end of this unit, the student will be able to

- Find the generating functions for a sequence.(L1)
- Solve recurrence relations by using the method of Characteristic roots and Generating functions.(L3)

UNIT – V: Graph Theory:

Graphs: Basic Concepts, Isomorphism and Sub graphs, Planar Graphs, Euler's Formula, Multi graphs and Euler Circuits, Hamiltonian Graphs.

Graph coloring: Chromatic Number, The Four-Color Problem.

Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees.

Algorithms to find a spanning tree in connected graph: Minimum spanning tree, Depth first search (DFS) algorithm, Breadth first search (BFS) algorithm and Kruskal's algorithm.

Learning Outcomes:

At the end of this unit, the student will be able to

- Investigate if a given graph is simple or a multigraph, directed or undirected, cyclic or acyclic.(L6)

- Apply the concepts of functions to identify the Isomorphic Graphs and Identify Euler Graphs, Hamilton Graph.(L3)
- Describes Graph coloring and chromatic number of a graph.(L2)
- Apply depth-first and breadth-first search algorithm to find a minimum spanning tree.(L3)
- Apply Kruskal's algorithms to find a minimum spanning tree.(L3)

Text Books:

- J P Trembly and R Manohar, "Discrete Mathematical Structures with Applications to Computer Science", 1st Edition, McGraw Hill, 2017(For Unit I&II).
- Joe L. Mott. Abraham Kandel and Theodore P. Baker, "Discrete Mathematics for Computer Scientists & Mathematicians", 2nd Edition, Pearson, 2008. (for Units III to V).

Reference Books:

- Kenneth H Rosen, "Discrete Mathematics and Its Applications (SIE)", 7th Edition, McGraw-Hill.
- Ralph P. Grimaldi and B.V. Ramana, "Discrete and Combinatorial Mathematics, an Applied Introduction", 5th Edition, Pearson, 2016.
- Narsingh Deo, "Graph Theory with Applications to Engineering", Prentice Hall, 1979.
- S. Malik and M.K. Sen, "Discrete Mathematics theory and Applications", 1st Edition, Cengage Learning, 2012.
- L Liu and D P Mohapatra, "Elements of Discrete Mathematics, A computer Oriented approach", 4th edition, McGraw-Hill, 2018.
- Dr. D.S. Chandrasekharaiah, "Mathematical foundations of computer science", 3rd edition Prism books Pvt. Ltd.

Course Outcomes:

At the end of this Course the student will be able to

- Apply mathematical concepts and logical reasoning to solve problems in different fields of Computer science and information technology (L3).

- Apply the properties of Set theory to find Equivalence and Partial Ordering relations and Hasse Diagrams for different functions (L3).
- Analyse the properties of Algebraic Structures to find the given sets are Semi group, Monoids and Groups (L4).
- Analyse the concepts of Generating and Recurrence relations for solving Homogeneous and In-Homogeneous equations (L4).
- Investigate the graphs are Isomorphic Graphs, Euler and Hamilton Graphs (L6).

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B.Tech III SEM

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(EC20AES301) DIGITAL ELECTRONICS & MICROPROCESSORS (CSE)

Course Objectives:

- To understand all the concepts of Logic Gates and Boolean Functions.
- To understand about Combinational Logic and Sequential Logic Circuits
- To Create Combinational logic circuits using Programmable Logic Devices.
- To understand the concepts of 8085, 8086 Microprocessor and 8051 Microcontroller.
- To Analyze Assembly Language Programming of 8086 & 8051.

Unit I

Number systems and Boolean Algebra: Digital Systems, Introduction to number systems and conversion, Binary codes, Complements, signed and unsigned Binary numbers, Boolean Algebra and its properties, Simplification of Boolean functions, SOP and POS methods – Simplification of Boolean functions using K-maps and realization using Universal Gates.

Learning Outcomes:

- Explain number systems and convert number systems. (L2)
- Explains the simplification of logical statements with using boolean rules and de-morgan theorems (L2)
- Understand the simplification of logical statements with karnaugh maps (L2)

Unit II

Combinational Logic Circuits : Adders & Subtractors, 4-bit binary adder and Subtractor, Decoders, Encoders, Multiplexers, Demultiplexers, Programmable Logic devices - PROM, PAL, PLA, Design of combinational circuits using PLD's.

Learning Outcomes:

- Analyze combinational logic circuits (L4)
- Understand and Analyze the working principle of encoders, decoders (L2)
- Design combinational circuits using PLD's. (L6)

UnitIII

Sequential Logic Circuits : Sequential Circuits, Latches, Flipflops: RS, D, JK, Master Slave JK, T Flip-Flops, Shift Registers, Types of Shift Registers, Universal Shift registers, Counters, Synchronous Counters, Asynchronous Counters, Up-Down Counter

Learning Outcomes:

- Analyze sequential circuits (L4)
- Understand and Analyze the counters (L2)

UnitIV

Introduction to 8085 & 8086 Microprocessor: 8085 microprocessor Review (brief detail only), 8086 Architecture – Block Diagram, register organization 8086, Flag register of 8086 and its functions, Pin diagram of 8086, Minimum mode & Maximum mode operation of 8086, Interrupts in 8086, Addressing modes of 8086.

Learning Outcomes:

- To understand the concepts of 8085, 8086 Microprocessor (L2).
- To understand the addressing modes of 8086 Microprocessor (L2).

UnitV

Instruction Set of 8086 Microprocessor: Instruction set of 8086, Assembler directives, Procedures and Macros, Simple programs involving arithmetic, logical, branch instructions, Ascending, Descending and Block move programs, String Manipulation Instructions.

Introduction to 8051 Microcontrollers: Overview of 8051 microcontroller, Architecture, Register set of 8051, Memory organization, Addressing modes & instruction set of 8051, Simple programs.

Learning Outcomes:

- Distinguish and analyze between Microprocessor and Microcontrollers. (L4)
- Understand the concepts of 8051 microcontroller. (L2)
- Apply knowledge and demonstrate programming proficiency using various addressing modes and instruction sets of 8086 & 8051 (L3)

Text Books:

1. M. Morris Mano, Michael D. Ciletti, Digital Design, Pearson Education, 5th Edition, 2013

2. Advanced microprocessors and peripherals-A.K Ray and K.M. Bhurchandani, TMH, 2nd edition, 2006

References:

1. Switching Theory and Logic Design –A. Anand Kumar, PHI learning Pvt.Ltd.2013.
2. N.Senthil Kumar, M .Saravanan ,S.Jeevanathan ,Microprocessor and Microcontrollers, Oxford Publishers,2010.

Course Outcomes:

After the completion of the course, students will be able to

CO1: To understand the concept of Logic circuits and analyze various Boolean algebra functions.

CO2: To understand the concept of Combinational Logic and Sequential Logic Circuits.

CO3: To create combinational circuits using PLD's.

CO4: To understand and Analyze the counters,

CO5: To understand the concepts of 8085, 8086 Microprocessor and 8051 Microcontroller.

CO6: Apply knowledge and demonstrate programming proficiency using various addressing modes and instruction sets of 8086 & 8051

SRI VENKATESWARA COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech III Sem.

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(CS20APC305) SOFTWARE ENGINEERING

(CSE)

Course Objectives:

- To learn the basic concepts of software engineering and life cycle models
- To explore the issues in software requirements specification and enable to write SRS documents for software development problems
- To elucidate the basic concepts of software design and enable to carry out procedural and object oriented design of software development problems
- To understand the basic concepts of black box and white box software testing and enable
- To design test cases for unit, integration, and system testing
- To reveal the basic concepts in software project management

Unit – I: Basic concepts in software engineering and software project management

Basic concepts: abstraction versus decomposition, evolution of software engineering techniques, Software development life cycle (SDLC) models: Iterative waterfall model, Prototype model, Evolutionary model, Spiral model, RAD model, Agile models, software project management: project planning, project estimation, COCOMO, Halstead's Software Science, project scheduling, staffing, Organization and team structure, risk management, configuration management.

Unit Outcomes:

Student should be able to

1. Recognize the basic issues in commercial software development.
2. Summarize software lifecycle models.
3. Infer Workout project cost estimates using COCOMO and schedules using PERT and GANTT charts.

Unit – II: Requirements analysis and specification

The nature of software, The Unique nature of Webapps, Software Myths, Requirements gathering and analysis, software requirements specification, Traceability, Characteristics of a

Good SRS Document, IEEE 830 guidelines, representing complex requirements using decision

tables and decision trees, overview of formal system development techniques. axiomatic specification, algebraic specification.

Unit Outcomes:

Student should be able to

1. Identify basic issues in software requirements analysis and specification.
2. Develop SRS document for sample problems using IEEE 830 format.
3. Develop algebraic and axiomatic specifications for simple problems.

Unit – III : Software Design

Good Software Design, Cohesion and coupling, Control Hierarchy: Layering, Control Abstraction, Depth and width, Fan-out, Fan-in, Software design approaches, object oriented vs.

function oriented design. Overview of SA/SD methodology, structured analysis, Data flow

diagram, Extending DFD technique to real life systems, Basic Object oriented concepts, UML

Diagrams, Structured design, Detailed design, Design review, Characteristics of a good user

interface, User Guidance and Online Help, Mode-based Vs Mode-less Interface, Types of user

interfaces, Component-based GUI development, User interface design methodology: GUI design methodology.

Unit Outcomes

Student should be able to

1. Identify the basic issues in software design.
2. Apply the structured, object oriented analysis and design (SA/SD) technique.
3. Recognize the basic issues in user interface design.

Unit – IV : Coding and Testing

Coding standards and guidelines, code review, software documentation, Testing, Black Box

Testing, White Box Testing, debugging, integration testing, Program Analysis Tools, system

testing, performance testing, regression testing, Testing Object Oriented Programs.

Unit Outcomes:

Student should be able to

1. Identify the basic issues in coding practice.
2. Recognize the basic issues in software testing.
3. Design test cases for black box and white box testing.

Unit – V: Software quality, reliability, and other issues

Software reliability, Statistical testing, Software quality and management, ISO 9000, SEI

capability maturity model (CMM), Personal software process (PSP), Six sigma, Software quality

metrics, CASE and its scope, CASE environment, CASE support in software life cycle,

Characteristics of software maintenance, Software reverse engineering, Software maintenance

processes model, Estimation maintenance cost. Basic issues in any reuse program, Reuse

approach, Reuse at organization level.

Unit Outcomes:

Student should be able to

1. Summarize various methods of software quality management.
2. Instruct the quality management standards ISO 9001, SEI CMM, PSP, and Six Sigma.
3. Outline software quality assurance, quality measures, and quality control.
4. Identify the basic issues in software maintenance, CASE support, and software reuse.

Course Outcomes:

Student should be able to

- Obtain basic software life cycle activity skills(L1).
- Design software requirements specification for given problems.(L4)
- Implement structure, object oriented analysis and design for given problems.(L5)

- Design test cases for given problems.(L4)
- Apply quality management concepts at the application level.(L3)

Text Book:

1. Rajib Mall, "Fundamentals of Software Engineering", 5th Edition, PHI, 2018.
2. Pressman R, "Software Engineering- Practioner Approach", McGraw Hill.

Reference Books:

1. Somerville, "Software Engineering", Pearson 2.
2. Richard Fairley, "Software Engineering Concepts", Tata McGraw Hill.
3. Jalote Pankaj, "An integrated approach to Software Engineering", Narosa

SRI VENKATESWARA COLLEGE OF ENGINEERING
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B.Tech III Sem

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(CS20APC303) DATABASE MANAGEMENT SYSTEMS

Course Objectives:

This course is designed to

- Train in the fundamental concepts of database management systems, database modeling and design, SQL, PL/SQL and system implementation techniques.
- Enable students to model ER diagram for any customized application.
- Inducting appropriate strategies for optimization of queries.
- Provide knowledge on concurrency techniques.
- Demonstrate the organization of Databases.

UNIT-I: Introduction to DBMS: Database systems applications, Purpose of Database Systems, view of Data, Database Languages, Relational Databases, Database Design, Data Storage and Querying, Transaction Management, Database Architecture, Database users and Administrators.

Database Design and the E-R Model: Overview of the Design Process, The Entity-Relationship Model, Constraints, Entity-Relationship Diagrams, and Convert E-R to Relational Schemas.

Learning outcomes:

At the end of the Unit, students will be able to

- Distinguish between Database and File System (L4).
- Categorize different kinds of data models (L4).
- Define functional components of DBMS (L1).
- Develop E-R model for the given problem (L6).
- Derive tables from E-R diagrams (L5).

UNIT-II: Introduction to Relational Model: Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages, Relational Operations.

Relational Database Design: Features of Good Relational Designs, Atomic Domains and First Normal Form, Decomposition Using Functional Dependencies, Functional-Dependency Theory, Algorithms for Decomposition, Decomposition Using Multi valued Dependencies, More Normal Forms.

Learning outcomes:

At the end of the Unit, students will be able to

- Outline the elements of the relational model such as domain, attribute, tuple, relation and entity (L2).
- Distinguish between various kinds of constraints like domain, key and integrity (L4).
- Differentiate between various normal forms based on functional dependency (L4).
- Apply normalization techniques to eliminate redundancy (L3).

UNIT-III: Introduction to SQL: Overview of the SQL Query Language, SQL Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions, Nested Sub-queries, Modification of the Database, Joins and Views.

Advanced SQL: Accessing SQL from a Programming Language, Functions and Procedures, Triggers.

Learning outcomes:

At the end of the Unit, students will be able to

- Define relational schema (L1)
- Develop queries using Relational Algebra and SQL (L6)
- Perform DML operations on databases (L3)

UNIT-IV: Query Processing: Overview, Measures of Query cost, Selection operation, Sorting, Join Operation, other operations, Evaluation of Expressions.

Transaction Management: Transactions: Concept, A Simple Transactional Model, Storage Structures, Transaction Atomicity and Durability, Transaction Isolation, Serializability, Isolation and Atomicity, Transaction Isolation Levels, Implementation of Isolation Levels, Transactions as SQL Statements.

Learning outcomes:

At the end of the Unit, students will be able to

- Identify variety of methods for effective processing of given queries (L2)
- Understand various properties of transaction (L1)
- Design atomic transactions for an application (L6)

UNIT V: Concurrency Control: Lock based Protocols, Deadlock Handling, Multiple granularities, Timestamp based Protocols, and Validation based Protocols.

Recovery System: Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm, Buffer Management, Failure with Loss of Nonvolatile Storage, Early Lock Release and Logical Undo Operations.

Learning outcomes:

At the end of the Unit, students will be able to

- Understand various locking protocols (L1)
- Gain the knowledge about log mechanism and checkpointing techniques for system recovery (L2)

Course Outcomes

Students will be able to

- Design a database for a real world information system (L6)
- Define transactions which preserve the integrity of the database (L1)
- Generate tables for a database (L4)

- Organize the data to prevent redundancy (L4)
- Pose queries to retrieve the information from database (L3)

TEXT BOOKS:

1. A.Silberschatz, H.F.Korth, S.Sudarshan, "**Database System Concepts**", 6/e, TMH 2019

REFERENCE BOOKS:

1. Shamkant B. Navathe, "**Database Management System**" 6/e RamezElmasriPEA
2. "**Database Principles Fundamentals of Design Implementation and Management**", Carlos Coronel, Steven Morris, Peter Robb, CengageLearning.
3. Raghurama Krishnan, Johannes Gehrke, "**Database Management Systems**", 3/e, TMH

SRI VENKATESWARA COLLEGE OF ENGINEERING (AUTONOMOUS)

B. Tech III Sem.

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(IT20APC301) PYTHON PROGRAMMING
(CSE, CSM & IT)

Course Objectives:

1. To learn the fundamentals of Python
2. To elucidate problem-solving using a Python programming language
3. To introduce a function-oriented programming paradigm through python
4. To get training in the development of solutions using modular concepts
5. To introduce the programming constructs of python

Unit – I

Introduction to Python Programming: Overview of Programming Languages, History of Python, Installing Python, Executing Python Programs, Commenting in Python, Internal Working of Python.

Basics of Python Programming: Python Character Set, Token, Python Core Data Type, I/O functions, Assigning Value to a Variable, Multiple Assignments, Writing Simple Programs in Python, Formatting Number and Strings, Python Inbuilt Functions.

Operators and Expressions: Operators and Expressions, Arithmetic Operators, Operator Precedence and Associativity, Changing Precedence and Associativity of Arithmetic Operators, Translating Mathematical Formulae into Equivalent Python Expressions, Bitwise Operator, The Compound Assignment Operator.

Learning Outcomes:

At the end of this unit, the student will be able to

- List the basic constructs of Python (L1).
- Understand operators and expressions. (L2).

Unit – II

Decision Statements: Boolean Type, Boolean Operators, Using Numbers with Boolean Operators, Using String with Boolean Operators, Boolean Expressions and Relational Operators, Decision Making Statements, Conditional Expressions.

Loop Control Statements: The while Loop, The range() Function, The for Loop, Nested Loops, The break Statement, The continue Statement.

Functions: Syntax and Basics of a Function, Use of a Function, Parameters and Arguments in a Function, The Local and Global Scope of a Variable, The return Statement, Recursive Functions, The Lambda Function.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply the conditional execution of the program (L3).
- Apply the principle of recursion to solve the problems (L3).

Unit - III

Strings: The str class, Basic Inbuilt Python Functions for String, The index[] Operator, Traversing String with for and while Loop, Immutable Strings, The String Operators, String Operations.

Lists: Creating Lists, Accessing the Elements of a List, Negative List Indices, List Slicing [Start: end], List Slicing with Step Size, Python Inbuilt Functions for Lists, The List Operator, List Comprehensions, List Methods, List and Strings, Splitting a String in List, Passing List to a Function, Returning List from a Function.

Tuples, Sets and Dictionaries: Introduction to Tuples, Sets, Dictionaries.

Learning Outcomes:

At the end of this unit, the student will be able to

- Design programs for manipulating strings (L6).
- Apply lists, Tuples, Sets and Dictionaries (L3).

Unit – IV

Exceptions: When Something Goes Wrong, Classes of Exceptions, A Final Note on Pythonic Exception Handling.

File Handling: Need of File Handling, Text Input and Output, The seek() Function, Binary Files, Accessing and Manipulating Files and Directories on a Disk.

Modules: Reusing Code with Modules and Packages, Understanding Python Modules, Everyday Module Usage, Advanced Module Behavior, Combining Modules into Packages

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand Exceptions and Modules (L2).
- Organize data in the form of files (L4).

Unit – V

Object-Oriented Programming: Class, Objects and Inheritance: Defining Classes, The Self parameter and Adding Methods to a Class, Display Class Attributes and Methods, Special Class Attributes, Accessibility, The __init__ Method (Constructor), Passing an Object as Parameter to a Method, __del__() (Destructor Method), Class Membership Tests, Method Overloading, Operator Overloading, Inheritance, The Object Class.

Case study: The turtle module, Simple Repetition, Encapsulation, Generalization, Interface design, Refactoring, docstring.

Learning Outcomes:

At the end of this unit, the student will be able to

- Plan programs using object orientation approach (L4).
- Design graphics using turtle module (L4).

Course Outcomes:

- Apply the features of Python language in various real applications (L3).
- Select appropriate core data structure of Python for solving a problem (L5).
- Design object-oriented programs using Python for solving real-world problems (L4).
- Apply modularity to programs (L3).
- Design graphics using turtle module (L4).

Text books:

1. Programming and problem solving with Python by Ashok Namdev Kamthane, Amit Ashok Kamthane (2018): McGraw Hill Education (India) Private Limited.
2. Allen B. Downey, "Think Python", 2nd edition, SPD/O'Reilly, 2016.
3. Python 3 for Absolute Beginners, Tim Hall and J-P Stacey, Apress.

Reference Books:

- R. Nageswara Rao, "Core Python Programming", 2nd edition, Dreamtech Press, 2019.
- Python Pocket Reference 5ed: Python in Your Pocket, Mark Lutz, 2014.

e-Resources:

- https://www.tutorialspoint.com/python3/python_tutorial.pdf

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B. Tech III Sem

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(EC20AES302)DIGITAL ELECTRONICS & MICROPROCESSORSLAB
(CSE)

CourseObjectives:

- To understand and analyze the concepts of Logic Gates and Boolean functions.
- To understand and analyze Combinational Logic and Sequential Logic Circuits .
- To understand and analyze the logic circuits using Programmable Logic Devices.
- Apply knowledge and demonstrate programming proficiency using various addressing modes and instruction sets of 8086 & 8051.

List of Experiments:

Note: Minimum of 12 experiments shall be conducted from both the sections:

Hardware: DIGITAL ELECTRONICS (Any 6 Experiments):

1. Realization of NOT, AND, OR, EX-OR gates with only Universal gates.
2. Karnaugh map Reduction and Logic Circuit Implementation.
3. Verification of DeMorgan's Laws.
4. Implementation of Half-Adder and Half-Subtractor.
5. Implementation of Full-Adder and Full-Subtractor.
6. Four Bit Binary Adder
7. Implementation of 4*1 Multiplexer and 8*1 Multiplexer.
8. Verification of state tables of D flip-flop , JK flip-flop, T flip-flop.

Software: MICROPROCESSORS & MICROCONTROLLERS (Any 6 Experiments)

1. Programs using arithmetic and logical operations
2. Programs for code conversions.
3. ASCII Arithmetic Addition and Subtraction.
4. Searching for an element in an Array.
5. Sorting in Ascending and Descending Orders.
6. Finding Largest and Smallest elements from an array.
7. Reversing a string.
8. String Comparison
9. Block Move.
10. Arithmetic and logical operations using 8051,
11. Sorting in Ascending and Descending Orders using 8051,

Course Outcomes:

After Completion of this course, the student will be able to:

- Analyze the concepts of Logic Gates and Boolean functions.

- Analyze Combinational Logic and Sequential Logic Circuits.
- Analyze the logic circuits using Programmable Logic Devices.
- Apply knowledge and demonstrate programming proficiency using various addressing modes and instruction sets of 8086 & 8051.

Equipment Required:

1. Hardware kits.
2. TASM
3. 8051 kits.
4. Personal computer with necessary peripherals

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B. Tech III Sem

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(CS20APC304) DATABASE MANAGEMENT SYSTEMS LAB

(CSE, CSM & IT)

Course Objectives:

This course is designed to

- Use SQL commands to create, update, modify and retrieve data from the data bases.
- ER model for a practical real-life system.
- Understand the importance of good database design and indexing.
- Understand the properties of transactions in a database system.

List of Experiments

1. Practice DDL and DML Queries
2. Perform various SQL queries on LIKE, AND, OR, NOT AND BETWEEN operations.
3. Perform various SQL queries on select clause, where clause, pattern matching, Order by and Group by.
4. SQL Queries on Set operations, Aggregate functions and Join Operations.
5. Perform DCL, TCL Queries, and Constraints with Primary and Foreign Keys.
6. Design and Create University Library Database using ER diagram and Schema Diagram.
7. Design and create a university database consisting of the following tables Department, Course, Instructor and Student using ER Modelling and Schema Diagram.
8. Create various tables like Branch, banking system with constraints using a Schema diagram.
9. PL/SQL program using controls Structures.
10. Program to implement Procedures and Functions.
11. Program to implement Triggers.
12. Program to implement Cursors.

Course Outcomes:

At the end of the course, students will be able to

- Work with the concepts of DDL, DML, DCL Commands (L3).
- Design of databases for real life systems using Oracle (L5).
- Learning of SQL queries on the real-life systems (L4).
- Execution of PL/SQL programs for different problems (L6).
- Implementation of procedure, function, trigger and cursor concepts in PL/SQL (L4).

Web References:

1. <https://www.w3schools.com/sql>
2. <https://www.tutorialspoint.com/plsql/index.htm>

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B. Tech III Sem.

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(IT20APC302) PYTHON PROGRAMMING LAB

(CSE, CSM&IT)

Course Objectives:

- To train the students in solving computational problems
- To elucidate solving mathematical problems using Python programming language
- To understand the fundamentals of Python programming concepts and its applications.
- To understand the object-oriented concepts using Python in problem solving.

Laboratory Experiments

1. Install Python Interpreter and use it to perform different Mathematical Computations. Try to do all the operations present in a Scientific Calculator

2. Write a function that draws a grid like the following:

```
+ - - - + - - - +  
| | |  
| | |  
| | |  
| | |  
+ - - - + - - - +  
| | |  
| | |  
| | |  
| | |  
+ - - - + - - - +
```

3. Write a function that draws a Pyramid with # symbols

```
#  
# # #  
# # # # #  
# # # # # # #
```

.Up to 15 hashes at the bottom

4. Using turtles concept draw a wheel of your choice
5. Write a program that draws Archimedean Spiral
6. The letters of the alphabet can be constructed from a moderate number of basic elements, like vertical and horizontal lines and a few curves. Design an alphabet that can be drawn with a minimal number of basic elements and then write functions that draw the letters. The alphabet can belong to any Natural language excluding English. You should consider at least Ten letters of the alphabet.
7. The time module provides a function, also named time that returns the current Greenwich Mean Time in "the epoch", which is an arbitrary time used as a reference point. On UNIX systems, the epoch is 1 January 1970.

```
>>> import time
```

```
>>> time.time()
```

```
1437746094.5735958
```

Write a script that reads the current time and converts it to a time of day in hours, minutes, and seconds, plus the number of days since the epoch.

8. Given $n+r+1 \leq 2^r$. n is the input and r is to be determined. Write a program which computes minimum value of r that satisfies the above.
9. Write a program that evaluates Ackermann function
10. The mathematician Srinivasa Ramanujan found an infinite series that can be used to generate a

numerical approximation of $1/\pi$:

Write a function called estimate_pi that uses this formula to compute and return an estimate of π .

$$\frac{1}{\pi} = \frac{2\sqrt{2}}{9801} \sum_{k=0}^{\infty} \frac{(4k)!(1103 + 26390k)}{(k!)^4 396^{4k}}$$

It should use a while loop to compute terms of the summation until the last term is smaller than $1e-15$ (which is Python notation for 10^{-15}). You can check the result by comparing it to `math.pi`.

11. Choose any five built-in string functions of C language. Implement them on your own in Python. You should not use string related Python built-in functions.
12. Given a text of characters, Write a program which counts number of vowels, consonants and special characters.

13. Given a word which is a string of characters. Given an integer say 'n', Rotate each character by 'n' positions and print it. Note that 'n' can be positive or negative.
14. Given rows of text, write it in the form of columns.
15. Given a page of text. Count the number of occurrences of each letter (Assume case insensitivity and don't consider special characters). Draw a histogram to represent the same
16. Write program which performs the following operations on list's. Don't use built-in functions
 - a) Updating elements of a list
 - b) Concatenation of list's
 - c) Check for member in the list
 - d) Insert into the list
 - e) Sum the elements of the list
 - f) Push and pop element of list
 - g) Sorting of list
 - h) Finding biggest and smallest elements in the list
 - i) Finding common elements in the list
18. Write a program that reads a file, breaks each line into words, strips whitespace and punctuation from the words, and converts them to lowercase.
19. Go to Project Gutenberg (<http://gutenberg.org>) and download your favorite out-of-copyright book in plain text format. Read the book you downloaded, skip over the header information at the beginning of the file, and process the rest of the words as before. Then modify the program to count the total number of words in the book, and the number of times each word is used. Print the number of different words used in the book.
Compare different books by different authors, written in different eras.
20. Go to Project Gutenberg (<http://gutenberg.org>) and download your favorite out-of-copyright book in plain text format. Write a program that allows you to replace words, insert words and delete words from the file.
21. Consider all the files on your PC. Write a program which checks for duplicate files in your PC and displays their location. Hint: If two files have the same checksum, they probably have the same contents.
22. Consider turtle object. Write functions to draw triangle, rectangle, polygon, circle and sphere. Use object oriented approach.
23. Write a program illustrating the object oriented features supported by Python.

24. Design a Python script using the Turtle graphics library to construct a turtle bar chart representing the grades obtained by N students read from a file categorising them into distinction, first class, second class, third class and failed.

25. Design a Python script to determine the difference in date for given two dates in YYYY:MM:DD format($0 \leq \text{YYYY} \leq 9999$, $1 \leq \text{MM} \leq 12$, $1 \leq \text{DD} \leq 31$) following the leap year rules.

26. Design a Python Script to determine the time difference between two given times in HH:MM:SS format. ($0 \leq \text{HH} \leq 23$, $0 \leq \text{MM} \leq 59$, $0 \leq \text{SS} \leq 59$)

Course outcomes:

Student should be able to

- Design solutions to mathematical problems (L6).
- Organize the data for solving the problem (L4).
- Develop Python programs for numerical and text-based problems (L6).
- Select appropriate programming construct for solving the problem (L5).
- Illustrate object-oriented concepts (L3).

Reference Books:

1. Peter Wentworth, Jeffrey Elkner, Allen B. Downey and Chris Meyers, "How to Think Like a Computer Scientist: Learning with Python 3", 3rd edition, Available at <http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf>
2. Paul Barry, "Head First Python a Brain Friendly Guide" 2nd Edition, O'Reilly, 2016
3. Dainel Y.Chen "Pandas for Everyone Python Data Analysis" Pearson Education, 2019

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B. Tech III Sem

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(AM20ASC301) LINUX ADMINISTRATION (Skill Oriented Course)

(CSE, CSM&IT)

Course Objectives:

- To familiarize basic concepts of shell programming
- To learn shell programming.
- To practice basic administration skills.
- To demonstrate use of system calls
- To demonstrate Inter process communication

1. Practice session: practice use of some basic Linux commands. Document the syntax and semantics of the commands like man, passwd, tty, script, clear, date, cal, cp, mv, ln, rm, unlink, mkdir, rmdir, du, df, mount, umount, find, unmask, ulimit, ps, who.
2. Study and Practice on various commands like cat, tail, head, sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, tee, pg, comm, cmp, diff, tr, awk, tar, cpio.
3. Write a shell script that accepts a name from user and displays whether it is a file, directory or something else.
4. Write a shell script that creates users
5. Write a shell script that searches for a given string in a file
6. Write a shell script that compiles all C files in your home directory and creates executable files
7. Write a shell script that given a filename as argument, deletes all even lines in a file
8. Implement the grep command in C language
9. Write a shell script that removes duplicate lines from a file
10. Write a shell script that enhances find command by adding error messages that explain why the command failed.
11. Write a shell script to backup files in a specified directory
12. Write a shell script that finds all links to a file
13. Write an awk script to count the number of lines in a file that do not contain vowels.
14. Write an awk script to find the number of characters, words and lines in a file.
15. Write C programs that illustrate communication between two unrelated processes using named pipe (FIFO).

16. Write a C program in which a parent writes a message to a pipe and the child reads the message.
17. Write a C program (sender.c) to create a message queue with read and write permissions to write 3 messages to it with different priority numbers.
18. Write a C program (receiver.c) that receives the messages (from the above message queue) and displays them.
19. Configure mail server and file server.
20. Write Client and Server programs in C for connection oriented communication between Server and Client processes using Unix Domain sockets to perform the following: Client process sends a message to the Server Process. The Server receives the message, reverses it and sends it back to the Client. The Client will then display the message to the standard output device.

Course Outcomes:

At the end of the course students will be able to:

- Understand shell script to create files and handle text documents. (L2)
- Analyze various methodologies in Linux administration. (L3)
- Implementation of IPC through shell programming in the Linux environment.(L5)
- Create child processes and background processes. (L5)

References:

1. "Unix and Shell programming", B.A.Forouzan and R.F.Gilberg, Cengage Learning.
2. "Beginning Linux Programming", 4th Edition, N.Matthew, R.Stones,Wrox, Wiley
3. "Advanced Unix Programming", N.B.Venkateswarulu, BS Publications.
4. "Unix and Shell Programming", M.G. Venkatesh Murthy, Pearson Education.
5. "Unix Shells by Example", 4th Edition, Ellie Quigley, Pearson Education.
6. "Sed and Awk", O.Dougherty&A.Robbins,2nd edition,SPD.
7. "Unix shell Programming", S.G.Kochan and P.Wood,3rd edition, Pearson Education.

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B. Tech III Sem

L T P C

2 0 0 0

(CH20AMC201) ENVIRONMENTAL SCIENCE (Common to All Branches)

Course Objectives:

- To make the students to get awareness on environment.
- To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day-to-day activities of human life.
- To save earth from the inventions by the engineers.

UNIT – I

Multidisciplinary Nature of Environmental Studies: – Definition, Scope and Importance
– Need for Public Awareness.

Natural Resources:

Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer- pesticide problems, water logging, salinity, case studies. Energy resources.

Learning outcomes:

At the end of this unit, the students will be able to

- Understanding the importance of public awareness. (L2)
- Understanding about the various resources. (L2)

UNIT – II

Ecosystems:

Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession

– **Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:**

- a. Forest ecosystem.
- b. Grassland ecosystem.
- c. Desert ecosystem.
- d. Aquatic ecosystems. (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and Its Conservation:

Introduction: Definition, genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels

– India as a mega-diversity nation – Hot-spots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Learning outcomes:

At the end of this unit, the students will be able to

- Understanding about various ecosystems and their characteristics. (L2)
- Understanding the biodiversity and its conservation. (L2)

UNIT – III

Environmental Pollution: Definition, Causes, effects and control measures of

- a. Air Pollution
- b. Water pollution
- c. Soil pollution
- d. Marine pollution
- e. Noise pollution
- f. Thermal pollution
- g. Nuclear hazards

Solid Waste Management: Causes, effects and control measures of urban and industrial wastes –Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

Learning outcomes:

At the end of this unit, the students will be able to

- Understanding about the various sources of pollution. (L2)
- Understanding about the various sources of solid waste and preventive measures. (L2)
- Understanding about the different types of disasters and their managerial measures. (L2)

UNIT – IV

Social Issues and the Environment:

From Unsustainable to Sustainable development – Urban problems related to energy

– Water conservation, rain water harvesting, watershed management –Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products Environment Protection Act. – Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act –Issues involved in enforcement of environmental legislation – Public awareness.

Learning outcomes:

At the end of this unit, the students will be able to

- Understanding about the social issues related to environment and their protection acts. (L2)
- Understanding about the various sources of conservation of natural resources. (L2)
- Understanding about the wild life protection and forest conservation acts. (L2)

UNIT – V

Human Population and The Environment:

Population growth, variation among nations. Population explosion – Family Welfare Programmes. – Environment and human health – Human Rights – Value Education –

HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

Field Work: Visit to a local area to document environmental assets
River/forest/grass/hill/mountain–Visit to a local polluted site–
Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes.

Learning outcomes:

At the end of this unit, the students will be able to

- Understanding about the population explosion and family welfare programmes. (L2)
- To identify the natural assets and related case studies. (L3)

Text Books:

- Text book of Environmental Studies for Undergraduate Courses ErachBharucha for University Grants Commission, Universities Press.
- Palaniswamy, "Environmental Studies", Pearson education.
- S.AzeemUnnisa, "Environmental Studies" Academic Publishing Company.
- K.Raghavan Nambiar, "Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus", Scitech Publications (India), Pvt. Ltd.

References:

- Deeksha Dave and E.Sai Baba Reddy, "Textbook of Environmental Science", Cengage Publications.
- M.Anji Reddy, "Text book of Environmental Sciences and Technology", BS Publication.
- J.P.Sharma, Comprehensive Environmental studies, Laxmi publications.
- J. Glynn Henry and Gary W. Heinke, "Environmental Sciences and Engineering", Prentice hall of India Private limited.
- G.R.Chatwal, "A Text Book of Environmental Studies" Himalaya Publishing House.
- Gilbert M. Masters and Wendell P. Ela, "Introduction to Environmental Engineering and Science, Prentice hall of India Private limited.

Course Outcomes:

At the end of the course, the student will be able to

- Understanding multidisciplinary nature of environmental studies and various renewable and nonrenewable resources. (L2)

- Understand flow and bio-geo- chemical cycles and ecological pyramids. (L2)
- Understand various causes of pollution and solid waste management and related preventive measures. (L2)
- Apply the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation. (L3)
- Apply the concepts of population explosion, value education and welfare programmes in society. (L3)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B. Tech III Sem

L T P C

2 0 0 0

(EG20AMC302) ENHANCING ENGLISH LANGUAGE SKILLS

COURSE OBJECTIVES:

- To enhance communication skills through listening, speaking, reading, and writing.
- To improve language proficiency of the students for career development.
- To train students to use language appropriately for interview skills, group discussion and public speaking.
- To develop confidence in the students to use English in everyday situations.
- To provide training and opportunities to participate in formal and informal communication.

UNIT- I

1. Greetings-Introducing oneself and others
2. Just A Minute (JAM) & Role play
3. Prepositions, Word formation

Learning Outcomes

At the end of the module, the learners will be able to

- Respond general questions on familiar topics by introducing oneself and others
- Comprehend short talks on general topics.
- Use grammatical structures effectively and meaningfully.

UNIT – II

1. Oral Presentations – Technical presentations
2. Letter Writing- Formal and Informal, Email Writing
3. Articles, Punctuation.

Learning Outcomes

At the end of the module, the learners will be able to

- Make formal oral presentations using effective strategies
- Write formal letters and e-mail writing appropriately in formal contexts without any mistakes
- Use articles and use punctuation contextually.

UNIT – III

1. Communication – Verbal and Non- verbal communication
2. Telephone Etiquettes
3. Tenses, Subject-verb agreement, Prefixes & suffixes

Learning Outcomes

At the end of the module, the learners will be able to

- **Understand** non-verbal features of communication and hold Formal & informal conversations
- **Use** correct tense forms and structures in speech and writing
- Use grammatical structures aptly.

UNIT – IV

1. Resume Writing and Technical Report writing
2. Book/Film review
3. Synonyms and Antonyms, Vocabulary building

Learning Outcomes

At the end of the module, the learners will be able to

- Write Resume appropriately and ready for an interview.
- Review a book/film
- Edit short texts by correcting errors

UNIT – V

1. Group Discussions
2. Debate

3. Interview Skills

Learning Outcomes

At the end of the module, the learners will be able to

- Participate in formal & informal discussions and speak clearly on a specific topic
- Understand how to face interviews effectively.
- Comprehend, discuss and respond to academic texts orally and in writing

COURSE OUTCOMES

- Use English language, both written and spoken, competently and correctly.
- Improve comprehension and fluency of speech.
- Hone the communication skills to meet the challenges of their careers successfully.
- Gain confidence in using English in verbal situations.
- Strengthen communication skills in different contexts like formal and informal.

REFERENCE BOOKS:

1. Krishna Mohan & NP Singh, Speaking English Effectively, 2nd Edition, 2011.
2. MAshrafRizvi, Effective Technical Communication, Tata McGraw-Hill, New Delhi, 2017.
3. Francis Soundararaj, Basics of Communication in English: Soft Skills for Listening, Speaking, Reading and Writing, New Delhi: Macmillan-2012.
4. Chase R. Tarver & Kristin L. Johannsen, Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
5. Meenakshi Raman, Technical Communication, Oxford University Press, 2008
6. Raymond Murphy, English Grammar in Use, Cambridge University Press, 4th Edition, 2012.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech IV Sem

L T P C

3 0 0 3

(MA20ABS401) NUMERICAL METHODS, PROBABILITY AND STATISTICS (Common to CIVIL, ME, EEE, CSE, AI&ML, IT)

Course Objectives:

- To familiarize the students with numerical methods of solving the non-linear equations, interpolation, differentiation, integration, and ordinary differential equations.(L2)
- To impart knowledge in basic concepts and few techniques in probability and statistics in various applications in engineering.(L3)

UNIT – 1: Solution to algebraic and transcendental equations& Interpolation:

Solution of algebraic and transcendental equations: Bisection method, Newton-Raphson method and Regula-Falsi method.

Interpolation: Newton's forward and backward difference formulae. Interpolation with unequal intervals: Lagrange's formulae.

Learning Outcomes:

At the end of this unit, the student will be able to

- Find approximate roots of an equation by using different numerical methods(L3)
- Explain various discrete operators and find the relation among operators(L2)
- Apply Newton forward and backward formulas for equal intervals(L3)

UNIT – II: Numerical differentiation, integration &Solution of Initial Value Problems to Ordinary Differential Equations of first order:

Numerical differentiation using Newton's forward & backward interpolation formulae; Numerical Integration by trapezoidal rule, Simpson's $1/3^{\text{rd}}$ and $3/8^{\text{th}}$ rules.

Numerical Solutions of Ordinary differential equation: Solution by Taylor's series, Picard's method of successive approximations, Euler's method, modified Euler's method and Runge-Kutta method of fourth order.

Learning Outcomes:

At the end of this unit, the student will be able to

- Find integration of a function by using different numerical methods. (L3)
- Solve ordinary differential equations using different numerical schemes. (L3)

UNIT – III: Probability & Random Variables:

Probability axioms, addition law, conditional probability, Baye's theorem.

Random variables (discrete and continuous), probability distribution: Binomial - Poisson and Normal distribution-their properties. (All concepts without proofs)

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the basic concepts of probability theory and elementary theorems on probability.(L2)
- Apply the knowledge of discrete random variable and continuous random variable and the respective probability distributions.(L3)

UNIT – IV: Testing of hypothesis:

Formulation of hypothesis, critical region, level of significance. Large sample tests: test for single proportion, difference of two proportions, test for single mean and difference of two means.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the concept of testing of hypothesis(L2)
- Apply the concept of hypothesis testing for large samples(L3)

UNIT – V: Small Sample Tests:

Student t-distribution (single mean, two means and paired t-test), Testing of equality of variances (F-test), χ^2 - test for independence of attributes and goodness of fit.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply the concept of testing hypothesis for small samples(L3)
- Apply the concept of hypothesis testing for small samples and estimate the goodness of fit (L3)

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017, 44th edition.
2. Miller and Freunds, Probability and Statistics for Engineers,7/e, Pearson, 2008
3. S.S.Sastry, "Introductory methods of Numerical Analysis", 5th edition, PHI, 2012.
4. Advanced Engineering Mathematics, R K Jain and S R K Iyengar, Narosa Publishing House, New Delhi.

Reference Books:

1. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons publications, 2012.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9/e, John Wiley & Sons, 2006.

3. Kandasamy, K. Thilagavathy, S. Gunavathy, Numerical Methods, S. Chand & Company, 2nd Edition, Reprint 2012.
4. S. Ranganatham, Dr. M. V. S. S. N. Prasad, Dr. V. Ramesh Babu, Numerical Analysis, S. Chand Publications, 2015
5. Dr. A. Singaravelu, Probability and Statistics, Meenakshi Agency, 2017

Course Outcomes:

At the end of this Course the student will be able to

- Apply different methods to find roots of algebraic and transcendental equations. (L3)
- Apply different methods to find approximate solution of ordinary differential equations and Numerical Integration. (L3)
- Analyse the concepts of probability and their applications. (L4)
- Apply discrete and continuous probability distributions in practical problems. (L3)
- Analyse the statistical inferential methods based on small and large sampling tests. (L4)

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(CS20APC401) OBJECT ORIENTED PROGRAMMING THROUGH JAVA

(CSE, CSM&IT)

Course Objectives:

- To understand object-oriented concepts and problem-solving techniques
- To obtain knowledge about the principles of inheritance and polymorphism
- To implement the concept of packages, interfaces, exception handling and concurrency mechanism.
- To design the GUIs using applets and swing controls.

UNIT - I

Introduction to OOP: OOP principles, Java Buzzwords, Implementing Java program, JVM, Data Types, Variables, Type conversions and Casting, Operators, Control statements, Arrays. Classes, Objects, Methods, Constructors, this keyword, static keyword, Overloading Methods and Constructors, Argument passing, Exploring String class.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the syntax, semantics and features of Java Programming Language (L1).
- Learn object-oriented features and understanding type conversion and casting (L2).
- Understand different types of string handling functions and its usage (L1).

UNIT – II

Inheritance: Basics, Using Super, Creating Multilevel hierarchy, Method overriding, Dynamic Method Dispatch, Using Abstract classes, Using final with inheritance

Interfaces: Definition, Implementing Interfaces, Extending Interfaces, Nested Interfaces, Applying Interfaces, Variables in Interfaces.

Packages: Basics, finding packages and CLASSPATH, Access Protection, Importing packages.

Learning Outcomes:

At the end of this unit, the student will be able to

- Implement types of Inheritance and developing new classes based on existing classes(L3)
- Demonstrate features of interfaces to implement multiple inheritances (L2).
- Distinguish between system packages and user defined packages (L2).

UNIT – III

Exception handling - Fundamentals, Exception types, uncaught exceptions, using try and catch, Multiple catch clauses, nested try statements, throw, throws and finally, built-in exceptions, creating own exception sub classes.

I/O and Other Topics: – I/O basics, Reading Console input, Writing console Output, The PrintWriter class, Reading and writing files, Automatically closing a file, enumerations, type wrappers.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn what exceptions are and how they are handled (L1).
- Learn when to use exception handling and how to create user defined exceptions(L3)
- Learn the difference between various files and streams (L1).

UNIT - IV

Multithreading: The Java thread model, Creating threads, Thread priorities, Synchronizing threads, Inter thread communication.

The Collections Framework (java.util): Collections overview, Collection Interfaces, The Collection classes- Array List, Linked List, Hash Set, Hash table, Properties, Stack, Vector, String Tokenizer, Date, Calendar, Random, Scanner.

Applets- Definition, Life Cycle and Execution.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand concurrency, parallelism and multithreading(L1).
- Learn the importance of collections and use prebuilt generic data structures from Framework (L1).
- Develop applets for web applications(L5)

UNIT – V

Event Handling-Delegation Event Model, Event Sources, Event Classes, Event Listener Interfaces, Handling Mouse and Keyboard Events, Adapter classes.

AWT AND Swings: AWT: AWT Hierarchy, AWT controls, Layout Managers: FlowLayout, BorderLayout, GridLayout, CardLayout, and Limitations of AWT. SWINGS: JFrame, JPanel, JComponent- JLabel and ImageIcon, JTextField, JTabbedPane , Swing Buttons, JScrollPane, JComboBox, JTable.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the GUI programming (L1).

Course Outcomes:

After completion of the course the student will be able

- To solve real world problems using OOP techniques (L3).
- To apply code reusability through inheritance, packages and interfaces(L3)
- To solve problems using java collection framework and I/O classes (L3).
- To develop applications by using parallel streams for better performance (L4).
- To build GUIs and handle events generated by user interactions (L4).

Text Books:

1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill Education (India) Pvt. Ltd.
2. Java How to Program, 10th Edition, Paul Dietel, Harvey Dietel, Pearson Education.

Reference Books:

1. T. Budd "Understanding Object-Oriented Programming with Java", updated edition, Pearson Education.
2. Cay S. Horstmann "Core Java Volume – 1 Fundamentals", Pearson Education.
3. Sagayaraj, Dennis, Karthik and Gajalakshmi "Java Programming for core and advanced learners, University Press.
4. Y. Daniel Liang, "Introduction to Java programming", Pearson Education.
5. P. Radha Krishna "Object Oriented Programming through Java", University Press.
6. S. Malhotra, S. Chudhary, "Programming in Java", 2nd edition, Oxford Univ. Press.
7. R.A. Johnson, "Java Programming and Object-oriented Application Development", Cengage Learning.

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(CS20APC301) COMPUTER ORGANIZATION AND ARCHITECTURE

(CSE)

Course objectives:

- To learn the fundamentals of computer organization and its relevance to classical and modern problems of computer design
- To understand the structure and behavior of various functional modules of a computer.
- To learn the techniques that computers use to communicate with I/O devices
- To acquire the concept of pipelining and exploitation of processing speed.
- To learn the basic characteristics of multiprocessors

UNIT - I

Digital Computers: Introduction, Block diagram of Digital Computer, Definition of Computer Organization

Basic Structure of Computer: Computer Types, Functional Units, Basic operational Concepts, Bus Structure, Software, Performance, Multiprocessors and Multicomputer.

Machine Instructions and Programs: Numbers, Arithmetic Operations and Programs, Instructions and Instruction Sequencing, Addressing Modes, Basic Input/output Operations, Stacks and Queues, Subroutines, Additional Instructions.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the various blocks & the definition of Computer Organization (L1)
- Identify the basic functional units and different ways of interconnecting to form a computer system (L1)
- Illustrate various addressing modes for accessing register and memory operands (L2)
- Describe the instruction sequencing and various types of instructions (L3)

UNIT- II

Arithmetic: Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed-operand Multiplication, Fast Multiplication, Integer Division, Floating-Point Numbers and Operations.

Basic Processing Unit: Fundamental Concepts, Execution of a Complete Instruction,

Multiple- Bus Organization, Hardwired Control and Multi programmed Control.

Learning Outcomes:

At the end of this unit, the student will be able to

- Outline the arithmetic operations on signed numbers (L1)
- Describe the operations performed on floating point numbers (L1)
- Distinguish between hardwired and micro programmed control units. (L2)

UNIT- III

The Memory System: Basic Concepts, Semiconductor RAM Memories, Read-Only Memories, Speed, Size and Cost, Cache Memories, Performance Considerations, Virtual Memories, Memory Management Requirements, Secondary Storage.

Learning Outcomes:

At the end of this unit, the student will be able to

- Recognize the various types of memories (L2)
- Analyze the performance of cache memory (L4)
- Apply effective memory management strategies (L3)

UNIT - IV

Input/output Organization: Accessing I/O Devices, Interrupts, Processor Examples, Direct Memory Access, Modes of Transfer, Buses, Interface Circuits, Standard I/O Interfaces.

Learning Outcomes:

At the end of this unit, the student will be able to

- Examine the basics of I/O data transfer synchronization (L5)
- Analyze the interrupt handling mechanisms of various processors (L4)
- Describe various techniques for I/O data transfer methods (L1)

UNIT - V

Pipelining: Basic Concepts, Data Hazards, Instruction Hazards, Influence on Instruction Sets.

Large Computer Systems: Forms of Parallel Processing, Array Processors, the Structure of General-Purpose multiprocessors, Interconnection Networks.

Learning Outcomes:

At the end of this unit, the student will be able to

- Investigate the use of pipelining and multiple functional units in the design of high-

Performance processors (L4)

- Design and analyze a high-performance processor (L4)
- Describe the interconnection networks for multiprocessors (L1)

Course Outcomes:

At end of the course the student will be able to

- Understand the computer organization concepts related to design of modern processors, memories and I/Os (L2)
- Identify the hardware requirements for cache memory and virtual memory (L2)
- Understand the importance and tradeoffs of different types of memories (L2)
- Design algorithms to exploit pipelining and multiprocessors (L4)
- Identify pipeline hazards and possible solutions to those hazards (L2)

TEXT BOOKS:

1. M.Morris Mano, "Computer System Architecture", 3rd Edition, Pearson Education
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, "Computer Organization", 5th Edition, McGraw Hill Education, 2013.

REFERENCE BOOKS:

1. Themes and Variations, Alan Clements, "Computer Organization and Architecture", CENGAGE Learning.
2. Smruti Ranjan Sarangi, "Computer Organization and Architecture", McGraw Hill Education.
3. John P.Hayes, "Computer Architecture and Organization", McGraw Hill Education

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(AM20APC301) DESIGN AND ANALYSIS OF ALGORITHMS
(CSE, CSM& IT)

Course Objectives:

- Demonstrate the importance of the complexity of a given algorithm.
- Illustrate various algorithm design techniques.
- Make use of data structures and/or algorithmic design techniques in solving new problems.
- Explain the advanced algorithm design and analysis techniques.
- Identify and understand basic computability concepts and the complexity classes P, NP, and NP-Complete.

UNIT I

Introduction: What is an Algorithm, Algorithm specification, Performance analysis.

Divide and Conquer: General method, Binary Search, Finding the maximum and minimum, Merge sort, Quick Sort, Selection sort, Strassen's matrix multiplication.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyze the complexity of Algorithms. (L4)
- Identify with mathematical formulation, complexity analysis and methodologies to solve recurrence relations for algorithms. (L3)
- Analyze different scenarios for running time of algorithms using asymptotic notations and Design using Recursion. (L4)
- Apply divide and conquer strategy for design of various algorithms. (L3)
- Compare complexities of Merge sort, Quick sort and Selection sort techniques. (L2)

UNIT II

Greedy Method: General method, Knapsack problem, Job Scheduling with Deadlines, Minimum cost Spanning Trees, Optimal storage on tapes, Single-source shortest paths. **Dynamic programming:** General Method, Multistage graphs, All-pairs shortest paths, Optimal binary search trees, 0/1 knapsack, The traveling sales person problem.

Learning Outcomes:

At the end of this unit, the student will be able to

- Decide and apply algorithmic strategies to solve given problem. (L5)

- Develop algorithms for well known problems using greedy methods. (L3)
- Define Principle of optimality with examples. (L1)
- Contrast Greedy and Dynamic programming paradigms. (L2)
- Apply dynamic-programming approach for designing graph and matrix based algorithms. (L3)

UNIT III

Basic Traversal and Search Techniques: Techniques for binary trees, Techniques for Graphs,

Connected components and Spanning trees, Bi-connected components and DFS

Back tracking: General Method, 8-queens' problem, Sum of subsets problem, Graph coloring and Hamiltonian cycles, Knapsack Problem.

Learning Outcomes:

At the end of this unit, the student will be able to

- Define solution space tree. (L1)
- Illustrate graph search strategies: BFS, DFS and D-Search. (L2)
- Demonstrate the recursive and iterative backtracking algorithms. (L2)
- Apply backtracking strategy to solve N – queens' problem, Sum of subsets problem and Knapsack problem. (L3)

UNIT IV

Branch and Bound: The method, Travelling salesperson, 0/1 Knapsack problem, Efficiency Considerations.

String Matching: The naive string-matching algorithm, The Rabin-Karp algorithm, String matching with finite automata, The Knuth-Morris-Pratt algorithm.

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Learning Outcomes:

At the end of this unit, the student will be able to

- Find optimal solution by applying various methods. (L1)
- Analyze the advantage of bounding functions in Branch and Bound technique to solve the Travelling Salesperson problem. (L4)
- Apply the knowledge to find patterns in the given text. (L3)

UNIT V

NP – Hard and NP – Complete Problems: NP Hardness, NP Completeness, Consequences of being in P, Cook's Theorem, Reduction Source Problems, Reductions: Reductions for some known problems

Learning Outcomes:

At the end of this unit, the student will be able to

- Define P, NP, NP –hard and NP-complete classes of problems.(L1)
- Prove that a certain problem is NP-Complete.(L5)
- Apply algorithm design principles to derive solutions for real life problems and comment on complexity of solution.(L3)

Course Outcomes:

- Analyze the complexity of the algorithms
- Make use of various design techniques like divide and conquer, greedy, dynamic programming, backtracking, branch and bound to solve the problems.
- Identify and analyze criteria and specifications appropriate to new problems, and choose the appropriate algorithmic design technique for their solution.
- Able to prove that a certain problem is NP-Complete.

Text Books:

1. Fundamentals of Computer Algorithms II, Ellis Horowitz, S. Satraj Sahani and Rajasekhran, 2nd edition, University Press. 2014,
2. Introduction to Algorithms, Third Edition, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein.

Reference Books:

1. Introduction to Algorithms II, second edition, T.H.Cormen, C.E.Leiserson, R.L.Rivest and C.Stein, PHI Pvt. Ltd./ Pearson Education.
2. Introduction to Design and Analysis of Algorithms A strategic approach II, R.C.T.Lee, S.S.Tseng, R.C.Chang and T.Tsai, Mc Graw Hill.
3. Data structures and Algorithm Analysis in C++ II, Allen Weiss, Second edition.

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(BA20AHS301) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course Objectives:

The objective of this course is to equip the student with the basic inputs of Managerial Economics and Economic Environment of business and to impart analytical skills in helping them take sound financial decisions for achieving higher organizational productivity.

UNIT I

INTRODUCTION TO MANAGERIAL ECONOMICS

Managerial Economics – Definition- Nature- Scope - Contemporary importance of Managerial Economics - Relationship of Managerial Economics with Financial Accounting and Management. Demand Analysis: Concept of Demand-Demand Function - Law of Demand - Elasticity of Demand- Significance - Types of Elasticity - Measurement of elasticity of demand - Demand Forecasting- factors governing demand forecasting- methods of demand forecasting.

UNIT II

THEORY OF PRODUCTION AND COST ANALYSIS

Production Function- Least cost combination- Short-run and Long- run production function- Isoquants and Isocosts, MRTS - Cobb-Douglas production function - Laws of returns - Internal and External economies of scale - Cost Analysis: Cost concepts and cost behavior- Break-Even Analysis (BEA) - Determination of Break Even Point (Simple Problems)- Managerial significance and limitations of Break- Even Point.

UNIT III

INTRODUCTION TO MARKETS AND NEW ECONOMIC ENVIRONMENT

Market structures: Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition- Monopoly-Monopolistic Competition-Oligopoly-Price-Output Determination - Pricing Methods and Strategies-Forms of Business Organizations- Sole Proprietorship- Partnership – Joint Stock Companies - Public Sector Enterprises – New Economic Environment- Economic Liberalization – Privatization - Globalization. GST and Demonetization.

UNIT IV

INTRODUCTION TO FINANCIAL ACCOUNTING AND ANALYSIS

Financial Accounting – Concept - Emerging need and Importance - Double-Entry Book Keeping- Journal- Ledger – Trial Balance - Financial Statements - Trading Account – Profit & Loss Account – Balance Sheet (with simple adjustments). Financial Analysis – Ratios – Liquidity, Leverage, Profitability, and Activity Ratios (simple problems).

UNIT V

CAPITAL AND CAPITAL BUDGETING

Concept of Capital - Over and Undercapitalization – Remedial Measures - Sources of Short term and Long term Capital - Estimating Working Capital Requirements – Capital Budgeting – Features of Capital Budgeting Proposals – Methods and Evaluation of Capital Budgeting Projects – Pay Back Method – Accounting Rate of Return (ARR) – Net Present Value (NPV) – Internal Rate Return (IRR) Method (simple problems)

TEXT BOOKS:

1. Managerial Economics 3/e, Ahuja H.L, S.Chand, 2013.
2. Financial Management, I.M.Pandey, Vikas Publications, 2013.

REFERENCES

1. Managerial Economics and Financial Analysis, 1/e, Aryasri, TMH, 2013.
2. Managerial Economics and Financial Analysis, S.A. Siddiqui and A.S. Siddiqui, New Age International, 2013.
3. Accounting and Financial Management, T.S.Reddy & Y. Hariprasad Reddy, Margham

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(BA20AHS302) BUSINESS ENVIRONMENT

Objective: To provide the student with a background of various environment factors that have major repercussions on business and sharpen their mind to watch and update the changes that occur constantly in this sphere.

UNIT-I

An Overview of Business Environment:-

Type of Environment- internal, external, micro and macro environment- Competitive structure of industries, environmental analysis and strategic management- Managing diversity- Scope of business, characteristics of business- Objectives and the uses of study- Process and limitations of environmental analysis.

UNIT-II

Economic Environment:

Nature of Economic Environment- Economic factors-growth strategy, basic economic system, economic planning, Economic policies- new industrial policy, FEMA, monetary and fiscal policies- Consumer Protection Act and Competition Law. Liberalization, Privatization and Globalization of Indian Economy,- Trends and Issues.

UNIT-III

Socio-Cultural Environment:-

Nature and impact of culture on business, culture and globalization, social responsibilities of business, social audit, business ethics and corporate governance, Demographic environment population size, migration and ethnic aspects, birth rate, death rate and age structure

UNIT-IV

Political Environment:-

Functions of state- economic roles of government- government and legal environment- The constitutional environment, rationale and extent of state intervention.

UNIT-V

Natural and Technological Environment:

Innovation, technological leadership and followership, sources of technological dynamics, impact of technology on globalization, transfer of technology, time lags in technology introduction, Status of technology in India; Management of technology; Features and Impact of technology.

Textbooks:

- K.Aswathappa (2017), Essentials of Business Environment, 13th Edition, Himalaya publishers.
- N.D.Kapoor (2019), Elements of Mercantile Law, 38th Edition, Sultan Chand & Sons.

References:

- Indian Economy, Dutt and Sundaram, S. Chand, New Delhi.
- Business Environment – Text and Cases, Justin Paul, TMH.
- Indian Economy- Misra and Puri, Himalaya.
- Business Environment, Suresh Bedi, Excel.
- Rangarajan, C.A.; Perspective in Economics, S.Chand & Sons, New Delhi
- Cherunilam, Francis; Business Environment - Text and Cases, Himalaya Publishing House.
- Aswathappa, K.; Essentials of Business Environment, Himalaya Publishing House, New Delhi.

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(BA20AHS303) ORGANIZATIONAL BEHAVIOUR

Objective: To provide the student with a background of various environment factors that have major repercussions on business and sharpen their mind to watch and update the changes that occur constantly in this sphere.

UNIT-I

Introduction to Organization Behaviour:-

Introduction to organization, organization and managers, manager's roles and skills, behaviour at work, introduction to organization behaviour, major behavioral science disciplines contributing to OB, challenges and opportunities managers have in applying OB concepts, OB model (including motivation models) and levels of OB model

UNIT-II

Individual behaviour:

Introduction to individual behaviour, values, attitudes, job satisfaction, personality, perception and individual decision making, learning, motivation at work, managing emotions and stress (Meaning-Definition Stress and job performance relationship Approaches to stress management (Coping with stress)

UNIT-III

Interpersonal behaviour:-

Interpersonal Behaviour, Johari Window, Transactional Analysis- ego states, types of transactions, life positions, applications of T.A., managerial interpersonal styles..

UNIT-IV

Group behaviour:-

Introduction to group behaviour, foundations of group behaviour, concept of group and group dynamics, types of groups, formal and informal groups, theories of group formation, group norms, group cohesiveness, group decision making, inter group behaviour, concept of team vs. group, types of teams, building and managing effective teams, leadership theories and styles, power and politics, conflict and negotiation.

UNIT-V

Organisational behaviour:

Foundations of organization structure, organization design, organization culture, organization change, managing across cultures, human resource management policies and practices, diversity atwork.

Textbooks:

- Pardeshi, P. C., Organizational Behaviour & Principles & Practice Of Management, Nirali publication

References:

- Robbins, S. P/ Judge, T. A/ Sanghi, S., Organizational Behavior, Pearson Publication
- Aswathappa, K., Organisational Behaviour– Text and Problem, Himalaya Publication

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(CS20APC402) OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB

(CSE, CSM&IT)

Course Objectives

- To introduce the concepts of Java.
- To Practice object-oriented programs and build java applications.
- To implement java programs for establishing interfaces.
- To implement sample programs for developing reusable software components.
- To establish database connectivity in java and implement GUI applications.

List of Experiments

Week 1:

- Read the marks of a student in 4 subjects and find grade.
- Program to check a number is Armstrong or not.
- Program to display prime numbers from m to n.

Week 2:

- Define a class Rectangle with data member's length and width. Write methods to find perimeter and area of a rectangle. (class and object)
- Create a class Account with data members name, accno and balance. Use appropriate methods to perform various operations like deposit, withdraw, balance Check.
- Create a class Student with appropriate data and methods using constructor.

Week 3:

- Create overloaded methods to find volume of Sphere, Cylinder & Cone.
- To sort given list of elements in ascending order.
- Read two matrices of size $m \times n$, $p \times q$, perform the multiplication of matrices.

Week 4:

- Check a string is palindrome or not.
- Given a string and an int n, return a string made of n repetitions of the last n characters of the string.
 - You may assume that n is between 0 and the length of the string, inclusive. Write a Java program.

repeatEnd("Hello",3)→"llo llo llo"

repeatEnd("Hello",2)→"llo"

repeatEnd("Hello", 1) → "o"

- Read array of City names and Sort in dictionary order.(Ascending order).

Week 5:

- Write Java program on use of inheritance, preventing inheritance using final, abstract classes.
- Write Java program on dynamic binding, differentiating method overloading and overriding

Week 6:

- Write a Java program to implement user defined exception handling.
- Write java program that inputs 5 numbers, each between 10 and 100 inclusive. As each number is read display it only if it's not a duplicate of any number already read. Display the complete set of unique values input after the user enters each new value.
- Write a Java program that creates a user interface to perform integer division. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 and Num2 were not integers, the program would throw a Number Format Exception. If Num2 were zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box.

Week 7:

- Implement the concept of producer consumer problem using thread synchronization.
- Write a Java program that creates three threads. First thread displays —Good Morningll every one second, the second thread displays —Hello ll every two seconds and the third thread displays —Welcomell every three seconds.

Week 8:

- Use an Array List to manage Employee objects for insertion, display and remove.
- Use HashSet methods to perform operations on collection of data.

Week 9:

- Implement Mouse Listener and Mouse Motion Listener to handle various mouse events.
- Implement Key Listener to handle key events.

- Create a Simple login window to validate a user with name and password.

Week 10:

- Create a JTable to display various fields of Student data like RollNo, Name, Branch ,Year, Percentage etc.
- Write a java program to Create and Read data using JDBC

At the end of the course, students will be able to

- Recognize the Java programming environment (L3).
- Select appropriate programming construct to solve a problem (L2).
- Develop efficient programs using multithreading (L5).
- Design reliable programs using Java exception handling features (L3).
- Extend the programming functionality supported by Java (L4).

Text Books:

1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill Education (India) Pvt. Ltd.
2. Java How to Program, 10th Edition, Paul Dietel, Harvey Dietel, Pearson Education.

Reference Books:

1. T. Budd "Understanding Object-Oriented Programming with Java", updated edition, Pearson Education.
2. Cay S. Horstmann "Core Java Volume – 1 Fundamentals", Pearson Education.
3. Sagayaraj, Dennis, Karthik and Gajalakshmi "Java Programming for core and advanced learners, University Press.
3. Y. Daniel Liang, "Introduction to Java programming", Pearson Education.
4. P. Radha Krishna "Object Oriented Programming through Java", University Press.
6. S. Malhotra, S. Chudhary, "Programming in Java", 2nd edition, Oxford Univ. Press.
7. R.A. Johnson, "Java Programming and Object-oriented Application Development", Cengage Learning.

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(CS20APC302) Computer Organization and Architecture Lab

(CSE)

Course Objectives:

- To understand the various components of a Computer.
- To implement binary operations.
- To understand the working of booth's multiplication.
- To understand the basics of logic gates.

List of Experiments :

1. Study of peripherals, components of a Computer System.
2. Write a C Program for Binary Addition.
3. Write a C Program for Binary Multiplication.
4. Write a C Program for Booth's Multiplication algorithm.
5. Write a C Program for Restoring Division.
6. Write a C Program for Non Restoring Division Algorithm.
7. Design 8-bit ALU.
8. Implementing HALF ADDER, FULL ADDER using basic logic gates.
9. Write a C Program to perform addition & subtraction on floating point number.
10. To implement operations on BCD adder and subtractor.

Course outcomes:

- Understand various components of computer system.
- Design adder circuit using basic gates.
- Analyze arithmetic operation on binary.
- Analyze the behavior of logic gates

Reference Books:

1. M.Morris Mano, "Computer System Architecture", 3rd Edition, Pearson Education.
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, "Computer Organization", 5th Edition, McGraw Hill Education, 2013.

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(AM20APC302) ALGORITHMS LAB

(CSE, CSM&IT)

Course objectives

- Analyze a problem and design the solution for the problem.
- Illustrate the method of finding the complexity of algorithms
- Infer the advanced algorithm design and analysis techniques.
- Identify and apply the suitable algorithm for the given real world problem.

Week-1 QUICK SORT

Sort a given set of elements using the quick sort method and determine the time required to sort the elements. Repeat the experiment for different values of n , the number of elements in the list to be sorted and plot a graph of the time taken versus n . The elements can be read from a file or can be generated using the random number generator.

Week-2 MERGESORT

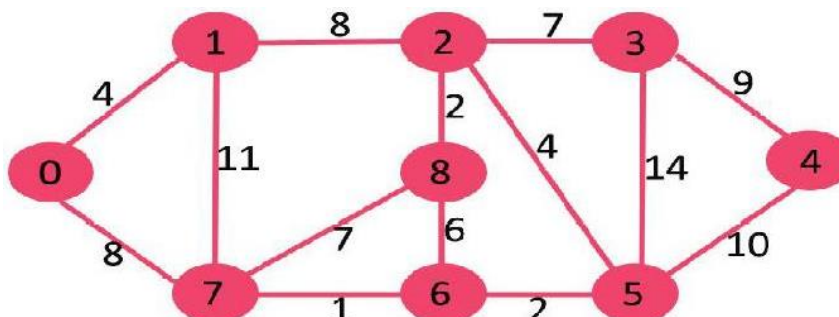
Implement merge sort algorithm to sort a given set of elements and determine the time required to sort the elements. Repeat the experiment for different values of n , the number of elements in the list to be sorted and plot a graph of the time taken versus n . The elements can be read from a file or can be generated using the random number generator.

Week-3 KNAPSACK PROBLEM

Implement 0/1 Knapsack problem using Dynamic Programming.

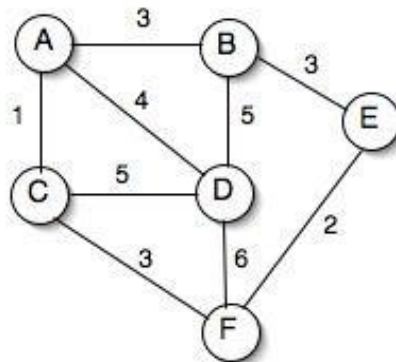
Week-4 SHORTEST PATHS ALGORITHM

From a given vertex in a weighted connected graph, find shortest paths from 0 to



other vertices using Dijkstra's algorithm.

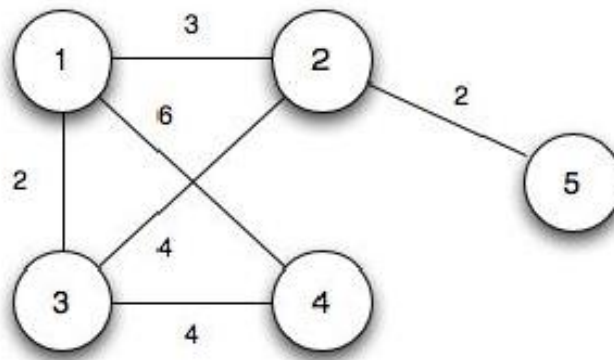
Week-5 MINIMUM COST SPANNINGTREE



Find Minimum Cost Spanning Tree of a given undirected graph using Kruskal's algorithm.

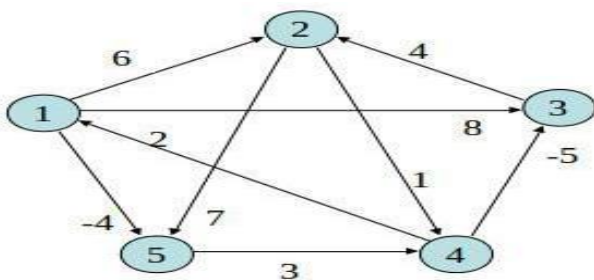
Week-6 MINIMUM COST SPANNINGTREE

Find Minimum Cost Spanning Tree of a given undirected graph using Prim's algorithm.



Week-7 ALL PAIRS SHORTESTPATHS

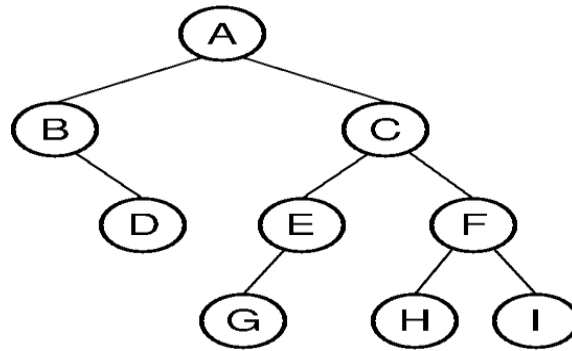
Implement All-Pairs Shortest Paths Problem using Floyd's algorithm.



	1	2	3	4	5
1	0	6	8	∞	-4
2	∞	0	∞	1	7
3	∞	4	0	∞	∞
4	2	∞	-5	0	∞
5	∞	∞	∞	3	0

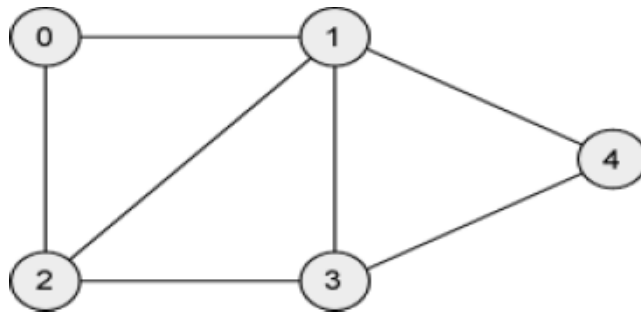
Week-8 TREETRAVERSALS

Perform various tree traversal for a given tree

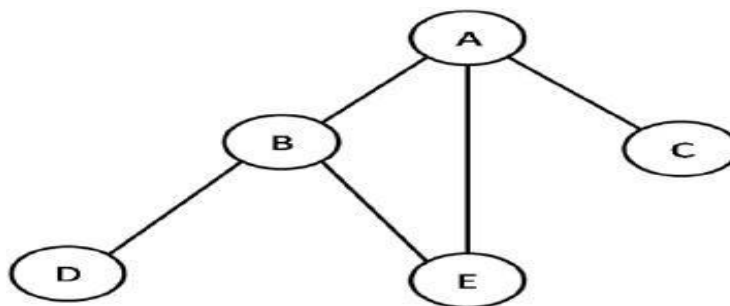


Week-9 GRAPHTRAVERSALS

a. Print all the nodes reachable from a given starting node in a digraph using BFS method.



b. Check whether a given graph is connected or not using DFS method.



Week-10 SUM OF SUB SETSPROBLEM

Find a subset of a given set $S = \{s_1, s_2, \dots, s_n\}$ of n positive integers whose sum is equal to a given positive integer d . For example, if $S = \{1, 2, 5, 6, 8\}$ and $d = 9$ there are two solutions $\{1, 2, 6\}$ and $\{1, 8\}$. A suitable message is to be displayed if

the given problem instance doesn't have a solution.

Week-11 TRAVELLING SALES PERSON PROBLEM

Implement any scheme to find the optimal solution for the Traveling Sales Person problem and then solve the same problem instance using any approximation algorithm and determine the error in the approximation.

Week-12 N QUEENS PROBLEM

Implement N Queen's problem using Back Tracking.

Week-13 STRING MATCHING

- a. Implement naïve string matching algorithm.
- b. Implement Rabin-karp string matching algorithm.
- c. Implement knuth-Morris-Pratt algorithm.
- d. Implement finite automata string matching algorithm.

Course outcomes

- Apply the Divide and Conquer strategy to solve searching, sorting problems.
- Analyze the efficiency of Greedy and Dynamic Programming design techniques to solve the optimization problems.
- Relate Backtracking technique for solving constraint satisfaction problems.

Reference Books:

- Levitin A —Introduction to the Design and Analysis of Algorithms, Pearson Education, 2008.
- Goodrich, M.T. R Tomassia —Algorithm Design foundations Analysis and Internet Examples, John Wiley and Sons, 2006.

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B. Tech IV Sem

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(IT20ASC401) EXPLORATORY DATA ANALYSIS WITH R

(Skill Oriented Course)(CSE,CSM&IT)

Course Objectives:

- Understand the R Programming Language.
- Exposure on Solving of data science problems.
- Understand The Regression Model

List of Experiments:

1: INTRODUCTION TO COMPUTING

- a. Installation of R
- b. The basics of R syntax, workspace
- c. Matrices and lists
- d. Subsetting
- e. System-defined functions; the help system
- f. Errors and warnings; coherence of the workspace

2: GETTING USED TO R: DESCRIBING DATA

- a. Viewing and manipulating Data
- b. Plotting data
- c. Reading the data from console, file (.csv) local disk and web
- d. Working with larger datasets

3: SHAPE OF DATA AND DESCRIBING RELATIONSHIPS

- a. Tables, charts and plots.
- b. Univariate data, measures of central tendency, frequency distributions, variation, and Shape.
- c. Multivariate data, relationships between a categorical and a continuous variable,
- d. Relationship between two continuous variables – covariance, correlation coefficients, comparing multiple correlations.
- e. Visualization methods – categorical and continuous variables, two categorical variables, two continuous variables.

4: PROBABILITY DISTRIBUTIONS

- a. Sampling from distributions – Binomial distribution, normal distribution
- b. tTest, zTest, Chi Square test
- c. Density functions
- d. Data Visualization using ggplot – Box plot, histograms, scatter plotter, line chart, bar chart, heat maps.

5: EXPLORATORY DATA ANALYSIS

- a. Demonstrate the range, summary, mean, variance, median, standard deviation, histogram, box plot, scatter plot using population dataset.

6: TESTING HYPOTHESES

- a. Null hypothesis significance testing
- b. Testing the mean of one sample
- c. Testing two means

7: PREDICTING CONTINUOUS VARIABLES

- a. Linear models
- b. Simple linear regression
- c. Multiple regression
- d. Bias-variance trade-off – cross-validation

8: CORRELATION

- a. How to calculate the correlation between two variables.
- b. How to make scatter plots.
- c. Use the scatter plot to investigate the relationship between two variables

9: TESTS OF HYPOTHESES

- a. Perform tests of hypotheses about the mean when the variance is known.
- b. Compute the p-value.
- c. Explore the connection between the critical region, the test statistic, and the p-value

10: ESTIMATING A LINEAR RELATIONSHIP

Demonstration on a Statistical Model for a Linear Relationship

- a. Least Squares Estimates
- b. The R Function lm
- c. Scrutinizing the Residuals

Course Outcomes:

- Install and use R for simple programming tasks (L3).
- Extract data from files and other sources and perform various data manipulation tasks on them (L3).
- Explore statistical functions in R (L4).
- Use R Graphics and Tables to visualize results of various statistical operations on data (L3).
- Apply the knowledge of R gained to data Analytics for real-life applications (L3).

Reference Books:

1. SandipRakshit, "Statistics with R Programming", McGraw Hill Education, 2018.
2. Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, "AN Introduction to Statistical Learning: with Applications in R", Springer Texts in Statistics, 2017.
3. Joseph Schmuller, "Statistical Analysis with R for Dummies", Wiley, 2017.
4. K G Srinivasa, G M Siddesh, ChetanShetty, Sowmya B J, "Statistical Programming in R", Oxford Higher Education, 2017

Web References:

- <http://www.r-bloggers.com/how-to-perform-a-logistic-regression-in-r/>
- <http://www.ats.ucla.edu/stat/r/dae/rreg.htm>
- <http://www.coastal.edu/kingw/statistics/R-tutorials/logistic.html>
- <http://www.ats.ucla.edu/stat/r/data/binary.csv>

SOFTWARE REQUIREMENTS:

SOFTWARE: R Software , R Studio Software

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(CS20AMC401)DESIGN THINKING FOR INNOVATION (Mandatory Course)

(CSE,CSM&IT)

Course Objectives:

- To familiarize product design process
- To introduce the basics of design thinking
- To bring awareness on idea generation
- To familiarize the role of design thinking in services design

Unit -I

Introduction to design, product development process, product planning, Innovation in product development, characteristics of successful product development.

Design Thinking: Introduction, Defining design thinking, Principles, the process.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand design and development process. (L2)
- Understand Design thinking concept and its uses. (L2)
- Learn Principles of design thinking.(L3)

Unit –II

Stages in design thinking, Benefits of Design thinking, design thinking and innovation, case studies.

Immersion: Preliminary immersion, In Depth immersion.

Learning Outcomes:

At the end of this unit, the student will be able to

- Familiarize with design thinking stages.(L2)
- Differentiate design thinking and innovation.(L3)
- Identify the problems in the immersion stage (L4)

Unit-III

Analysis and Synthesis: Insight, Affinity diagram, Conceptual Map, Guiding criteria, Empathy map.

Idea generation: Introduction, techniques, Conventional methods, Brainstorming, Gallery method, Delphi method, Synectics, etc, Select ideas from ideation methods, case studies.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyze possibilities of the problem through analysis and synthesis process.(L4)
- Understand different analysis and synthesis techniques.(L2)
- Apply different ideation techniques for designing solutions. (L3)

Unit-IV

Prototyping: Paper prototyping, Volumetric model, Staging, Storyboard, Service prototyping. Design Thinking in Information Technology, Design thinking in Business process model, Design thinking for agile software development, TILES toolkit, Cloud implementation.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand different prototyping techniques.(L2)
- Know the role of design thinking in information technology field.(L2)
- To distinguish traditional software development model and agile model.(L3)

Unit V

Design thinking for service design: How to design a service, Principles of service design, Benefits of service design, Service blueprint, Design strategy, organization, principles for information design, principles of technology for service design.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand different prototyping techniques.(L2)
- Know the role of design thinking in information technology field.(L2)
- To distinguish traditional software development model and agile model.(L3)

Course Outcomes:

Student will be able to

- Generate and develop different design ideas.(L4)
- Appreciate the innovation and benefits of design thinking.(L3)
- Experience the design thinking process in IT and agile software development.(L2)
- Understand design techniques related to variety of software services.(L2)

Reference Books:

- Christoph Meinel and Larry Leifer, "Design Thinking", Springer, 2011
- Aders Riise Maehlum, "Extending the TILES Toolkit" from Ideation to Prototyping
- Maurício Vianna, Ysmar Vianna, Brenda Lucena and Beatriz Russo," Design thinking : Business innovation", MJV Technologies and innovation press, 2011.
- Tim Brown, "Change by Design: Design Thinking Transforms organizations and inspires innovations", Harper Collins publication, 2009
- <http://www.algarytm.com/it-executives-guide-to-design-thinking:e-book>.
- Marc stickdorn and Jacob Schneider, "This is Service Design Thinking", Wiely, 2011
- Pahl and Vietz, "Engineering Design", Springer, 2007

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B. Tech IV Sem

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(MA20AMC401) ENGINEERING MATHEMATICS

(Common to All Branches of LE Students)

Course Objectives:

- This course will illuminate the students in the concepts of calculus and linear algebra.
- To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various realworld problems and their applications.

UNIT -1

Matrices

Solving system of homogeneous and non homogeneous linear equations. Eigen values and Eigenvectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem,

Learning Outcomes:

At the end of this unit, the student will be able to

- Solving systems of linear equations, using technology to facilitate row reduction determine the rank, eigen values and eigenvectors (L3).
- Identify special properties of a matrix, such as positive definite, etc., and use this information to facilitate the calculation of matrix characteristics (L3).

UNIT -2

Mean Value Theorems

Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof) related problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Translate the given function as series of Taylor's and Maclaurin's with remainders (L3)

Analyze the behaviour of functions by using mean value theorems (L3)

UNIT 3

Linear differential equations of higher order

Definitions, complete solution, operator D , rules for finding complimentary function, inverse operator, rules for finding particular integral, method of variation of parameters, Applications to L-C-R Circuit problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify the essential characteristics of linear differential equations with constant coefficients (L3)
- Solve the linear differential equations with constant coefficients by appropriate method (L3)

UNIT 4

Multivariable Calculus

Partial derivatives, total derivatives, chain rule, change of variables, Jacobian, maxima and minima of functions of two variables, method of Lagrange multipliers.

Learning Outcomes:

At the end of this unit, the student will be able to

- Find partial derivatives numerically and symbolically and use them to analyze and interpret the way a function varies. (L3)
- Acquire the Knowledge maxima and minima of functions of several variable (L1)
- Utilize Jacobian of a coordinate transformation to deal with the problems in change of variables (L3)

UNIT -5

Vector Calculus

Vector differentiation

Scalar and vector point functions, vector operator ∇ , ∇ applies to scalar point functions-Gradient, ∇ applied to vector point functions-Divergence, Curl and their related properties.

Vector integration

Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and applications of these theorems.

Learning Outcomes:

At the end of this unit, the student will be able to $\square$

- Find the work done in moving a particle along the path over a force field (L4)
- Evaluate the rates of fluid flow along and across curves (L4) □
- Apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals (L3)

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.

Reference Books:

1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
3. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.
4. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education
5. H. k Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand.
6. N. Bali, M. Goyal, C. Watkins, Advanced Engineering Mathematics, Infinity Science Press.

Course Outcomes:

At the end of the course, the student will be able to

- Develop the use of matrix algebra techniques that is needed by engineers for practical applications (L6)
- Utilize mean value theorems to real life problems (L3)
- Solve the differential equations related to various engineering fields (L6) □
- Apply multiple integrals to find the area and volumes for different functions. (L3)
- Estimate the work done against a field, circulation and flux using vector calculus (L6)

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B. Tech V Sem

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(CS20APC501) COMPUTER NETWORKS

Course Objectives:

- Understand the basic concepts of Computer Networks.
- Introduce the layered approach for design of computer networks
- Familiarize with the applications of Internet
- Explore the network protocols used in Internet environment
- Explain the format of headers of IP, TCP and UDP
- Elucidate the design issues for a computer network

Unit – 1:

Computer Networks and the Internet

What is the Internet ?, The Network Edge, The Network Core, Delay, Loss, and Throughput in Packet- Switched Networks, Protocol Layers and their Service Models, Networks under attack, History of Computer Networking and the Internet

Learning Outcomes:

At the end of the unit, students will be able to:

- Enumerate the hardware components of a computer network (L1)
- List the layers of a Computer Network (L1)
- Identify the performance metrics of a computer network (L3)

Unit – 2:

Application Layer

Principles of Network Applications, The web and HTTP, File transfer: FTP, Electronic mail in the internet, DNS-The Internet's Directory Service, Peer-to-Peer Applications

Learning outcomes:

At the end of the unit, students will be able to:

- Design new applications of a computer network (L6)
- Analyze the application protocols (L4)
- Extend the existing applications (L2)

Unit – 3 :

Transport Layer

Introduction and Transport-Layer Services, Multiplexing and De-multiplexing, Connectionless Transport: UDP, Principles of Reliable Data transfer, Connection-Oriented Transport: TCP, Principles of Congestion Control, TCP Congestion Control

Learning outcomes:

At the end of the unit, students will be able to:

- Design Congestion control algorithms (L6)
- Select the appropriate transport protocol for an application (L3)
- Identify the transport layer services (L3)

Unit – 4 :

The Network Layer

Introduction, Virtual Circuit and Datagram Networks, The Internet Protocol(IP): Forwarding and Addressing in the Internet, Routing Algorithms, Routing in the Internet, Broadcast and Multicast Routing

Learning outcomes:

At the end of the unit, students will be able to:

- Compare routing algorithms (L4)
- Design routing algorithms (L6)
- Extend the existing routing protocols (L2)

Unit – 5 :The Layer:

Links, Access Networks, and LANs

Introduction to the Link Layer, Error-Detection and Correction Techniques, Multiple Access Links and Protocols, Switched Local Area Networks, Link Virtualization: A Network as a Link Layer, Data Center Networking, Retrospective: A Day in the Life of a Web Page Request

Learning outcomes:

At the end of the unit, students will be able to:

- Compare medium access protocols (L4)
- Classify the computer networks (L2)
- Design a Data Centre for an organization (L6)

Course Outcomes:

Upon completion of the course, the students should be able to:

- Identify the software and hardware components of a Computer network (L3)
- Develop new routing, and congestion control algorithms (L3)
- Assess critically the existing routing protocols (L5)
- Explain the functionality of each layer of a computer network (L2)
- Choose the appropriate transport protocol based on the application requirements(L3)

Text Books:

1. James F. Kurose, Keith W. Ross, "Computer Networking: A Top-Down Approach", 6th edition, Pearson, 2019.

References:

1. Forouzan, "Datacommunications and Networking", 5th Edition, McGraw Hill Publication.
2. Andrew S.Tanenbaum, David j.wetherall, "Computer Networks", 5th Edition, PEARSON.
3. Youlu Zheng, Shakil Akthar, "Networks for Computer Scientists and Engineers", Oxford Publishers, 2016.

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B.Tech– V Sem

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(CS20APC502) FORMAL LANGUAGES AND COMPILER DESIGN

Course Objectives:

This course is designed to:

- Introduce languages, grammars, and computational models
- Ability to check Context Free Grammars
- Enable the students to use Turing machines
- Demonstrate decidability and un-decidability for NP Hard problems

UNIT – I

Formal Language And Regular Expressions

Languages, Operations On Languages, RegularExpressions, Identity Rules For Regular Expressions, Finite Automata – DFA, NFA, Conversion ofRegular Expression to NFA, NFA To DFA. Introduction to Compilers: Phases of the Compiler.

Learning Outcomes:

At the end of the unit, students will be able to:

- Distinguish DFA and NFA(L3).
- Construct DFA for an input string(L4).
- Perform minimization of Automata(L3).
- Compare Moore and Mealy Machines(L4).

UNIT – II

Syntax Analysis

Context Free Grammars, Top-Down Parsing, Recursive Descent Parsers: LL (K)Parsers. Bottom-Up Parsing: Shift Reduces Parser, LR Parsers: SLR, CLR, LALR.

Learning Outcomes:

At the end of the unit, students will be able to:

- Construct Context Free Grammars
- Construct shift reduce parsers.
- Apply top down and bottom up parsing to regular expressions.

UNIT – III

Syntax Directed Translation:

Syntax Directed Definition, Construction of Syntax Trees, L-Attributed Definitions. Intermediate Code Generation: Intermediate Languages, Translation of Assignment Statements and Boolean Expressions.

Learning Outcomes:

At the end of the unit, students will be able to:

- Construction of syntax trees (L4).
- Generating intermediate code (L5).

UNIT – IV

Type Checking

Specification of Simple Type Checker, Equivalence of Type Expressions, Type Conversions, Runtime Environments: Storage Organization, Storage Allocation Strategies, Access to Non Local Names, Parameter Passing, Symbol Table, Dynamic Storage Allocation Techniques.

Learning Outcomes:

At the end of the unit, students will be able to:

- List the dynamic storage allocation techniques (L4).
- Constructing symbol table (L4).

UNIT – V

Code Optimization

Principal Sources Of Optimization, Optimization Of Basic Blocks, Loops In Flow Graphs, Global Data Flow Analysis, Peephole Optimization.

Code Generation: Issues in Design of Code Generator, Simple Code Generator, Register Allocation and Assignment, DAG Representation of Basic Block, Generating Code from DAGs.

Learning Outcomes:

At the end of the unit, students will be able to:

- List types of Turing Machines (L4).
- Design DAG for basic blocks (L5).

Course Outcomes:

Students will be able to:

- Employ finite state machines to solve problems in computing and classify

- machines by their power to recognize languages. (L2)
- Understand the basic concept of compiler design, and its different phases
- which will be helpful to construct new tools like LEX, YACC, etc(L6)
- Ability to implement semantic rules into a parser that performs attribution
- while parsing and apply error detection and correction methods. (L3)
- Apply the code optimization techniques to improve the space and time
- complexity of programs while programming. (L3)
- Ability to design a compiler for a concise programming language. (L3)

TEXT BOOKS:

1. Compilers Principles, Techniques and Tools, Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman,
2. PEA.
3. Introduction to Automata Theory Languages & Computation, 3rd Edition, Hopcroft, Ullman, PEA.

REFERENCE BOOKS:

4. Theory of Computer Science, Automata Languages and Computation, 2nd Edition,
5. Mishra, Chandra Shekaran, PHI.
6. Elements of Compiler Design, A.Meduna, Auerbach Publications, Taylor and Francis
7. Group

Online Learning Resources:

- <https://nptel.ac.in/courses/106106049/>
- <https://nptel.ac.in/courses/106104028>

(CS20APC504)OPERATING SYSTEMS
(CSE,CSM&IT)**Course Objectives:**

- Understand basic concepts and functions of operating systems.
- Understand the processes, threads and scheduling algorithms.
- Provide good insight on various memory management techniques.
- Expose the students with different techniques of handling deadlocks.
- Explore the concept of file-system and its implementation issues.
- Implement various schemes for achieving system protection and security.
- Familiarize with the basics of Windows and Linux operating systems.

UNIT I**Operating Systems Overview**

Operating system functions, Operating system structure, operating systems Operations, protection and security, Kernel data Structures, Computing Environments, Open-Source Operating Systems.

Operating System Structure: Operating System Services, User and Operating-System Interface, system calls, Types of System Calls, system programs, operating system structure, operating system debugging, System Boot.

Processes: Process concept, process Scheduling, Operations on processes, Inter process Communication, Examples of IPC systems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify major components of operating systems and understand the types of computing environments.(L1)
- Explore several open source operating systems.(L2)
- Recognize operating system services to users, processes and other systems.(L2)
- Understand the importance, features of a process and methods of communication between processes.(L2)

UNIT II**Multithreaded Programming**

Overview, Multi-core Programming, Multithreading Models, Thread Libraries, Implicit threading, Threading Issues, Examples.

CPU Scheduling: Basic concepts, Scheduling-Criteria, Scheduling Algorithms, Thread Scheduling, Multiple-Processor Scheduling, Real-Time CPU Scheduling, Algorithm Evaluation.

Inter-process Communication: Race conditions, Critical Regions, Mutual exclusion with busy waiting, Sleep and wakeup, Semaphores, Mutexes, Monitors, Message passing, Barriers, Classical IPC Problems - Dining philosopher's problem, Readers and writers problem.

Learning Outcomes:

At the end of this unit, the student will be able to

- Improving CPU utilization through multi programming and multithreaded programming. (L3)
- Examine several classical synchronization problems.(L2)
- Understand various process scheduling algorithms.(L2)
- Understand the importance, features of a process and methods of communication between processes.(L2)

UNIT III

Memory Management

Swapping, contiguous memory allocation, segmentation, paging, structure of the page table.

Virtual memory: demand paging, page-replacement, Allocation of frames, Thrashing, Memory-Mapped Files, Allocating Kernel Memory, Examples.

Learning Outcomes:

At the end of this unit, the student will be able to

- Examine the various techniques of allocating memory to processes. (L2)
- Summarize how segmentation and paging works in contemporary computer systems. (L2)
- Understanding the benefits of virtual memory systems. (L2)

UNIT IV

Deadlocks: System Model, deadlock characterization, Ostrich algorithm, Methods of handling Deadlocks, Deadlock prevention, Detection and Avoidance, Recovery from deadlock.

File Systems: Files, Directories, File system implementation, management and optimization, Directory Implementation, Allocation Methods, Free-Space management.

Secondary-Storage Structure: Overview of disk structure, and attachment, Disk scheduling, RAID structure, Stable storage implementation.

Learning Outcomes:

At the end of this unit, the student will be able to

- Investigate methods for preventing/avoiding deadlocks.(L3)
- Examine file systems and its interface in various operating systems.(L2)
- Analyze different disk scheduling algorithms.(L4)
- Understand the Stable-storage implementation and Free-Space management.(L2)

UNIT V

Protection: Goals of Protection, Principles of Protection, Domain of protection, Access Matrix, Implementation of Access Matrix, Access control, Revocation of Access Rights, Capability- Based systems, Language – Based Protection

Security: The Security problem, Program threats, System and Network threats, Cryptography as a security tool, User authentication, Implementing security defenses, Firewalling to protect systems and networks, Computer–security classifications.

Case Studies: Linux, Microsoft Windows.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify various schemes available for achieving system protection.(L2)
- Acquiring knowledge about various countermeasures to security attacks.(L2)
- Outline protection and security in Linux and Microsoft Windows. (L2)

Course Outcomes:

- Understand the OS design structures, its services and basics of a Process. (L2)
- Analyze various scheduling algorithms and examine concurrency mechanisms in Operating Systems. (L4)
- Apply memory management techniques in the design of operating systems. (L3)
- Compare and contrast various structures and organization of the file system and secondary storage structure. (L4)
- Apply different concepts of Protection and Security services in OS. (L3)

Text Books:

1. Operating System Concepts, Abraham Silberchatz, Peter B. Galvin, Greg Gagne, Ninth Edition, 2012, Wiley.

2. Modern Operating Systems, Andrew S Tanenbaum, Third Edition, Pearson Education, 2008

Reference Books:

1. Operating systems by A K Sharma, Universities Press.
2. Operating Systems: Internals and Design Principles, Stallings, Sixth Edition, 2009, Pearson Education.
3. Operating Systems, S. Haldar, A.A. Aravind, Pearson Education.
4. Operating Systems, A.S. Godbole, Second Edition, TMH.

Online Learning Resources:

- <https://nptel.ac.in/courses/106/106/106106144/>
- <http://peterindia.net/OperatingSystems.html>

(CE20AOE501) Basics of Civil Engineering**Course Objectives:**

- Understanding Relevance of Civil Engineering in the overall infrastructural development of the country
- Categorize various Types of buildings, selection of site for buildings
- Obtain knowledge about various techniques adopted in Importance, objectives and principles of surveying
- Become aware of various methods of Modern construction materials
- Understand the Building Construction in various methods

UNIT-I

General Introduction to Civil Engineering: Relevance of Civil Engineering in the overall infrastructural development of the country. Responsibility of an engineer in ensuring the safety of built environment. Brief introduction to major disciplines of Civil Engineering like Transportation Engineering, Structural Engineering, Geo-technical Engineering, Water Resources Engineering and Environmental Engineering.

Learning Outcomes:

After completion of this unit, students should

- Able to know various specialisations in Civil Engineering
- Responsibility of an engineer in ensuring the safety of built environment

UNIT-II

Introduction to buildings: Types of buildings, selection of site for buildings, components of aresidential building and their functions.

Building rules and regulations: Relevance of NBC, KBR & CRZ norms (brief discussion only).

Building area: Plinth area, built up area, floor area, carpet area and floor area ratio for a building asper KBR.

Learning Outcomes:

After completion of this unit, students should

- Able to know various types of buildings.
- Able to know various types building regulations and rules

UNIT-III

Surveying: Importance, objectives and principles.

Construction materials, Conventional construction materials: types, properties and uses of building materials: bricks, stones, cement, sand and timber

Cement concrete: Constituent materials, properties and types.

Steel: Steel sections and steel reinforcements, types and uses.

Learning Outcomes:

After completion of this unit, students should

- Able to know importance of Surveying.
- Able to know various materials used for construction.

UNIT-IV

Modern construction materials:- Architectural glass, ceramics, Plastics, composite materials, thermal and acoustic insulating materials, decorative panels, waterproofing materials. Modern uses of gypsum, pre-fabricated building components (brief discussion only).

Learning Outcomes:

After completion of this unit, students should

- Able to know importance new construction materials.
- Able to know various materials used for construction.

UNIT-V

Building Construction: Foundations: Bearing capacity of soil (definition only), functions of foundations, types – shallow and deep (brief discussion only). Load bearing and framed structures.

Brick masonry: - Header and stretcher bond, English bond & Flemish bond random rubble masonry.

Roofs and floors: - Functions, types; flooring materials (brief discussion only).

Learning Outcomes:

After completion of this unit, students should

- Able to know different types of foundations
- Able to know various masonry bonds.

Course Outcomes:

After studying this course, students will be able to:

- Understand various Civil Engineering in the overall infrastructural development
- Identify various types of buildings
- Understand the process of management of surveying
- Apply various Modern construction materials
- Obtain awareness on various Modern construction materials

Text Books:

1. Rangwala, S. C., Essentials of Civil Engineering, Charotar Publishing House 2015
2. 2Mckay, W.B. and Mckay, J. K., Building Construction, Volumes 1 to 4, Pearson IndiaEducationServicesedition 2019

Reference Books:

1. G Shanmugam, M S Palanichamy, Basic Civil and Mechanical Engineering, McGraw Hill Education; First edition, 2018
Benjamin,J.,Basic Mechanical Engineering,Pentex Books,9th Edition,2018

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B. Tech- V Sem

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(EC20AOE501) BASIC VLSI DESIGN

Course Objectives:

1. Learn about the various processing steps involved in the fabrication of a nMOS, pMOS and CMOS transistors.
2. Learn about the various Design rules and Layout of MOS transistors.
3. Enable the students to learn about the Scaling Models and Scaling factors of MOS transistors.
4. Study the various examples of structured design.
5. Learn about the Testing concepts in VLSI Chip design.

Unit I

Review of Microelectronics and Introduction to MOS technology:

The IC era, Basic MOS transistors- Enhancement mode and Depletion mode transistor action, nMOS fabrication, CMOS fabrication-P-Well, N-Well and Twin-tub process, Drain-to-Source Current versus Voltage V_{DS} relationships, MOS transconductance, output conductance and Figure of Merit.

Unit II

MOS circuits and Design process:

The Pass transistor, nMOS inverter, Pull-up to Pull-down ratio of different cases, CMOS inverter and Latch-up in CMOS circuits, MOS layers, Stick diagrams-nMOS and CMOS design styles, Design rules and Layout- Lambda-based design rules, Contact cuts.

Unit III

Circuit Concepts and Scaling of MOS circuits:

Sheet resistance concept, Area Capacitance of layers and calculations, The Delay unit, Inverter delay, Driving large capacitance loads, Propagation delays and Wiring capacitances, Scaling Models and Scaling factors, Scaling factors for various device parameters and its summary.

Unit IV

Subsystem Design:

Architectural issues, Switch logic, Gate restoring logic-The inverter, Two-input nMOS, CMOS and BiCMOS NAND and NOR gates and Other forms of CMOS logic.

Unit V**Test and Testability:**

System partitioning, Layout and Testability, Reset/Initialization, Design for Testability, Testing Combinational Logic and Sequential Logic, Practical Design for Test guidelines, Scan Design Techniques and Built-In-Self-Test (BIST).

Text Books:

1. K.Eshraghian, D.A. Pucknell and S.Eshraghian, "Essentials of VLSI Circuits and Systems", Third Edition, PHI Learning Pvt. Ltd., 2019.
2. W.Wolf "Modern VLSI Design IP based design" Fourth edition, PHI Learning Pvt. Ltd., 2020.

References:

1. Mead, C.A and Conway, L.A., "Introduction to VLSI Systems", Addison -Wesley, USA, 1980.
2. Neil H. E. Weste & D.M.Harris, "CMOS VLSI Design-A Circuits and Systems Perspective", Fourth edition, Pearson Edition, 2020.

Course Outcomes:

- CO1:** Outline the processing steps in the fabrication of a nMOS, pMOS and CMOS structure.
- CO2:** Illustrate the Layout procedure of simple MOS circuit using Lambda based design rules.
- CO3:** Summarize the scaling effects of various key parameters of MOSFET devices.
- CO4:** Design various MOS based logic circuits.
- CO5:** Develop algorithms for automatic test generation for combinational and sequential circuits.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech- V Sem

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(EE20AOE501) INTRODUCTION TO CONTROL SYSTEMS

Course Objectives:

To make the students learn about:

- The effect of feedback, the use of block diagram algebra and Mason's gain formula to find the overall transfer function
- Transient and steady state response and time domain specifications
- The concept of stability by Routh's stability criterion and Root loci
- Frequency domain specifications, Bode diagrams and Nyquist plots
- State space modeling of Control system and the concept of controllability and observability.

UNIT – I

CONTROL SYSTEMS CONCEPTS

Open loop and closed loop control systems and their differences- Classification of control systems, Feedback characteristics, Block diagram reduction methods – Signal flow graphs - Reduction using Mason's gain formula.

Principle of operation of DC and AC Servo motor, Transfer function of DC servo motor - AC servo motor, Synchros.

Learning Outcomes:

At the end of the unit, the student will be able to

- Write the differential equations for mechanical and electrical systems(L3)
- Obtain the transfer function from block diagrams, servo motors and signal flow graphs (L4)

UNIT-II

TIME RESPONSE ANALYSIS

Step Response - Impulse Response - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response -

Learning Outcomes:

At the end of the unit, the student will be able to

- Analyze the time domain specifications(L4)
- Calculate the steady state errors(L4)

UNIT– III**STABILITY ANALYSIS IN TIME DOMAIN**

The concept of stability – Routh's stability criterion – Stability and conditional stability – limitations of Routh's stability. The Root locus concept - construction of root loci-effects of adding poles and zeros to $G(s)H(s)$ on the root loci.

Learning Outcomes:

At the end of the unit, the student will be able to

- Analyze the concept of stability in time domain(L4)
- Apply the concept of Routh's stability and Root locus in time domain (L5)

UNIT– IV**FREQUENCY RESPONSE ANALYSIS**

Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Stability Analysis from Bode Plots. Polar Plots- Phase margin and Gain margin-Stability Analysis.

Learning Outcomes:

At the end of the unit, the student will be able to

- Evaluate the frequency domain specifications from Bode, Polar and Nyquist plots (L5)
- Deducing transfer functions from Bode Plots(L4)
- Understand difference between Phase and Gain margins (L2)

UNIT– V**STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS**

Concepts of state, state variables and state model, state models -, Transfer function from state model, Solving the Time invariant state Equations- State Transition Matrix and its Properties, The concepts of controllability and observability.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the concept of state space, controllability and observability (L2)

- Obtain the transfer function from state space and vice versa (L4)
- Understand the state transition method of solving time invariant state equations (L2)

Text Books:

1. Katsuhiko Ogata, "Modern Control Engineering", 5th edition, Prentice Hall of India Pvt. Ltd., 2010.
2. J. Nagrath and M. Gopal, "Control Systems Engineering" 5th edition, New Age International (P) Limited Publishers, 2007.

Reference Books:

1. M. Gopal, "Control Systems Principles & Design" 4th Edition, McGraw Hill Education, 2012.
2. B. C. Kuo and Farid Golnaraghi, "Automatic Control Systems" 8th edition, John Wiley and sons, 2003.
3. Joseph J Distefano III, "Feedback and Control Systems", Allen R Stubberud & Ivan J Williams, 2nd Edition, Schaum's outlines, McGraw Hill Education, 2013.
4. Graham C. Goodwin, "Control System Design" Stefan F. Graebe and Mario E. Salgado, Pearson, 2000.
5. Gene F. Franklin, "Feedback Control of Dynamic Systems", J.D. Powell and Abbas Emami-Naeini, 6th Edition, Pearson, 2010.

Course Outcomes:

After completing the course, the student should be able to:

- CO-1:** Understand the concepts of control systems classification, feedback effect and Apply the concepts of Block diagram reduction, Signal flow graph
- CO-2:** Analyse time response analysis, error constants, and stability characteristics of a given mathematical model using different methods.
- CO-3:** Apply the concepts of RH and Root locus for stability calculations
- CO-4:** Analyze system behavior of the system in frequency domain. frequency response characteristics, Bode, Nyquist, Polar plots for stability calculations
- CO-5:** Analyze system behavior based on the state space analysis of that system. controllability and observability

SRI VENKATESWARA COLLEGE OF ENGINEERING
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B.Tech - V Sem

L T P C

(ME20AOE502) SOLAR AND WIND ENERGY SYSTEMS**Prerequisites:** Power Plant Engineering**Course Objectives:**

- Familiarize with basics of solar radiation, available solar energy and its measurement.
- Familiarize with solar collectors, construction and operation of solar collectors.
- Understand solar energy conversion systems, applications and power generation.
- Familiarize the wind energy sources assessment
- Explain basics of designing aerofoil

UNIT – 1:

Solar radiation and collectors: Solar angles – Sun path diagrams – Radiation - extra terrestrial characteristics - measurement and estimation on horizontal and tilted surfaces - flat plate collector thermal analysis - testing methods-evacuated tubular collectors - concentrator collectors – classification - design and performance parameters - tracking systems - compound parabolic concentrators - parabolic trough concentrators - concentrators with point focus - Heliostats – performance of the collectors.

Solar thermal technologies: Principle of working, types, design and operation of - Solar heating and cooling systems - Thermal Energy storage systems – Solar Desalination – Solar cooker : domestic, community – Solar pond – Solar drying.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the basic concepts of solar radiation and solar collectors (L2)
- Develop sun path diagrams (L3)
- Explain the concepts of tracking systems (L2)
- Discuss the working principles of solar thermal technologies (L6)
- Develop design and operation of solar heating and cooling systems (L3)
- Explain the principles of thermal storage systems (L2).

UNIT – 2:

Solar PV fundamentals: Semiconductor – properties - energy levels - basic equations of semiconductor devices physics. Solar cells - p-n junction: homo and hetero junctions - metal-semiconductor interface - dark and illumination characteristics - figure of merits of solar cell

- efficiency limits - variation of efficiency with band-gap and temperature - efficiency measurements - high efficiency cells – Solar thermo-photovoltaics.

SPV system design and applications: Solar cell array system analysis and performance prediction- Shadow analysis: reliability - solar cell array design concepts - PV system design - design process and optimization - detailed array design - storage autonomy - voltage regulation - maximum tracking - centralized and decentralized SPV systems - stand alone - hybrid and grid connected system - System installation - operation and maintenances - field experience - PV market analysis and economics of SPV systems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the properties of a semiconductor (L2)
- Apply the principles of solar thermo photovoltaics (L3)
- Outline the applications of SPV system (L2)
- Analyze the performance of a solar cell array system (L4)
- Utilize centralized and decentralized SPV systems (L3)

UNIT – 3:

Introduction: Historical Perspectives on Wind Turbines- Indian Energy Scenario - Global Energy Scenario - Introduction to Indian Wind Industry - Wind Energy potential of India and Global Wind Installations.

Basics of Wind Resource Assessment: Power in the wind –Wind Characteristics - Measurement of wind using anemometers (cup anemometer, propeller anemometer, pressure plate anemometer, pressure tube anemometer, sonic anemometer and other remote wind speed sensing techniques) –Turbulence-Wind Power Density –Average wind speed calculation - Statistical models for wind data analysis (Weibull and Rayleigh distribution). Energy estimation of wind regimes – Wind Rose, Wind Monitoring Station Siting and Instrumentation.

Learning Outcomes:

At the end of this unit, the student will be able to

- Recall historical perspective of wind turbines(L1)
- Relate Indian and globalenergy requirements(L1)
- Interpret power in the wind (L2)
- Classify different wind speed measuring instruments(L2)

- Apply different statistical models for wind data analysis (L3)

UNIT – 4:

Wind Energy Conversion Systems: Types - Components of Modern Wind Turbine (HAWT and VAWT) - Fixed and Variable Speed operations - Power Control (Passive stall, Active pitch, Passive pitch and Active stall) - Electrical aspects of wind turbine, Safety of wind turbines.

Learning Outcomes:

At the end of this unit, the student will be able to

- Utilize different wind parameters for design of rotor (L3)
- Make use of power curve for energy estimation (L3)
- List different components of modern wind turbine (L1)
- Explain how to control the power of a wind turbine (L2)
- Name different safety measures of wind turbine (L1)

UNIT – 5:

Wind Farm Design and Health (Condition) Monitoring: Planning of wind farm, Site selection, Micro siting, Grid Integration, Power evacuation, Wind Farm Feasibility Studies, Preparation of DPR, Environmental Benefits and Impacts.

Small Wind Turbines: Water pumping wind mills, offshore wind energy, Wind turbine testing, future developments.

Learning Outcomes:

At the end of this unit, the student will be able to

- Plan the wind farm(L3)
- Analyze the feasibility of wind farm(L4)
- List the environmental benefits and impacts (L1)
- Explain about small wind turbines(L2)

Textbooks:

1. Goswami D.Y., Kreider, J. F. and Francis., "Principles of Solar Engineering', Taylor and Francis, 2000.
2. Chetan Singh Solanki, "Solar Photovoltaics – Fundamentals, Technologies and Applications", PHI Learning Private limited, 2011.

Reference Books:

1. Sukhatme S.P.,. Nayak.J.P, 'Solar Energy – Principle of Thermal Storage and collection", Tata McGraw Hill, 2008.
2. Sathyajith Mathew, Wind Energy Fundamentals, Resource Analysis and Economics, Springer Publications, (2006).
3. Wei Tong, Wind Power Generation and Wind Turbine Design, WIT Press,(2010)
4. Wind Power, Revised Edition: Renewable Energy for Home, Farm, and Business, Paul Gipe, 2004, Chelsea Green Publishing.
5. A.R. Jha, Wind Turbine Technology, CRC Press, (2010).

Course Outcomes:

At the end of the course, the student will be able to

- **Explain** the basic concepts of solar radiation and solar collectors (L2)
- **Develop** sun path diagrams (L3)
- **Explain** the properties of a semiconductor (L2)
- **Apply** the principles of solar thermo photovoltaics (L3)
- **Utilize** different wind parameters for design of rotor (L3)
- **Make** use of power curve for energy estimation (L3)

SRI VENKATESWARA COLLEGE OF ENGINEERING

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BTech V Sem

L T P C

(CS20APE501)Advanced Computer Architecture
Professional Elective – I

Course Objective

- Discuss the concept of parallel processing and the relationship between parallelism and performance
- Understand the organization of computer structures that can be electronically configured and reconfigured
- Discuss the performance advantages that multithreading can offer along with the factors that make it difficult to derive maximum benefits from this approach

Course Outcomes

- Realize Parallelism and Parallel architectures
- Ability to use Instruction Level Parallelism
- Ability to use Thread level parallelism.
- Understand the various models to achieve memory consistency.
- Understand the performance and efficiency in advanced multiple-issue processors.

Unit - I :

Evolution of Computer Architecture, System Attributes to performance; Shared Memory Multiprocessors, Distributed Memory Multiprocessors, A Taxonomy of MIMD Computers; architecture of Vector Super computers, operational model of SIMD computer, PRAM models and PRAM variants Conditions of Parallelism- data and resource dependencies, hardware and software parallelism, Program partitioning and Scheduling- grain sizes and latency, grain packing and scheduling, static multi processor scheduling, Program flow mechanisms- control flow vs data flow, demand driven mechanisms, comparison of flow mechanisms, System interconnect architectures- network properties and routing, static and dynamic connection networks.

Unit – II:

Principles of scalable performances- performance metrics and measures- parallelism profile in programs, mean performance, efficiency, utilization and quality, benchmarks and performance measures, characteristics of parallel processing applications, Speed up performance laws- Amdahl's law, Gustafson's law, memory bounded speed up model, Scalability metrics and goals, Bus systems- back plane bus specification, Addressing and Timing protocols, Arbitration, transaction and interrupt, IEEE future bus standard

requirement set, Shared memory organizations- Interleaved memory organization, band width and fault tolerance, memory allocation schemes, Atomicity and event ordering

Unit – III :

Linear Pipeline Processors- asynchronous and synchronous models, clocking and timing control, speedup, efficiency, and throughput, Non linear pipeline processors- reservation and latency analysis, collision free scheduling, pipeline schedule optimization, Instruction pipe line design- instruction execution phases, mechanisms for instruction pipelining, dynamic instruction scheduling, branch handling techniques, static arithmetic pipelines. Hierarchical bus system, cross bar switch and multiport memory, multistage and combining networks, multistage and combining networks, The cache coherence problem, message passing mechanism- message routing schemes, deadlock virtual channels, flow control strategies, multicast routing algorithms.

Unit – IV :

Vector processing principles- vector instruction types, vector access memory schemes, early super computers, Multi vector multiprocessors- performance directed design rules, architecture of Cray and MPP, Compound vector operations, vector loops and chaining, SIMD computer organizations

Unit – V :

Latency-hiding techniques- shared virtual memory, pre fetching techniques, distributed coherent caches, scalable coherence interface, relaxed memory consistency, principles of multithreading and context switching policies, MPD architecture, The Tera multiprocessor system, Data flow computer architecture

Text Books :

1. Advanced Computer Architecture- Parallelism, Scalability, Programmability|| KAI Hwang & Naresh Jotwani, Mc Graw Hill Publishing, Second Edition,

Reference Books :

1. Computer Architecture- A Quantitative Approach Hennessy Patterson, Elsevier, Fifth Edition
2. Advanced Computer Architecture- Parallelism, Scalability, Programmability, Kai Hwang, TMH.
3. Computer Architecture, Concepts and Evolutions, Garrit A Blaauw, PEA

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(CS20APE502) DATA WAREHOUSING AND DATA MINING
Professional Elective – I

Course Objectives:

- To understand data warehouse concepts, architecture, business analysis and tools
- To understand data pre-processing and data visualization techniques
- To study algorithms for finding hidden and interesting patterns in data
- To understand and apply various classification and clustering techniques using tools.

Course Outcomes:

Upon completion of the course, the students should be able to:

- Design a Data warehouse system and perform business analysis with OLAP tools.
- Apply suitable pre-processing and visualization techniques for data analysis
- Apply frequent pattern and association rule mining techniques for data analysis
- Apply appropriate classification and clustering techniques for data analysis

UNIT-I:

DATA WAREHOUSING, BUSINESS ANALYSIS AND ON-LINE ANALYTICAL PROCESSING (OLAP)

Basic Concepts - Data Warehousing Components – Building a Data Warehouse – Database Architectures for Parallel Processing – Parallel DBMS Vendors - Multidimensional Data Model – Data Warehouse Schemas for Decision Support, Concept Hierarchies - Characteristics of OLAP Systems – Typical OLAP Operations, OLAP and OLTP.

Learning Outcomes:

At the end of the unit, students will be able to:

- Identify the component of Data warehouse (L1)
- Create the architecture of Data warehouse (L6)
- Apply different types of OLAP operations (L3)

UNIT-2:

DATA MINING – INTRODUCTION

Introduction to Data Mining Systems – Knowledge Discovery Process – Data Mining Techniques – Issues – applications- Data Objects and attribute types, Statistical description

of data, Data Preprocessing – Cleaning, Integration, Reduction, Transformation and discretization, Data Visualization, Data similarity and dissimilarity measures.

Learning Outcomes:

At the end of the unit, students will be able to:

- Summarize the data processing steps (L2)
- Apply data cleaning process (L3)

UNIT-3:

DATA MINING - FREQUENT PATTERN ANALYSIS

Mining Frequent Patterns, Associations and Correlations – Mining Methods- Pattern Evaluation Method – Pattern Mining in Multilevel, Multi Dimensional Space – Constraint Based Frequent Pattern Mining, Classification using Frequent Patterns

Learning Outcomes:

At the end of the unit, students will be able to:

- Understand Association Rules(L2)
- Apply different Mining Methods (L3)
- Review Classification using Frequent Patterns (L2)

UNIT-4 :

CLASSIFICATION AND CLUSTERING

Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines -- Lazy Learners – Model Evaluation and Selection-Techniques to improve Classification Accuracy.

Clustering Techniques – Cluster analysis-Partitioning Methods - Hierarchical Methods – Density Based Methods - Grid Based Methods – Evaluation of clustering – Clustering high dimensional data- Clustering with constraints, Outlier analysis-outlier detection methods.

Learning Outcomes:

At the end of the unit, students will be able to:

- Creating Decision Tree (L6)
- Evaluate Classification techniques (L5)

UNIT-5 :

WEKA TOOL

Datasets – Introduction, Iris plants database, Breast cancer database, Auto imports database - Introduction to WEKA, The Explorer – Getting started, Exploring the explorer, Learning algorithms, Clustering algorithms, Association–rule learners.

Learning Outcomes:

At the end of the unit, students will be able to:

- Investigate WEKA tool (L4)
- Explain learning, clustering algorithms (L2)

TEXT BOOK:

1. Jiawei Han and Micheline Kamber, —Data Mining Concepts and TechniquesII, Third Edition, Elsevier, 2012.

REFERENCES:

1. Alex Berson and Stephen J.Smith, —Data Warehousing, Data Mining & OLAPII, Tata McGraw – Hill Edition, 35th Reprint 2016.
2. K.P. Soman, Shyam Diwakar and V. Ajay, —Insight into Data Mining Theory and Practice, Eastern Economy Edition, Prentice Hall of India, 2006.
3. Ian H.Witten and Eibe Frank, —Data Mining: Practical Machine Learning Tools and Techniques, Elsevier, Second Edition.

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B.Tech V Sem

**L T P C
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(CS20APE503)DIGITAL IMAGE PROCESSING

Professional Elective – I

Course Objectives:

- To interpret fundamental concepts of digital image processing.
- To exemplify image enhancement.
- To interpret fundamental concepts of color image processing.
- To assess image compression techniques for digital images.
- To summarize segmentation for digital images.

UNIT-I:

INTRODUCTION TO DIGITAL IMAGE PROCESSING

Introduction: Digital image representation, Fundamental steps in image processing, Elements of digital image processing, Elements of visual perception, Simple image model, Sampling and Quantization, Basic relationships between pixels, Image transformations.

Applications: Medical imaging, Robot vision, Character recognition, Remote sensing.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the fundamental concepts of image processing, Sampling process and basis relationships between pixels (L1)
- Explain the elements of Digital Image Processing (L2)

UNIT-II:

IMAGE ENHANCEMENT

Need for image enhancement, Point processing, Histogram processing, Spatial filtering- Smoothing and Sharpening.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the need for enhancement process (L1)
- Ability to know the terminology involved in enhancement process (L2)

UNIT-III:

COLOR IMAGE PROCESSING

Colour fundamentals, Colour models, Color transformations, Pseudo colour image processing, Full colour image processing.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the need for enhancement process (L1)
- Explain the terminology involved in enhancement process (L2)

UNIT-IV:**IMAGE COMPRESSION**

Redundancies, Fidelity criteria, Image compression model, Lossless compression: Huffman coding, Arithmetic coding.

Lossy compression: Lossy Predictive Coding, JPEG Compression Standard.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the need for image compression (L1)
- Explain the image compression and various types of compression techniques (L2)

UNIT-V:**IMAGE SEGMENTATION**

Detection of discontinuities: point, line and edge detection, Edge linking and Boundary detections: Local Processing, Global processing via Hough transform, Thresholding, Region oriented segmentation: Region growing, Region splitting and merging.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the principle of image segmentation and its importance (L1)
- Explain the image compression and various types of compression techniques (L2)
- Analyze the various terminologies involved in image segmentation like edge, boundary detection etc. (L3)

Course Outcomes:

- Interpret fundamental concepts of digital and color image processing.
- Exemplify image enhancement.
- Analyze the various terminologies involved in image segmentation like edge, boundary detection etc. Assess image compression techniques for digital images.
- Summarize segmentation techniques for digital images.

TEXT BOOKS:

1. Rafael C. Gonzalez and Richard E. Woods, "Digital Image Processing", 3rd

Edition, Pearson Education, 2011.

REFERENCE BOOKS:

1. S Jayaraman, S Esakkirajan and T Veerakumar, "Digital Image Processing", TMH, 2011.
2. S. Sridhar, "Digital Image Processing", 2nd Edition, Oxford Publishers, 2016.

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BTech V Sem

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(CS20APE504)OBJECT ORIENTED ANALYSIS DESIGN & TESTING

Professional Elective-I

Course Objectives:

This course is designed to:

- Understand the basic concepts of object-oriented techniques
- Build the Model of the software system using UML diagrams
- Elucidate design patterns as templates for good design
- Learn the object-oriented methodology in software design
- Explore testing techniques for object-oriented software

Unit – I:

Basic concepts

Basic concepts: objects, classes, abstract classes, data types, ADT, inheritance, polymorphism, encapsulation and information hiding, aggregation, composition, association, dynamic binding, object-oriented principles.

Learning Outcomes:

At the end of the unit, students will be able to:

- Recognize basic issues of object-orientation (L2)
- Identify class relations from problem statements (L4)
- Construct principles of object-orientation (L6)

Unit – II:

Modelling Using UML

UML Diagrams: Use case diagrams, class diagrams, various relationships among classes: generalization, association, aggregation, composition, dependency etc., object diagram, UML packages, activity diagram, state machine diagram, communication diagram sequence diagram, interaction overview diagram, component diagram, deployment diagram.

Learning outcomes:

At the end of the unit, students will be able to:

- Describe the basic syntax and semantics of UML (L2)
- Develop modeling of the user's view using use case diagrams (L3)
- Design class diagram and object-diagrams (L6)
- Summarize behavioral modeling of a given problem using sequence diagram, collaboration diagram, and state chart diagram (L2)

Unit – 3:

Design Patterns:

Basic pattern concepts, Types of patterns, some common design patterns such as Expert, Observer, Façade, MVS, MVC, Creator, Publish-Subscribe, Proxy etc.

Learning outcomes

At the end of the unit, students will be able to:

- Identify the basic issues in reusable design (L4)
- Recognize the basic design patterns (L2)

Unit – IV:

Designing using UML

Overview of OOAD methodology, Use case model development, Domain modelling, Identification of entity objects, Brooch's object identification method, Interaction modelling, CRC cards, Applications of the analysis and design process, object-oriented design principles. OOD goodness criteria, CK Metrics, LK Metrics, MOOD Metrics, Code Refactoring

Learning outcomes:

At the end of the unit, students will be able to:

- Interpret domain modeling (L2)
- Develop sequence diagram for any given use case (L3)
- Design class diagram for a given problem (L6)

Unit – V:

Testing Object Oriented Software:

Challenges in testing object-oriented software, Implications of object-oriented Features in testing object-oriented software, Importance of grey-box testing of object-oriented software, Coverage analysis, State-based testing, Class testing, Scenario-Based Test Design.

Fault-Based Testing Integration Testing:

Thread-based integration Strategies, Use-based integration Strategies, Cluster Testing, ValidationTesting, System Testing, Testing tools.

Learning outcomes:

At the end of the unit, students will be able to:

- Design unit test cases (L6)
- Design integration test cases (L6)

- Select appropriate tool to carry out testing (L2)

Course outcomes:

Upon completion of the course, the students should be able to:

- Analyze the problem from object-oriented perspective (L4)
- Model complex systems using UML Diagrams (L3)
- Choose the suitable design patterns in software design (L5)
- Adapt Object-Oriented Design Principles (L6)
- Identify the challenges in testing object-oriented software. (L3)

Text Book:

1. Rajib Mall, "Fundamentals of Software Engineering", 5th Edition, PHI, 2018

Reference Books:

1. Rumbaugh and Blaha, Object-oriented Modeling and design with UML, Pearson, 2007
2. Bernd Bruegge and, Allen H. Dutoit, Object-Oriented Software Engineering Using UML, Patterns, and Java, Pearson, 2009

SRI VENKATESWARA COLLEGE OF ENGINEERING

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BTech V Sem

**L T P C
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(CS20APE505)Principles of Programming Languages
Professional Elective-I

Unit I

Preliminary Concepts:

Reasons for Studying Concepts of Programming Languages, Programming Domains, Language Evaluation Criteria, Influences on Language Design, Language Categories, Language Design Trade-Offs, Implementation Methods, Programming Environments.

Syntax and Semantics:

General Problem of Describing Syntax and Semantics, Formal Methods of Describing Syntax, Attribute Grammars, Describing the Meanings of Programs.

Unit II

Names, Bindings, and Scopes:

Introduction, Names, Variables, Concept of Binding, Scope, Scope and Lifetime, Referencing Environments, Named Constants

Data Types:

Introduction, Primitive Data Types, Character String Types, User Defined Ordinal Types, Array, Associative Arrays, Record, Union, Tuple Types, List Types, Pointer and Reference Types, Type Checking, Strong Typing, Type Equivalence.

Expressions and Statements:

Arithmetic Expressions, Overloaded Operators, Type Conversions, Relational and Boolean Expressions, Short Circuit Evaluation, Assignment Statements, Mixed-Mode Assignment

Control Structures –

Introduction, Selection Statements, Iterative Statements, Unconditional Branching, Guarded Commands.

Unit III

Subprograms and Blocks:

Fundamentals of Sub-Programs, Design Issues for Subprograms, Local Referencing Environments, Parameter Passing Methods, Parameters that Are Subprograms, Calling Subprograms Indirectly, Overloaded Subprograms, Generic Subprograms, Design Issues for Functions, User Defined Overloaded Operators, Closures, Coroutines.

Implementing Subprograms:

General Semantics of Calls and Returns, Implementing Simple Subprograms, Implementing Subprograms with Stack-Dynamic Local Variables, Nested Subprograms, Blocks, Implementing Dynamic Scoping

Abstract Data Types:

The Concept of Abstraction, Introductions to Data Abstraction, Design Issues, Language Examples, Parameterized ADT, Encapsulation Constructs, Naming Encapsulations.

Unit IV**Concurrency:**

Introduction, Introduction to Subprogram Level Concurrency, Semaphores, Monitors, Message Passing, Java Threads, Concurrency in Function Languages, Statement Level Concurrency. Exception Handling and Event Handling: Introduction, Exception Handling in Ada, C++, Java, Introduction to Event Handling, Event Handling with Java and C#.

Unit V**Functional Programming Languages:**

Introduction, Mathematical Functions, Fundamentals of Functional Programming Language, LISP, Support for Functional Programming in Primarily Imperative Languages, Comparison of Functional and Imperative Languages

Logic Programming Language:

Introduction, an Overview of Logic Programming, Basic Elements of Prolog, Applications of Logic Programming.

Scripting Language:

Pragmatics, Key Concepts, Case Study: Python – Values and Types, Variables, Storage and Control, Bindings and Scope, Procedural Abstraction, Data Abstraction, Separate Compilation, Module Library.

Course Outcomes

1. Acquire the skills for expressing syntax and semantics in formal notation
2. Identify and apply a suitable programming paradigm for a given computing application
3. Gain knowledge of and able to compare the features of various programming languages

TEXT BOOKS:

1. Concepts of Programming Languages Robert. W. Sebesta 10/E, Pearson Education.
2. Programming Language Design Concepts, D. A. Watt, Wiley Dreamtech, 2007.

REFERENCES:

1. Programming Languages, 2nd Edition, A.B. Tucker, R. E. Noonan, TMH.

2. Programming Languages, K. C. Loudon, 2nd Edition, Thomson, 2003.

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B. Tech V Sem

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(CS20APC503)Computer Networks Laboratory

Course Objectives:

This course is designed to:

1. • Understand the different types of networks
2. • Discuss the software and hardware components of a network
3. • Enlighten the working of networking commands supported by operating system
4. • Impart knowledge of Network simulator 2/3
5. • Familiarize the use of networking functionality supported by JAVA
6. • Familiarize with computer networking tools.

List of Experiments

1. Work with the commands Ping, Tracert, Ipconfig, pathping, telnet, ftp, getmac, ARP, Hostname, Nbtstat, netdiag, and Nslookup
2. Use Sniffers for monitoring network communication (Ethereal)
3. Find all the IP addresses on your network. Unicast, Multicast, and Broadcast on your network.
4. Use Packet tracer software to build network topology and configure using Distance vectorrouting protocol.
5. Use Packet tracer software to build network topology and configure using Link State Routingprotocol.
6. Using JAVA RMI Write a program to implement Basic Calculator
7. Implement a Chatting application using JAVA TCP and UDP sockets.
8. Hello command is used to know whether the machine at the other end is working or not. Echocommand is used to measure the round trip time to the neighbour. Implement Hello and Echocommands using JAVA.
9. Use Ethereal tool to capture the information about packets.
10. Install Network Simulator 2/3. Create a wired network using dumbbell

topology. Attach agents, generate both FTP and CBR traffic, and transmit the traffic. Vary the data rates and evaluate the performance using metric throughput, delay, jitter and packet loss.

11. Create a static wireless network. Attach agents, generate both FTP and CBR traffic, and transmit the traffic. Vary the data rates and evaluate the performance using metric throughput, delay, jitter and packet loss.

12. Create a mobile wireless network. Attach agents, generate both FTP and CBR traffic, and transmit the traffic. Vary the data rates and evaluate the performance using metric throughput, delay, jitter and packet loss.

Course outcomes:

Upon completion of the course, the students should be able to:

- Design scripts for Wired network simulation (L6)
- Design scripts of static and mobile wireless networks simulation (L6)
- Analyze the data traffic using tools (L4)
- Design JAVA programs for client-server communication (L6)
- Construct a wired and wireless networks using the real hardware (L3)

Reference Books:

1. Shivendra S. Panwar, Shiwen Mao, Jeong-dong Ryoo, and Yihan Li, "TCP/IP Essentials A Lab-Based Approach", Cambridge University Press, 2004.
2. Cisco Networking Academy, "CCNA1 and CCNA2 Companion Guide", Cisco Networking Academy Program, 3rd edition, 2003.
3. Ns Manual, Available at: <https://www.isi.edu/nsnam/ns/ns-documentation.html>, 2011.
4. Elloitte Rusty Harold, "Java Network Programming", 3rd edition, O'REILLY, 2011.

(CS20APC505) OPERATING SYSTEMS LAB
(CSE,CSM&IT)**Course Objectives:**

- To familiarize students with the architecture of OS.
- To provide necessary skills for developing and debugging CPU Scheduling algorithms.
- To explore the process management and scheduling and memory management.
- To explain the working of an OS as a resource manager, file system manager, process manager, memory manager, and page replacement tool.
- To provide insights into system calls, file systems and deadlock handling.

List of Experiments

1. Simulate the following CPU scheduling algorithms
a) Round Robin b) SJF c) FCFS d) Priority
2. Implement dynamic priority scheduling algorithm.
3. Assume that there are five jobs with different weights ranging from 1 to 5. Implement round robin algorithm with time slice equivalent to weight.
4. Implement priority scheduling algorithm. While executing, no process should wait for more than 10 seconds. If waiting time is more than 10 seconds, that process has to be executed for at least 1 second before waiting again.
5. Control the number of ports opened by the operating system with
a) Semaphore b) Monitors.
6. Simulate how parent and child processes use shared memory and address space.
7. Simulate sleeping barber problem.
8. Simulate dining philosopher's problem.
9. Simulate producer and consumer problem using threads.
10. Implement the following memory allocation methods for fixed partition a)
First fit b) Worst fit c) Best fit
11. Simulate the following page replacement algorithms
a) FIFO b) LRU c) LFU etc.,
12. Simulate Paging Technique of memory management
13. Simulate Bankers Algorithm for Dead Lock avoidance and prevention.
14. Simulate following file allocation strategies

a) Sequential b) Indexed c) Linked

15. Simulate all File Organization Techniques

a) Single level directory b) Two level c) Hierarchical d) DAG

Course Outcomes:

At the end of the course, students will be able to:

- Trace different CPU Scheduling algorithm. (L2)
- Implement Bankers Algorithms to Avoid and prevent the Dead Lock. (L3)
- Evaluate Page replacement algorithms. (L5)
- Illustrate the file organization techniques. (L4)
- Illustrate shared memory process. (L4)
- Design new scheduling algorithms. (L6)

Reference Books:

1. Peter B. Galvin, Greg Gagne "Operating System Concepts", Abraham Silberchatz, Eighth Edition, John Wiley.
2. Stallings "Operating Systems: Internals and Design Principles", Sixth Edition– 2009, Pearson Education
3. Andrew S Tanenbaum, "Modern Operating Systems", Second Edition, PHI.
4. S.Haldar, A.A.Aravind, "Operating Systems", Pearson Education.
4. B.L.Stuart, "Principles of Operating Systems", Cengage learning, India Edition.2013-2014
6. A.S.Godbole, "Operating Systems", Second Edition, TMH.

Online Learning Resources/Virtual Labs:

- <https://www.cse.iitb.ac.in/~mythili/os/>
- <http://peterindia.net/OperatingSystems.htm>

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B.Tech V Sem

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**(EG20ASC301) SOFTSKILLS
SOC – I**

Course Objectives

- To develop awareness in students of the relevance and importance of soft skills
- To provide students with interactive practice sessions to make them internalize soft skills
- To develop Time management, Positive thinking & Decision making skills
- To enable to manage stress effectively
- To enable them to develop employability skills.

UNIT– I

INTRODUCTION

Definition – Scope – Importance- – Methods of improving soft skills – Limits- Analysis – Interpersonal and intrapersonal skills - Verbal and Non-verbal skills.

Learning Outcomes:

At the end of the module, the learners will be able to

- Understand the importance of soft skills
- Identify the methods of improving soft skills
- Analyze various soft skills in different situations
- Distinguish various soft skills
- Apply various soft skills in day to day life and in workplace

UNIT – II

INTRAPERSONAL SKILLS

Knowing self/temperaments/traits - Johari windows – quotient skills(IQ, EQ, SQ), creativity, decision-making- Attitude – Confidence Building - Positive Thinking –Time Management – Goal setting.

Learning Outcomes:

At the end of the module, the learners will be able to

- Understand self and its temperament.
- Apply various techniques to know the self.
- Develop positive thinking
- Develop creative thinking and decision-making skills
- Apply self-knowing tools in day to day and professional life.

UNIT – III

INTERPERSONALSKILLS

Leadership Skills – Negotiation skills -- Team-building – Crisis Management – Event Management – Ethics and Etiquettes.

Learning Outcomes:

At the end of the module, the learners will be able to

- Understand the importance of interpersonal skills
- Analyze various tactics in negotiation skills.
- Develop team building spirit.
- Develop crisis management
- Apply interpersonal skills through etiquettes.

UNIT – IV

VERBALSKILLS

Importance of verbal skills in corporate climate, Listening skills –Mother Tongue Influence (MTI) - Speaking skills – Public speaking - Oral presentations - Writing skills –E-mail etiquettes – Memos – Indianism

Learning Outcomes:

At the end of the module, the learners will be able to

- Understand the importance of verbal skills in corporate climate.
- Explain the need of listening skills.
- Explore MTI and suggest remedies to avoid it.
- Interpret various contexts of speaking.
- Apply verbal skills in personal and professional life.

UNIT – V

NON-VERBAL SKILLS

Importance of body language in corporate culture – body language-Facial expressions – eye contact – posturegestures – Proxemics – Haptics – Dress Code – Paralanguage –Tone, pitch, pause& selection of words.

Learning Outcomes:

At the end of the module, the learners will be able to

- Comprehend the importance of non-verbal communication.
- Expound the need of facial expressions, postures and gestures.
- Analyze proxemics,haptics etc.
- Understand the importance of dress code.

- Apply various techniques to use para language.

Course Outcomes

- Recognize the importance of verbal and non verbal skills
- Develop the interpersonal and intrapersonal skills
- Apply the knowledge in setting the SMART goals and achieve the set goals
- Analyze difficult situations and solve the problems in stress-free environment
- Create trust among people and develop employability skills

Text Books

1. Meenakshi Raman & Shalini Upadhyay "Soft Skills", Cengage Learning, 2018.
2. S. Balasubramaniam, "Soft Skills for Interpersonal Communication", Orient Black Swan, 2017.

References

1. Barun K. Mitra, "Personality Development and Soft Skills", -OXFORD Higher Education 2018.
2. Alka Wadkar, "Life Skills for Success ", Sage Publications 2016.
3. Robert M Sheffield, "Developing Soft Skills", Pearson, 2010.
4. Diana Booher, "Communicate With Confidence", Tata McGrawhill, 2012.

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B.Tech –V Sem

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(BA20AMC502) INTELLECTUAL PROPERTY RIGHTS

Course Objectives:

- This course introduces the student to the basics of Intellectual Property Rights, Copy Right Laws, Cyber Laws, Trade Marks and Issues related to Patents. The overall idea of the course is to help and encourage the student for startups and innovations

UNIT I

Introduction to Intellectual Property Law – Evolutionary past – Intellectual Property Law Basics – Types of Intellectual Property – Innovations and Inventions of Trade related Intellectual Property Rights – Agencies Responsible for Intellectual Property Registration – Infringement – Regulatory – Overuse or Misuse of Intellectual Property Rights – Compliance and Liability Issues.

UNIT II

Introduction to Copyrights – Principles of Copyright – Subject Matters of Copyright – Rights Afforded by Copyright Law – Copyright Ownership – Transfer and Duration – Right to Prepare Derivative Works – Rights of Distribution – Rights of performers – Copyright Formalities and Registration – Limitations – Infringement of Copyright – International Copyright Law-Semiconductor Chip Protection Act.

UNIT III

Introduction to Patent Law – Rights and Limitations – Rights under Patent Law – Patent Requirements – Ownership and Transfer – Patent Application Process and Granting of Patent – Patent Infringement and Litigation – International Patent Law – Double Patenting – Patent Searching – Patent Cooperation Treaty – New developments in Patent Law- Invention Developers and Promoters.

UNIT IV

Introduction to Trade Mark – Trade Mark Registration Process – Post registration procedures – Trade Mark maintenance – Transfer of rights – Inter parties Proceedings – Infringement – Dilution of Ownership of Trade Mark – Likelihood of confusion – Trade Mark claims – Trade Marks Litigation – International Trade Mark Law.

UNIT V

Introduction to Trade Secrets – Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreement – Trade Secret Law – Unfair Competition – Trade Secret Litigation – Breach of Contract – Applying State Law. Introduction to Cyber Law – Information Technology Act – Cyber Crime and E-commerce – Data Security – Confidentiality – Privacy – International aspects of Computer and Online Crime.

Textbooks:

1. Deborah E. Bouchoux: "Intellectual Property". Cengage learning, New Delhi
2. Kompal Bansal & Parishit Bansal "Fundamentals of IPR for Engineers", BS Publications (Press)
3. Cyber Law. Texts & Cases, South-Western's Special Topics Collections

References:

1. Prabhuddha Ganguli: "Intellectual Property Rights" Tata Mc-Graw – Hill, New Delhi
2. Richard Stim: "Intellectual Property", Cengage Learning, New Delhi.
3. R. Radha Krishnan, S. Balasubramanian: "Intellectual Property Rights", Excel Books. New Delhi.

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BTech V Sem

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**(CH20AMC301) BIOLOGY FOR ENGINEERS
(Mandatory Non-Credit Course - V)**

Course Objectives: To provide basic understanding about life and life Process. Animal and plant systems. To understand what biomolecules are, their structures and functions. Application of certain biomolecules in Industry.

Brief introduction about human physiology and bioengineering.

To understand hereditary units, i.e. DNA (genes) and RNA and their synthesis in living organism.

How biology Principles can be applied in our daily life using different technologies.

Brief introduction to the production of transgenic microbes, Plants and animals.

Unit I: Introduction to Basic Biology

Cell as Basic unit of life, cell theory, Cell shapes, Cell structure, Cell cycle. Chromosomes. Prokaryotic and eukaryotic Cell. Plant Cell, Animal Cell, Plant tissues and Animal tissues, Brief introduction to five kingdoms of classification.

Unit Outcomes:

After completing this unit, the student will be able to

Summarize the basis of life. (L1)

Understand the difference between lower organisms (prokaryotes) from higher organisms (eukaryotes). (L2)

Understand how organisms are classified. (L3)

Unit II: Introduction to Biomolecules

Carbohydrates, lipids, proteins, Vitamins and minerals, Nucleic acids (DNA and RNA) and their types. Enzymes, Enzyme application in Industry. Large scale production of enzymes by Fermentation.

Unit Outcomes:

After completing this unit, the student will be able to

Understand what are biomolecules? their role in living cells, their structure, function and how they are produced. (L1)

Interpret the relationship between the structure and function of nucleic acids. (L2)

Summarize the applications of enzymes in industry. (L3)

Understand what is fermentation and its applications of fermentation in industry. (L4)

Unit III: Human Physiology

Nutrition: Nutrients or food substances. Digestive system, Respiratory system, (aerobic and anaerobic Respiration). Respiratory organs, respiratory cycle. Excretory system.

Unit Outcomes:

After completing this unit, the student will be able to

Understand what nutrients are (L1)

Understand the mechanism and process of important human functions (L2 & L3)

Unit IV: Introduction to Molecular Biology and recombinant DNA Technology

Prokaryotic gene and Eukaryotic gene structure. DNA replication, Transcription and Translation. rDNA technology. Introduction to gene cloning.

Unit Outcomes:

After completing this unit, the student will be able to

Understand and explain about gene structure and replication in prokaryotes

an

dEukaryotes (L1)

How genetic material is replicated and also understands how RNA and proteins are synthesized. (L2)

Understand about recombinant DNA technology and its application in different fields. (L3)

Explain what is cloning. (L4)

Unit V: Application of Biology

Brief introduction to industrial Production of Enzymes, Pharmaceutical and therapeutic Proteins, Vaccines and antibodies. Basics of biosensors, biochips, Bio fuels, and Bio Engineering. Basics of Production of Transgenic plants and animals.

Unit Outcomes:

After completing this unit, the student will be able to Understand.

How biology is applied for production of useful products for mankind.(L1)

What are biosensors, biochips etc. (L2)

Understand transgenic plants and animals and their production (L3)

Course Outcomes:

After studying the course, the student will be able to:

Explain about cells and their structure and function. Different types of cells and basics for classification of living Organisms.

Explain about biomolecules, their structure and function and their role in the living organisms. How biomolecules are useful in Industry.

Briefly about human physiology.

Explain about genetic material, DNA, genes and RNA how they replicate, pass and preserve vital information in living Organisms.

Know about application of biological Principles in different technologies for the production of medicines and Pharmaceutical molecules through transgenic microbes, plants and animals.

Text books:

1. P.K.Gupta, Cell and Molecular Biology, 5th Edition, Rastogi Publications -
2. U. Satyanarayana. Biotechnology, Books & Allied Ltd 2017

Reference Books:

1. N. A. Campbell, J. B. Reece, L. Urry, M. L. Cain and S. A. Wasserman, "Biology: A Global Approach", Pearson Education Ltd, 2018.
2. T Johnson, Biology for Engineers, CRC press, 2011
3. J.M. Walker and E.B. Gingold, Molecular Biology and Biotechnology 2nd ed.. PanimaPublications. PP 434.
4. David Hames, Instant Notes in Biochemistry –2016
5. Phil Tunner, A. Mctennan, A. Bates & M. White, Instant Notes – Molecular Biology – 2014

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(IT20AMC501) PROBLEM SOLVING AND PROGRAMMING FOR LE
(Common to All Branches of Engineering)

Course Objectives:

- To learn how to solve a given problem.
- To illustrate the basic concepts of C programming language.
- To discuss the concepts of Functions, Arrays, Pointers and Structures.
- To familiar with Dynamic memory allocation concepts.
- To apply concepts of structures and files to solve real word problems.

Unit 1

Introduction to Problem Solving: Problem solving Aspect, Problem identification, Problem understanding, Algorithm development, Solution planning, flowcharts, flowgorithm.

Overview of C: History of C, C Language elements, Basic structure of C programs, variables and data types, C Tokens, Operators and Expressions, Type Conversions.

Learning Outcomes: The students will be able to

- 1) Develop solution through problem understanding and decomposition (L6).
- 2) Develop basic flowcharts for performing input and output and computations (L3).
- 3) Solve Numerical Problems using Flowgorithm (L3).
- 4) Use C basic concepts to write simple C programs (L3).

Unit 2

Control Statements: Selection Statements- If and Switch Statements

Iterative Statements: For, While and Do-While Statements, Break and Continue Statements.

Learning Outcomes: The students will be able to

- 1) Implement C program using Conditional statements (L2).
- 2) Implement C program using Iterative statements (L2).

Unit 3

Arrays: Declaration, Accessing array elements, Storing values, Operations on arrays, Multi-dimensional arrays.

Functions: Introduction, Using Functions, Function declaration, Function definition and Function call, Parameter passing, Passing arrays to functions, Recursion, Storage classes.

Learning Outcomes: The students will be able to

- 1) Writing Structured programs using Functions (L5).
- 2) Apply arrays concepts on real time applications (L6).

Unit 4

Pointers: Declaration and Initialization of pointer variables, Pointer arithmetic, Pointers and arrays,

Pointer to pointer, Array of pointers, Pointers and functions, Dynamic memory allocation.

Strings: Introduction to Strings, String handling functions, Preprocessors.

Learning Outcomes: The students will be able to

- 1) Use pointers to write c Programs (L3). Understand the concepts of pre processors (L2).
- 3) Apply Dynamic Memory Allocation concepts on real time applications (L6).

Unit 5

Structures: Introduction, Nested structures, Array of structures, Structures and functions, Unions.

Files in C: Using Files in C, Read data from files, Writing data to files, Random access to files of records, Command line Arguments

Learning Outcomes: The students will be able to

- 1) Use the concepts of structures and unions to write c programs (L3).
- 2) Apply various operations on Files (L6).

Text Books:

1. Reema Thareja , Programming in C, Oxford University Press, AICTE Edition, 2018.
2. R.G. Dromey, "How to Solve it by Computer". 2014, Pearson.

Reference Books:

1. Jeri R. Hanly, Elliot B. Koffman, Problem Solving and Program Design in C, 5/e, Pearson
2. B. A. Forouzan and R. F. Gilberg, Computer Science: A Structured Programming Approach Using C, 3/e, Cengage Learning, 2007.
3. Brian W Kernighan and Dennis M Ritchie, The C Programming Language, Second Edition, Prentice Hall Publication.
4. Paul Deitel, Harvey Deitel -C How to Program with an introduction to C++, Eighth Edition,

Course Outcomes

- Solve computational problems (L3).
- Select the features of C language appropriate for solving a problem (L4)
- Design computer programs for real world problems (L6)
- Organize the data which is more appropriated for solving a problem (L6).

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B.Tech VI Sem

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(CS20APC601) Cryptography and Network Security

Course Objectives:

This course is designed to:

- Introduce the basic categories of threats to computers and networks
- Illustrate various cryptographic algorithms.
- Demonstrate public-key cryptosystem.
- Discuss the fundamental ideas of public-key cryptography.

- Explore Web security threats and protection mechanisms

UNIT – I

Attacks on Computers and Computer Security: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security Cryptography: Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.

Learning Outcomes :

At the end of the unit, students will be able to:

- Identify different types of Attacks (L3)
- Interpret various cryptography techniques (L5)
- Distinguish between cryptography and steganography (L4)

UNIT – II

Symmetric key Ciphers: Block Cipher principles & Algorithms (DES, AES, Blowfish), Differential and Linear Cryptanalysis, Block cipher modes of operation, Stream ciphers, RC4, Location and placement of encryption function, Key distribution Asymmetric key Ciphers: Principles of public key cryptosystems, Algorithms (RSA, Diffie-Hellman, ECC), Key Distribution

Learning Outcomes:

At the end of the unit, students will be able to:

- Differentiate symmetric and asymmetric ciphers (L4)
- Explain the principles of public key cryptography (L2)
- Select the appropriate cryptographic algorithm based on the requirements and applications. (L5)

UNIT – III

Message Authentication Algorithms and Hash Functions: Authentication requirements, Functions, Message authentication codes, Hash Functions, Secure hash algorithm, Whirlpool, HMAC, CMAC, Digital signatures, knapsack algorithm.

Learning Outcomes:

At the end of the unit, students will be able to:

- Summarize authentication techniques (L2)

- Apply Hash algorithm for generating Digital signatures (L3)

UNIT – IV

E-Mail Security: Pretty Good Privacy, S/MIME

IP Security: IP Security overview, IP Security architecture, Authentication Header, encapsulating security payload, combining security associations, key management.

Learning Outcomes:

At the end of the unit, students will be able to:

- Extend security for emails (L2)
- Examine IP security mechanisms (L4)

UNIT – V

Web Security: Web security considerations, Secure Socket Layer and Transport Layer Security, Secure electronic transaction Intruders, Virus and Firewalls: Intruders, Intrusion detection, password management, Virus and related threats, Countermeasures, Firewall design principles, Types of firewalls

Case Studies on Cryptography and security: Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability, Virtual Elections.

Learning Outcomes:

At the end of the unit, students will be able to:

- Design secure electronic transactions (L6)
- Explain different types of Firewalls (L2)

Course Outcomes:

Upon completion of the course, the students should be able to:

- Identify various type of vulnerabilities of a computer network (L2)
- Outline various security algorithms (L4)
- Design secure systems (L6)
- Investigate the threats and identify the solutions for threats (L4)

TEXT BOOKS:

1. William Stallings, "Cryptography and Network Security", 5th Edition, Pearson Education, 2011.
2. Atul Kahate, "Cryptography and Network Security", 2nd Edition, Mc Graw Hill, 2010.
3. Bernard Menezes "Network Security and Cryptography", 1st Edition, CENGAGE Learning, 2010.

REFERENCES:

1. C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, "Cryptography and Network Security", 1st Edition, Wiley India Pvt Ltd, 2011.
2. ForouzanMukhopadhyay "Cryptography and Network Security", 2nd Edition , Mc GrawHill, 2010.
3. Mark Stamp, Wiley India, "Information Security, Principles and Practice", 2nd Edition,Wiley, 2011.

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BTech VI Sem

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(CS20APC603) MACHINE LEARNING

Course Objectives:

This course is designed to:

- Understand the basic theory underlying machine learning
- Formulatemachinelearningproblemscorrespondingtodifferentapplications.
- Illustratearangeofmachinelearningalgorithmsalongwiththeirstrengthsandweaknesse
s
- Applymachinelearningalgorithmstosolveproblemsofmoderatecomplexity.

- Understand how Machine Learning imbibes the philosophy of Human learning.

UNIT-I

Introduction: Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.

Learning Outcomes:

At the end of the unit, students will be able to:

- Explore how to build computer programs that improve their performance at some task through experience. (L6).
- Interpret Decision tree learning as a practical method for inductive inference. (L2)

UNIT-II

NEURAL NETWORKS AND GENETIC ALGORITHMS: Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evolution and Learning.

Learning Outcomes:

At the end of the unit, students will be able to:

- Appraise artificial neural networks as one of the most effective learning methods currently known to interpret complex real-world sensor data. (L5).
- Illustrate the use of the genetic algorithm approach, and examine the nature of hypothesis space search. (L2)

UNIT-III

BAYESIAN AND COMPUTATIONAL LEARNING: Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.

Learning Outcomes:

At the end of the unit, students will be able to:

- Illustrate the principles of Probability for classification

as an important area of Machine Learning Algorithms.(L2)

- Analyze sample complexity and computational complexity for several learning Problems (L4)

UNIT-IV

INSTANCE BASED LEARNING: K-Nearest Neighbor Learning–Locally weighted Regression–Radial Bases Functions–Case Based Learning.

Learning Outcomes:

At the end of the unit , students will be able to:

- Infer that the Instance based algorithms can be used to overcome memory complexity and over fitting problems.(L2).

UNIT-V

ADVANCED LEARNING: Learning Sets of Rules–Sequential Covering Algorithm–Learning Rule Set– First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution –Analytical Learning–Perfect Domain Theories–Explanation Base Learning–FOCL Algorithm–Reinforcement Learning–Task–Q–Learning–Temporal Difference Learning

Learning Outcomes:

At the end of the unit, students will be able to:

- Infer that the combined methods out perform both purely inductive and purely analytical learning methods.(L2)
- Recognize the importance of Reinforcement Learning in the industry.

Course Outcomes:

Up on completion of the course, the students should be able to:

- Identify machine learning techniques suitable for a given problem.(L3)
- Solve the real world problems using various machine learning techniques.(L6)
- Apply Dimensionality reduction techniques for data pre-processing.(L3)
- Explain what is learning and why it is essential in the design of intelligent machines .(L2)
- Implement Advanced learning models for language, vision, speech, decision making etc.(L1)

Text Books:

- 1) T.M.Mitchell, "Machine Learning", McGraw-Hill, 1997.

Reference Books:

- 1) EthernAlpaydin, "Introduction to Machine Learning", MIT Press, 2004.
- 2) Stephen Marsland, "Machine Learning - An Algorithmic Perspective", Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.
- 3) Andreas C. Müller and Sarah Guido "Introduction to Machine Learning with Python: A Guide for Data Scientists", Oreilly.

e- Resources:

- 1) Andrew Ng, "Machine Learning Yearning" <https://www.deeplearning.ai/machine-learning-yearning/> Shai Shalev-Shwartz, Shai Ben-David, "Understanding Machine Learning: From Theory to Algorithms", Cambridge University Press <https://www.cse.huji.ac.il/~shais/UnderstandingMachineLearning/index.html>

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech VI Sem**L T P C**
3 0 0 3**(CS20APC605) WEB AND INTERNET TECHNOLOGIES****Course Objectives:**

This course is designed to:

- Familiarize the tags of HTML.
- Understand different Client side Scripting.
- Learn -specific web services of server side Programming.
- Connect different applications using PHP & XML .
- Connect XHTML, Java Scripting, Servlet Programming, Java Server Pages.

UNIT- I

WEBSITE BASICS, HTML 5, CSS 3, WEB 2.0 Web Essentials: Clients, Servers and Communication – The Internet – Basic Internet protocols– World wide web – HTTP Request Message – HTTP Response Message – Web Clients – Web Servers – HTML5 – Tables – Lists – Image – HTML5 control elements – Semantic elements –Drag and Drop – Audio – Video controls – CSS3 – Inline, embedded and external style sheets –Rule cascading – Inheritance – Backgrounds – Border Images – Colors – Shadows – Text – Transformations – Transitions – Animations.

Learning Outcomes:

At the end of the unit, students will be able to:

- Create standard tags of HTML tags and Knowing the features of designing Static web pages. (L6)
- List different types of CSS to design webpage attractively. (L1)
- Utilize different tools like Adobe Dream weaver and Microsoft Frontpage.(L3)

UNIT- II

CLIENT SIDE PROGRAMMING Java Script: An introduction to JavaScript–JavaScript DOM Model–Date and Objects,–Regular Expressions– Exception Handling–Validation–Built-in objects–Event Handling – DHTML with JavaScript– JSON introduction – Syntax – Function Files – Http Request – SQL.

Learning Outcomes:

At the end of the unit, students will be able to:

- Explain different types of client side scripting. (L2)
- Construct dynamic web pages using DHTML.(L6)
- Illustrate validation for web pages.(L2)

UNIT- III

SERVER SIDE PROGRAMMING Servlets : Java Servlet Architecture- Servlet Life Cycle- Form GET and POST actions-Session Handling- Understanding Cookies- Installing and Configuring Apache Tomcat Web Server DATABASE CONNECTIVITY: JDBC perspectives, JDBC program example – JSP :Understanding Java Server Pages-JSP Standard Tag Library (JSTL)-Creating HTML forms by embedding JSP code.

Learning Outcomes:

At the end of the unit, students will be able to:

- Analyze the importance of Server side scripting. (L4)
- Demonstrate deployment of the application using Tomcat Server.(L2)

- Experiment with Storing and Retrieving data from JDBC. (L3)

UNIT- IV

PHP and XML An introduction to PHP: PHP- Using PHP- Variables- Program control- Built-in functions-Form Validation- Regular Expressions - File handling – Cookies - Connecting to Database. XML: Basic XML- Document Type Definition- XML Schema DOM and Presenting XML, XML Parsers and Validation, XSL and XSLT Transformation, News Feed (RSS and ATOM).

Learning Outcomes:

At the end of the unit, students will be able to:

- Understand how XML interacts with different applications. (L1)
- Develop PHP Programs using WAMP and XAMPP Server.(L3)
- Examine background applications using XSL and XSLT.(L4)

UNIT- V

INTRODUCTION TO AJAX and WEB SERVICES : AJAX: Ajax Client Server Architecture-XML Http Request Object-Call Back Methods; Web Services: Introduction- Java web services Basics – Creating, Publishing, Testing and Describing a Web services (WSDL)-Consuming a web service, Database Driven web service from an application –SOAP.

Learning Outcomes:

At the end of the unit, students will be able to:

- Explain the importance of AJAX Architecture.
- Integrate and test web services.

Course Outcomes:

At the end of the course, the students should be able to:

- Construct a basic website using HTML and Cascading Style Sheets.(L3)
- Build dynamic web page with validation using Java Script objects and by applying different event handling mechanisms.(L6)
- Develop server side programs using Servlets and JSP.(L3)
- Construct simple web pages in PHP and represent data in XML format. (L6)
- Utilize AJAX and web services to develop interactive web applications.(L3)

Text Books:

1. Deitel and Deitel and Nieto, —Internet and World Wide Web - How to

- Programll,Prentice Hall, 5th Edition, 2011.
2. Web Technologies, Uttam K. Roy, Oxford Higher Education., 1st edition, 10th impression, 2015.
 3. The Complete Reference PHP by Steven Holzner, MGH HILL Education, Indian Edition, 2008.

References

1. Stephen Wynkoop and John Burke —Running a Perfect Websitell, QUE, 2nd Edition,1999.
2. Chris Bates, Web Programming – Building Intranet Applications, 3rd Edition, Wiley Publications, 2009.
3. Jeffrey C and Jackson, —Web Technologies A Computer Science Perspective Pearson Education, 2011.
4. Gopalan N.P. and Akilandeswari J., —Web Technology, Prentice Hall of India,

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B.Tech VI Sem

L T P C
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(CS20APE601)ARTIFICIAL INTELLIGENCE

Professional Elective -II

Course Objectives:

This course is designed to:

- Define Artificial Intelligence and establish the cultural background for study
- Understand various learning algorithms
- Explore the searching and optimization techniques for problem solving
- Provide basic knowledge on Natural Language Processing and Robotics

Unit – I:

Introduction: What is AI, Foundations of AI, History of AI, The State of Art.

Intelligent Agents: Agents and Environments, Good Behaviour: The Concept of Rationality, The Nature of Environments, The Structure of Agents.

Learning Outcomes:

At the end of the unit, students will be able to:

- Recognize the importance of Artificial Intelligence (L1)
- Identify how intelligent agent is related to its environment (L2)
- Build an Intelligent agent (L3)

Unit – II:

Solving Problems by searching: Problem Solving Agents, Example problems, Searching for Solutions, Uninformed Search Strategies, Informed search strategies, Heuristic Functions, Beyond Classical Search: Local Search Algorithms and Optimization Problems, Local Search in Continuous Spaces, Searching with Nondeterministic Actions, Searching with partial observations, online search agents and unknown environments.

Learning Outcomes:

At the end of the unit, students will be able to:

- Explain how an agent can formulate an appropriate view of the problem it faces. (L2)
- Solve the problems by systematically generating new states (L2)
- Derive new representations about the world using process of inference (L5)

Unit – III:

Reinforcement Learning: Introduction, Passive Reinforcement Learning, Active Reinforcement Learning, Generalization in Reinforcement Learning, Policy Search, applications of RL Natural Language Processing: Language Models, Text Classification, Information Retrieval, Information Extraction.

Learning Outcomes:

At the end of the unit, students will be able to:

- Examine how an agent can learn from success and failure, reward and punishment. (L5)
- Develop programs that make queries to a database, extract information from texts, and retrieve relevant documents from a collection using Natural Language Processing. (L6)

Unit-IV:

Natural Language for Communication:

Phrase structure grammars, Syntactic Analysis, Augmented Grammars and semantic Interpretation, Machine Translation, Speech Recognition Perception: Image Formation, Early Image Processing Operations, Object Recognition by appearance, Reconstructing the 3D World, Object Recognition from Structural information, Using Vision.

Learning Outcomes:

At the end of the unit, students will be able to:

- Develop programs that translate from one language to another, or recognize spoken words.(L6)
- Explain the techniques that provide robust object recognition in restricted context.(L2)

Unit-V:

Robotics: Introduction, Robot Hardware, Robotic Perception, Planning to move, planning uncertain movements, Moving, Robotic software architectures, application domains Philosophical foundations: Weak AI, Strong AI, Ethics and Risks of AI, Agent Components, Agent Architectures, Are we going in the right direction, What if AI does succeed.

Learning Outcomes:

At the end of the unit, students will be able to:

- Explain the role of Robot in various applications. (L2)
- List the main philosophical issues in AI. (L1)

Course outcomes:

Upon completion of the course, the students should be able to:

- Apply searching techniques for solving a problem (L3)
- Design Intelligent Agents (L6)
- Develop Natural Language Interface for Machines (L6)
- Design mini robots (L6)
- Summarize past, present and future of Artificial Intelligence (L5)

Text books:

1. Stuart J.Russell, Peter Norvig, "Artificial Intelligence A Modern Approach", 3rd Edition,Pearson Education, 2019.

References:

1. Nilsson, Nils J., and Nils Johan Nilsson. Artificial intelligence: a new synthesis. Morgan Kaufmann, 1998.
2. Johnson, Benny G., Fred Phillips, and Linda G. Chase. "An intelligent tutoring system for the accounting cycle: Enhancing textbook homework with artificial intelligence." Journal of Accounting Education 27.1 (2009): 30-39.

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B.Tech VI Sem

L T P C
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(CS20APE602) BIG DATA ANALYTICS

(Professional Elective-II)

Course Objectives:

The course is designed to

- Understand the basic concepts and importance of Big Data
- Familiarize with the installation of Hadoop and how to analyze the Big Data
- Understand the design concepts of HDFS
- Provide good insight for developing a MapReduce applications
- Understand Hadoop environment.
- Explore the concepts of Pig, Hive, Spark and HBase

UNIT-I

Introduction to Big Data:What is Big Data? Why Big Data is Important? Meet Hadoop, Data, Data Storage and Analysis, Comparison with other systems, History of Apache Hadoop, Hadoop Ecosystem, VMWare Installation of Hadoop. Analyzing the Data with Hadoop, Scaling Out.

Learning Outcomes:

At the end of the unit, students will be able to:

- Identify the characteristics of datasets. (L3)
- Compare trivial data and big data for various applications. (L4)
- Choose and implement various ways of selecting suitable model parameters.(L1)

UNIT- II

HDFS: The Design of HDFS, HDFS Concepts, The Command-Line Interface, Hadoop File systems, The Java Interface, Data flow.

MapReduce: Developing a MapReduce application, The Configuration API, Setting up the Development Environment, Running Locally on Test Data, Running on a Cluster.

Learning Outcomes:

At the end of the unit, students will be able to:

- Understand and apply scaling up Hadoop techniques and associated technologies.(L2)

- Estimate suitable test data. (L5)
- Apply the Map Reduce application on a cluster.(L3)

UNIT-III

How Map Reduce Works: Anatomy of a MapReduce, Job Run, Failures, Shuffle and Sort, Task Execution. MapReduce Types and Formats: MapReduce Types, Input formats, output formats.

Learning Outcomes:

At the end of the unit, students will be able to:

- Explore the Anatomy of MapReduce. (L5)
- Illustrate various input and output formats of MapReduce. (L2)
- List various MapReduce types.(L1)

UNIT-IV

Hadoop Environment: Setting up a Hadoop Cluster, Cluster specification, Cluster Setup and Installation, Hadoop Configuration, Security.

Pig: Installing and Running Pig, an Example, Comparison with Databases, Pig Latin, User-Defined Functions, Data Processing Operators.

Learning Outcomes:

At the end of the unit, students will be able to:

- Show the cluster setup and installation.(L2)
- Demonstrate the Configure the Hadoop.(L2)
- Compare Hadoop with various Databases.(L5)

UNIT-V

Hive: Installing Hive, Running Hive, Comparison with traditional Databases, HiveQL, Tables, Querying Data.

Spark: Installing Spark, Resilient Distributed Datasets, Shared Variables, Anatomy of a Spark Job Run.

HBase: HBasics, Installation, clients, Building an Online Query Application.

Learning Outcomes:

At the end of the unit, students will be able to:

- Explain various frameworks of Big Data. (L2)
- Compare Hive with traditional Databases.(L4)
- Learn how to build an online query application.(L1)

Course Outcomes:

Upon completion of the course, the students should be able to:

- Explain the concepts and challenges of big data (L2)
- Determine why existing technologies are inadequate to analyze the large data.

(L5)

- Outline the operations viz. Collect, manage, store, query, and analyze various forms of big data. (L2)
- Apply large-scale analytic tools to solve some of the open big data problems.

(L3)

- Analyze the impact of big data for business decisions and strategies.(L4)
- Design different big data applications. (L6)

Text Books:

1. Tom White, "Hadoop: The Definitive Guide"Fourth Edition, O'reilly Media, 2015.
2. Big Data, Big Analytics: Emerging business intelligence and analytic trends for today's businesses, Michael Minnelli, Michelle Chambers, and Ambiga Dhiraj, Wiley Cio Series

Reference Books:

1. Glenn J. Myatt, Making Sense of Data , John Wiley & Sons, 2007 Pete Warden,Big Data Glossary,O'Reilly, 2011.
2. Michael Berthold, David J.Hand, Intelligent Data Analysis, Spingers, 2007.
3. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos,Uderstanding Big Data : Analytics for Enterprise Class Hadoop and Streaming Data, McGraw Hill Publishing, 2012.
4. Anand Rajaraman and Jeffrey David UIIman, Mining of Massive Datasets Cambridge University Press, 2012.

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B.Tech VI Sem

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3 0 0 3

(CS20APE603) Computer Vision

(Professional Elective-II)

Course Objectives:

The course is designed to

- Understand the basic concepts and importance of Computer Vision
- Familiarize with the how to analyze the Images
- Understand the design concepts of KNN, ANN and Dimensionality Reduction.
- Understand Feature extraxtion and Segmentation.

Unit-1

Overview, computer imaging systems, lenses, Image formation and sensing, Image analysis, pre-processing and Binary image analysis.

Unit-2

Edge detection, Edge detection performance, Hough transform, corner detection

Unit-3

Segmentation, Morphological filtering, Fourier transform

Unit-4

Feature extraction, shape, histogram, color, spectral, texture, using CV IP tools, Feature analysis, feature vectors, distance /similarity measures, data preprocessing

Unit-5:

Clustering: K-Means, K-Medoids, Mixture of Gaussians Classification: Discriminant Function, Supervised, Un-supervised, Semi-supervised Classifiers: Bayes, KNN, ANN models; Dimensionality Reduction: PCA, LDA, ICA, and Non-parametric methods.

At the end of the module the student will be able to:

- Identify basic concepts, terminology, theories, models and methods in the field of computer vision(L1).
- Describe basic methods of computer vision related to multi-scale representation, edge detection and detection of other primitives, stereo, motion and object recognition (L2).
- Developed the practical skills necessary to build computer vision applications(L3).
- To have gained exposure to object and scene recognition and categorization from images(L2).

SRI VENKATESWARA COLLEGE OF ENGINEERING
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BTech VI Sem

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(CS20APE604) INTERNET OF THINGS

Course Objectives:

- Understand the basics of Internet of Things and protocols.
- Discuss the requirement of IoT technology
- Introduce some of the application areas where IoT can be applied.
- Understand the vision of IoT from a global perspective, understand its applications, determine its market perspective using gateways, devices and data management

Course Outcomes:

After completion of the course, students will be able to

- Understand general concepts of Internet of Things.
- Apply design concept to IoT solutions
- Analyze various M2M and IoT architectures
- Evaluate design issues in IoT applications
- Create IoT solutions using sensors, actuators and Devices

UNIT- I

Introduction to IoT : Definition and Characteristics of IoT, physical design of IoT, IoT protocols, IoT communication models, IoT Communication APIs, Communication protocols, Embedded Systems, IoT Levels and Templates

UNIT- II

Prototyping IoT Objects using Microprocessor/Micro controller : Working principles of sensors and actuators, setting up the board – Programming for IoT, Reading from Sensors, Communication: communication through Bluetooth, Wi-Fi.

UNIT- III

IoT Architecture and Protocols : Architecture Reference Model- Introduction, Reference Model and architecture, IoT reference Model, Protocols- 6LowPAN, RPL, CoAP, MQTT, IoT frameworks- Thing Speak.

UNIT IV

Device Discovery and Cloud Services for IoT : Device discovery capabilities- Registering a device, Deregister a device, Introduction to Cloud Storage models and communication APIs Web-Server, Web server for IoT.

UNIT -V

UAV IoT : Introduction to Unmanned Aerial Vehicles/Drones, Drone Types, Applications: Defense, Civil, Environmental Monitoring; UAV elements and sensors- Arms, motors, Electronic Speed Controller(ESC), GPS, IMU, Ultra sonic sensors; UAV Software – Ardupilot, Mission Planner, Internet of Drones(IoD)- Case study FlytBase.

Textbooks:

1. Vijay Madiseti and ArshdeepBahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014.
2. Handbook of unmanned aerial vehicles, K Valavanis; George J Vachtsevanos, New York, Springer, Boston, Massachusetts : Credo Reference, 2014. 2016.

Reference Books:

1. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.
2. ArshdeepBahga, Vijay Madiseti - Internet of Things: A Hands-On Approach, Universities JNTUA B.Tech. R20 Regulations Press, 2014.
3. The Internet of Things, Enabling technologies and use cases – Pethuru Raj, Anupama C. Raman, CRC Press.
4. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013
5. Cuno Pfister, Getting Started with the Internet of Things, O'Reilly Media, 2011, ISBN: 978-1-4493- 9357-1
6. DGCA RPAS Guidance Manual, Revision 3 – 2020
7. Building Your Own Drones: A Beginners' Guide to Drones, UAVs, and ROVs, John Baichtal

Online Learning Resources:

1. <https://www.arduino.cc/>
2. <https://www.raspberrypi.org/>
3. <https://nptel.ac.in/courses/106105166/5>
4. <https://nptel.ac.in/courses/108108098/4>

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(CS20APE605) SOFTWARE TESTING**Course Objectives:**

This course is designed to:

- Acquire knowledge on distinct types of testing methodologies..
- Describe the principles and procedures for designing test cases.
- Understand the stages of testing from Development to acceptance testing

UNIT- I

Introduction: Purpose of Testing, Dichotomies, Model for Testing, Consequences of Bugs, Taxonomy of Bugs. Flow graphs and Path testing: Basics Concepts of Path Testing, Predicates, Path Predicates and Achievable Paths, Path Sensitizing, Path Instrumentation, Application of Path Testing.

Learning Outcomes:

1. At the end of the unit, students will be able to:
 - a. Explain the purpose of Testing. (L2)
 - b. Interpret the need of testing (L2)
 - c. Classify different types of Bugs. (L4)

UNIT II

Transaction Flow Testing: Transaction Flows, Transaction Flow Testing Techniques. Dataflow testing: Basics of Dataflow Testing, Strategies in Dataflow Testing, Application of Dataflow Testing.

Learning Outcomes:

At the end of the unit, students will be able to:

- Apply data flow testing (L3)
- Design Transaction flow testing (L6)
- Outline the strategies of dataflow testing. (L2)
- List the applications of dataflow testing. (L1)

UNIT-III

Domain Testing: Domains and Paths, Nice & Ugly Domains, Domain testing, Domains and Interfaces Testing, Domain and Interface Testing, Domains and Testability.

Learning Outcomes:

At the end of the unit, students will be able to:

- Apply testing in various domains. (L3)

UNIT- IV

Paths, Path products and Regular expressions: Path Products & Path Expression, Reduction Procedure, Applications, Regular Expressions & Flow Anomaly Detection.

Logic Based Testing: Overview, Decision Tables, Path Expressions, KV Charts, Specifications.

Learning Outcomes: At the end of the unit, students will be able to:

- Analyze the paths in testing.(L4)
- Design testing for checking the logic (L6)

UNIT - V:

State, State Graphs and Transition Testing: State Graphs, Good & Bad State Graphs, State Testing, Testability Tips.

Graph Matrices and Application: Motivational Overview, Matrix of Graph, Relations, Power of a Matrix, Node Reduction Algorithm, Building Tools.

Learning Outcomes:

At the end of the unit, students will be able to:

- Use state graphs for testing. (L3)
- Create algorithms for node reduction (L6)

Course Outcomes:

Upon completion of the course, the students should be able to:

- Choose Test cases that are geared to discover the program defects (L5)
- Design test cases before writing code and run these tests automatically (L6)
- Formulate test cases for testing different programming constructs .(L6)
- Test the applications using different testing methods and automation tools.(L3)

Text Books:

1. Boris Beizer, "Software testing techniques", Dreamtech, second edition, 2002.

Reference Books:

1. Brian Marick, "The craft of software testing", Pearson Education.
2. Yogesh Singh, "Software Testing", Camebridge
3. P.C. Jorgensen, "Software Testing" 3rd edition, Aurbach Publications (Dist.bySPD).
4. N.Chauhan, "Software Testing", Oxford University Press.
5. P.Ammann&J.Offutt, "Introduction to Software Testing" , Cambridge Univ.Press.
6. Perry, "Effective methods of Software Testing", John Wiley, 2nd Edition, 1999.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech- VI Sem

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(ME20AOE501) INTRODUCTION TO AUTOMATION

Pre-Requisite: Operation Research, Production & Operation Management

Course Objectives:

Course Objectives:

- To understand the basic concepts of Automation
- To understand the concepts of automation cycle and hardware components
- To gain knowledge about pneumatic and hydraulic devices
- To understand the concepts of sensors and actuators
- To know the use of Robotics used in industries automation

UNIT -I: Introduction to Automation Definition and fundamentals of automation, reasons for Automating, basic elements of an automated system: Power, Program and control system, safety, maintenance & repair diagnosis, error detection and recovery, Automation principles and strategies: USA principle, strategies of automation and production system, automation migration strategy

Learning Outcomes:

At the end of the unit, students will be able to:

- To understand the fundamental concepts of automation and its basic elements
- To understand system safety requirements
- To understand about maintenance and repair strategies
- To know about production system automation

UNIT- II: Mechanization and Automation

Basic principles of Mechanization and automation, product cycle, hard Vs flexible automation, Capital- intensive Vs low cost automation. Types of systems- mechanical, electrical, hydraulic, pneumatic and hybrid systems, Automation using CAMS, Geneva mechanisms, gears etc.

Assembly line Automation: automated assembly systems, transfer systems, vibratory bowl feeders, non-vibratory feeders, part orienting, feed track, part

placing & part escapement systems. Introduction to Material storage/ handling and transport systems, and its automation using AS/RS, AGVS and conveyors etc.

Learning Outcomes:

At the end of the unit, students will be able to:

- To know about how to analyse the various automation methods
- To know about assembling and placing of various parts
- To distinguish between mechanization and automation of systems
- To know about material storage, handling and automation using various approaches

UNIT -III:

Pneumatics and hydraulics

Hydraulic and pneumatic devices-Different types of valves, Actuators and auxiliary elements in Pneumatics & hydraulics , their applications and use of their ISO symbols. Synthesis and design of circuits (up to 3 cylinders)-pneumatic, electro pneumatics and hydraulics. Design of Electro-Pneumatic Circuits using single solenoid and double solenoid valves; with and without grouping.

Learning Outcomes:

At the end of the unit, students will be able to:

- To know design of various pneumatic and hydraulic components
- To understand about synthesis and design of Pneumatic circuits
- To understand about electro pneumatic circuits
- To design using various solenoid valves with and without grouping

UNIT -IV: Sensors & Actuators Sensors Selection of sensors (Displacement, temperature, acceleration, force /pressure) based on static and dynamic characteristics. Interfacing: Concept of interfacing, bit accuracy and sampling speed, amplifying electronics, and microcontroller. Actuators: Principle and selection of electro mechanical actuators (1) DC motors (2) Stepper Motors (3) Solenoid Actuators (4) Servo Motors (5) BLDC

Learning Outcomes:

At the end of the unit, students will be able to:

- To know about selection of sensors and actuators based on dynamic characteristics
- To understand about necessity of interfacing sensors with Microcontroller
- To understand principle and selection of actuators

- To apply various electro mechanical actuators to certain machines

UNIT- V:

Robots and their applications

Introduction to robots, Types, Classifications, Selection of robots, Robot Degrees of freedom, Robot configuration, Accuracy and repeatability, Specification of a robot, Robot feedback controls: Point to point control and Continuous path control, Control system for robot joint, Adaptive control, Drives and transmission systems, End effectors, Industrial robot applications of robots

Learning Outcomes:

At the end of the unit, students will be able to:

- To know about Robots, classification, selection and specifications
- To understand the use of robotics in industrial applications
- To know about various feedback controls of Robot
- To understand how adaptive control strategies can be used in Robots

TEXT BOOKS:

1. Stamatios Manesis and George Nikolakopoulos, "Introduction to Industrial Automation", CRC Press, 2018.
2. Frank Lamb, "Industrial Automation", Hands on, Mc Graw Hill Education, 2013.

REFERENCES:

1. Richerd L. Shell and Ernest L. Hall, "Hand Book of Industrial Automation", CRC Press, 2000.
- Through reading the text, references and discussion of cases students should be able to understand the fundamentals underlying the management of an Organization.
 - Understand where the plant is to be located based on facilities available and what are the important factors affecting the facilities location of a plant, and plant layout.
 - Determine work measurement techniques for time study.
 - Recognize the importance of Inventory control to ensure their availability with minimum capital lock up.
 - Understand the concepts of TQM, ISO, BIS etc.

Course Outcomes:

1. Understand the basic concepts of Industrial automation
2. Design and analysis of automation methods, placing and assembling of various parts
3. Design of various processing and control circuits using pneumatic and hydraulic elements
4. Selection of sensors based on the industrial application
5. Role of robotics in industrial applications

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B.Tech- V Sem

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(EE20AOE503) RENEWABLE ENERGY RESOURCES (OPEN ELECTIVE)

Course Objectives:

- Familiarize with basics of solar radiation, available solar energy and its measurement & Familiarize with solar collectors, construction and operation of solar collectors.
- Understand solar energy conversion systems, applications and power generation & Familiarize the wind energy sources assessment
- To explain concept of various forms of renewable energy
- To outline division aspects and utilization of renewable energy sources for both domestics and industrial applications
- To analyse the environmental and cost economics of using renewable energy sources compared to fossil fuels

Unit -1:

Principles of Solar Radiation : Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on tilted surface, instruments for measuring solar radiation and sun shine, solar radiation data.

Unit -2:

Solar Energy Collection & Storage :

Solar Energy Collection: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

Solar Energy Storage and Applications :

Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications solar heating technique, solar distillation and drying, photovoltaic energy conversion

Unit -3:

Wind Energy & Bio-Mass :

Wind Energy : Sources and potentials, horizontal and vertical axis windmills,

performance characteristics, Betz criteria

Bio-Mass : Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C. Engine operation and economic aspects.

Unit -4:

Geothermal Energy & Ocean Energy:

Geothermal Energy : Resources, types of wells, methods of harnessing the energy, potential in India.

Ocean Energy : OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

Unit -5:

Direct Energy Conversion:

Direct Energy Conversion: Need for DEC, Carnot cycle, limitations, principles of DEC. Thermo-electric generators, Seebeck, Peltier and Joule Thomson effects, Figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux, MHD accelerator, MHD Engine, power generation systems, electron gas dynamic conversion, economic aspects. Fuel cells, principles, faraday's law's, thermodynamic aspects, selection of fuels and operating conditions.

Text Books:

1. Tiwari and Ghosal, Renewable energy resources, Narosa Publishing House-2004.
2. G.D. Rai, Non-Conventional Energy Sources, Khanna Publications-1988.

Reference Books:

1. Twidell & Weir, Renewable Energy Sources, Routledge; 3-e, 2015.
2. Sukhatme S.P.,. Nayak.J.P, 'Solar Energy – Principle of Thermal Storage and collection", Tata McGraw Hill, 2008.
3. Sathyajith Mathew, Wind Energy Fundamentals, Resource Analysis and Economics, Springer Publications, (2006).
4. Wei Tong, Wind Power Generation and Wind Turbine Design, WIT Press, (2010.)
5. Wind Power, Revised Edition: Renewable Energy for Home, Farm, and Business, Paul Gipe, 2004, Chelsea Green Publishing

Course Outcomes:

At the end of the course, the student will be able to

CO1: Explain the basic concepts of solar radiation and solar collectors

CO2: Develop the Bio - Energy Concepts

CO3: Explain the geothermal Energy ,Tidal and Wave Energy

CO4: Apply the principles of electrical technology to develop MHD power generator & Utilize different wind parameters for design of rotor

CO5: Make use of power curve for energy estimation and fuel cell Technology

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B. Tech- VI Sem

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(EC20AOE602) SIGNAL PROCESSING

Course Objectives:

1. To introduce students to the basic idea of signal and system analysis and its characterization in time and frequency domains.
2. To present Fourier tools through the analogy between vectors and signals.
3. To teach concept of sampling and reconstruction of signals.
4. To analyze characteristics of linear systems in time and frequency domains.
5. To understand Laplace and z-transforms as mathematical tool to analyze continuous and discrete-time signals and systems.

UNIT I

SIGNALS & SYSTEMS:

Definition and classification of Signal and Systems (Continuous time and Discrete time), Elementary signals such as Dirac delta, unit step, ramp, sinusoidal and exponential and operations on signals. Analogy between vectors and signals-orthogonality-Mean Square error-Fourier series: Trigonometric & Exponential and concept of discrete spectrum

UNIT II

CONTINUOUS TIME FOURIER TRANSFORM:

Definition, Computation and properties of Fourier Transform for different types of signals. Statement and proof of sampling theorem of low pass signals.

UNIT III

SIGNAL TRANSMISSION THROUGH LINEAR SYSTEMS:

Linear system, impulse response, Response of a linear system, linear time-invariant (LTI) system, linear time variant (LTV) system, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF

characteristics, Causality and Poly-Wiener criterion for physical realization, Relationship between bandwidth and rise time. Energy and Power Spectral Densities

UNIT IV

DISCRETE TIME FOURIER TRANSFORM:

Definition, Computation and properties of Fourier Transform for different types of signals.

UNIT V

LAPLACE TRANSFORM:

Definition-ROC-Properties-Inverse Laplace transforms-the S-plane and BIBO stability-Transfer functions-System Response to standard signals-Solution of differential equations with initial conditions.

The Z-TRANSFORM: Derivation and definition-ROC-Properties- Inverse Z-Transform-System analysis-Transfer function-BIBO stability-System.

TEXT BOOKS:

1. B. P. Lathi, "Linear Systems and Signals", Second Edition, Oxford University press.
2. A.V. Oppenheim, A.S. Willsky and S.H. Nawab, "Signals and Systems", Pearson, 2nd Edition.
3. A. Ramakrishna Rao, "Signals and Systems", 2008, TMH.

REFERENCES:

1. Simon Haykin and Van Veen, "Signals & Systems", Wiley, 2nd Edition.
2. B.P. Lathi, "Signals, Systems & Communications", 2009,BS Publications.

Course Outcomes:

- CO1:** Understand the mathematical description and representation of continuous-time and discrete-time signals and systems. Also understand the concepts of various transform techniques.
- CO2:** Apply sampling theorem to convert continuous-time signals to discrete-time signals and reconstruct back, different transform techniques to solve signals

and system related problems.

- C03:** Analyze the frequency spectra of various continuous-time signals using different transform methods.
- C04:** Analyze the systems based on their properties and determine the response of them.
- C05:** Analyze the frequency spectra of various discrete-time signals using different transform methods.

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(CE20AOE603)Water Resources Planning &Management

CourseObjectives:

This course

- Demonstrates Principles of Watershed Management
- Explains River basin Watershed Management Practices
- Imparts knowledge on conservation of water and its reuses
- Teaches the sustainable watershed approach
- Inculcates the knowledge of rainwater harvesting and GIS applications.

UNIT –I

Principles of Watershed Management: Basics concepts, Hydrology and water availability, Surface water, Groundwater, Conjunctive use, Human influences in the water resources system, Water demand, Integrated water resources system.

UNIT – II

River basin Watershed Management Practices in Arid and Semi-arid Regions, Watershed management through wells, Management of water supply - Case studies.

UNIT – III

Conservation of Water: Perspective on recycle and reuse, Waste water reclamation
Social Aspects of Watershed Management: Community participation, Private sector participation, Institutional issues, Socio-economy, Integrated development, Water legislation and implementations.

UNIT –IV

Sustainable Watershed Approach: Sustainable integrated watershed management, natural resources management, agricultural practices, integrated farming, Soil erosion and conservation.

UNIT – V

Water Harvesting: Rainwater management - conservation, storage and effective utilization of rainwater, Structures for rainwater harvesting, roof catchment system, check dams, Geographical Information System and Remote Sensing in Watershed Management.

Course Outcomes (CO):

At the end of this course, the students will be able to:

- Know the basic principles of watershed management.
- Know the river basin management practices
- Understand better different approaches for conservation of water.
- Identify sustainable watershed approach for resources management, prevention of soil erosion etc.,
- Different methods of rainwater harvesting management systems and role of GIS.

Textbooks:

1. Murthy, J.V.S., "Watershed Management in India", Wiley Eastern, New Delhi, 1994.

Reference Books:

1. Murty, J.V.S., "Watershed Management", New Age Intl., New Delhi 1998.
2. Allam, G.I.Y., "Decision Support System for Integrated Watershed Management", Colorado State University, 1994.
3. Vir Singh, R., "Watershed Planning and Management", Yash Publishing House, Bikaner, 2000.
4. American Society of Civil Engineers, Watershed Management, American Soc. of Civil Engineers, New York, 1975

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(CS20APC602) Cryptography and Network Security Lab

This course is designed to:

- Understand the different types of networks
- Discuss the software and hardware components of a network
- Enlighten the working of networking command supported by operating system
- Impart knowledge of Network simulator2/3
- Familiarize the use of networking functionality supported by JAVA
- Familiarize with computer networking tools.

List of Experiments:

1. Study different types of Network cables (Copper and Fiber) and prepare cables (Straight and Cross) to connect Two or more systems. Use crimping tool to connect jacks. Use LAN tester to connect the cables. Install and configure Network Devices: HUB, Switch and Routers. Consider both manageable and non-manageable switches. Do the logical configuration of the system. Set the bandwidth of different ports. Install and Configure Wired and Wireless NIC and transfer files between systems in WiredLAN and WirelessLAN. Consider both adhoc and infra structure mode of operation.
2. Work with the commands Ping, Tracert, Ipconfig, pathping, telnet, ftp, getmac, ARP, Hostname, Nbtstat, netdiag and Nslookup
3. Use Sniffers for monitoring network communication(Ethereal)

4. Find all the IPAddresses on your network. Unicast, Multicast, and Broadcast on your network.
5. Use Packet tracer software to build network topology and configure using Distance vector routing protocol.
6. Use Packet tracer software to build network topology and configure using LinkState routing protocol.
7. Using JAVA RMI Write a program to implement BasicCalculator
8. Implement a Chatting application using JAVA TCP and UDP sockets.
9. Hello command is used to know whether the machine at the other end is working or not. Echo command is used to measure the round trip time to the neighbour. Implement Hello and Echo commands using JAVA.
10. Use Ethereal tool to capture the information about packets.
11. Install Network Simulator2/3. Create a wired network using dumb bell topology. Attach agents, generate both FTP and CBR traffic, and transmit the traffic. Vary the data rates and evaluate the performance using metric throughput, delay, jitter and packet loss.
12. Create a static wireless network. Attach agents, generate both FTP and CBR traffic, and transmit the traffic. Vary the data rates and evaluate the performance using metric throughput, delay, jitter and packet loss.
13. Create a mobile wireless network. Attach agents, generate both FTP and CBR traffic, and transmit the traffic. Vary the data rates and evaluate the performance using metric throughput, delay, jitter and packet loss.

Course outcomes:

Upon completion of the course, the students should be able to:

- Design scripts for Wired network simulation(L6)
- Design scripts of static and mobile wireless networks simulation (L6)
- Analyze the data traffic using tools (L4)
- Design JAVA programs for client-server communication(L6)
- Construct a wired and wireless networks using the real hardware(L3)

ReferenceBooks:

1. ShivendraS.Panwar,ShiwenMao,Jeong-dong Ryoo, and YihanLi
,"TCP/IPEssentialsALab-BasedApproach",CambridgeUniversity
Press,2004.
2. CiscoNetworkingAcademy,"CCNA1andCCNA2CompanionGuide",Cisco
NetworkingAcademyProgram,3rdedition, 2003.
3. NsManual,Available at: [https://www.isi.edu/nsnam/ns/ns-
documentation.html](https://www.isi.edu/nsnam/ns/ns-documentation.html),2011.

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(CS20APC604)Machine Learning lab

Course Objective:

The objective of this lab is to get an overview of the various machine learning techniques and can able to demonstrate them using python.

Course Outcomes:

After the completion of the course the student can able to:

1. understand complexity of Machine Learning algorithms and their limitations;
2. understand modern notions in data analysis-oriented computing;
3. be capable of confidently applying common Machine Learning algorithms in practice and implementing their own;
4. Be capable of performing experiments in Machine Learning using real-world data.

List of Experiments

1. The probability that it is Friday and that a student is absent is 3 %. Since there are 5 school days in a week, the probability that it is Friday is 20 %. What is the probability that a student is absent given that today is Friday? Apply Baye's rule in python to get the result. (Ans: 15%)
2. Extract the data from database using python
3. Implement k-nearest neighbours classification using python
4. Given the following data, which specify classifications for nine combinations of VAR1 and VAR2 predict a classification for a case where VAR1=0.906 and VAR2=0.606, using the result of kmeans clustering with 3 means (i.e., 3 centroids)

VAR1	VAR2	CLASS
1.713	1.586	0
0.180	1.786	1

0.353	1.240	1
0.940	1.566	0
1.486	0.759	1
1.266	1.106	0
1.540	0.419	1
0.459	1.799	1
0.773	0.186	1

5. The following training examples map descriptions of individuals onto high, medium and low credit-worthiness.

medium skiing design single twenties no ->highRisk

high golf trading married forties yes ->lowRisk

low speedway transport married thirties yes ->medRisk

medium football banking single thirties yes ->lowRisk

high flying media married fifties yes ->highRisk

low football security single twenties no ->medRisk

medium golf media single thirties yes ->medRisk

medium golf transport married forties yes ->lowRisk

high skiing banking single thirties yes ->highRisk

low golf unemployed married forties yes ->highRisk

Input attributes are (from left to right) income, recreation, job, status, age-group, home-owner. Find the unconditional probability of 'golf' and the conditional probability of 'single' given 'medRisk' in the dataset?

6. Implement linear regression using python.

7. Implement Naïve Bayes theorem to classify the English text

8. Implement an algorithm to demonstrate the significance of genetic algorithm

9. Implement the finite words classification system using Back-propagation algorithm.

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(CS20APC606) WEB AND INTERNET TECHNOLOGIES LABORATORY

Course Objectives:

- To introduce client side scripting with Javascript and DHTML
- To introduce server side programming with Java servlets, JSP and PHP.
- To learn the basic web concepts and Internet protocols

Course Outcomes:

- Ability to create dynamic and interactive web sites.
- Gain knowledge of client side scripting using java script and DHTML.
- Demonstrate understanding of what is XML and how to parse and use XML data
- Able to do server side programming with Java Servelets, JSP and PHP.

1. To create a simple student bio-data form using html5 . it should contain the following name (text box), address (multiline text box),gender (radio button male,female),skill sets known (check boxes – c,c++,java,C#etc), extra curricular activities (text box), nationality (combobox) ,submit and reset button.
2. To create an html page with different types of frames such as floating frame, navigation frame & mixed frame.
3. Design the webpage by applying the different styles using inline, external & internal style sheets.
4. Write a java script program to read .XML file and display data in a neat format.
5. To write a Javascript program to define a user defined function for sorting the values in an array. Use HTML5 for user interface.
6. To create an html page to demonstrate exception handling in javascript

Create an html page named as "exception.html" and do the following. i. within the script tag write code to handle exception a) define a method RunTest() to get any string values(str) from the user and call the method Areletters(str). b) In

Areletters(str) method check whether str contain only alphabets (a-z, A- Z), if not throw exception. c) Define a exception method Input Exception(str) to handle the exception thrown by the above method. ii. Within the body tag define a script tag to call Runtest() method define.

7. Write a jsp servlet program to implement the single text field calculator.

8. Write a jsp servlet program to demonstrate session handling using

– url rewriting --hidden formfield --cookies --sessions 9. To create a php program to demonstrate the different predefined function in array, Math, Data & Regular Expression. Procedure:

□□ Create php file named as Regularexpression.php

□□ for demonstrating the method for handling various strings with regular expression Array.php

□□ for demonstrating the methods for handling the array values Math_function.php

□□ to demonstrate the predefined in math objects. Date_time.php to demonstrate the predefined function in date subject

10. Write a program in PHP for a simple email processing with attachment using forms

11. Write a program for PHP for a login script ; create a login database and store username and password

12. Write a program in PHP to add, update and delete using student database

13. Create a DTD to describe a library. Library has one or more books, members and staffs.

- Each book has BookID(Attribute), Title, one or more Authors, Publisher Year of Publication, ISBN and Price.
- Each Member has MemberID(Attribute), Name, Address, Phone number.
- Each Staff has StaffID(Attribute), Name, Address, Phone number.
- Each Author has AuthorID(Attribute), Name, Address, Phone number.
- Each Publisher has PublisherID(Attribute), Name, Address, Phone number.
- Use it in a XML document.

14. Create a DTD to describe a Computer. A computer has following details,

- Type of computer (this is an attribute), Which can be Desktop PC, Laptop, Palm Top, Server, Minicomputer or mainframe)
- A Monitor with Serial Number (Attribute), Make, Model, Year of manufacture, Size, Type (which is either colour or monochrome)
- A keyboard with Serial Number (Attribute), Make, Model, Year of manufacture, No of keys, Type(which is either Standard or Enhanced or Multimedia)
- A mouse with Serial Number (Attribute), Make, Model, Year of manufacture, No of buttons, Scroll wheel (which is yes or no), Type (Which is Ball or Optical)

A Mother board with Serial Number (Attribute), Make, Model, Year of manufacture, No of USB ports, No of IDE slots, No of SATA hubs, No of PCI slots, Display Type(Which is VGA or HDMI), Number of Processor slots, Type of Processors supported (must be a list), Type of RAM supported (Which is either SD or DDR1 or DDR2 or RD), Maximum Capacity of RAM, Form Factor (which is either AT or Baby AT), On Board sound card (Which is yes or no)

- A Microprocessor with Serial Number (Attribute), Make, Model, Year of manufacture, speed (in GHz), No of Cores (Single, Dual, Quad)
- A power supply with Serial Number (Attribute), Make, Model, Year of manufacture, Type (AT, ATX), Wattage
- One or more hard disks, each Hard disk must have Serial Number (Attribute), Make, Model, Year of manufacture, capacity and type (Which is IDE or SATAI or SATAII, SCSI)
- One or more RAM SIMM, with Serial Number (Attribute), Make, Model, Year of manufacture, Type (which must be SD, DDRI, DDRII, RD), capacity, operating frequency.

Use it in a XML document.

15. Create a Schema to describe a Computer. Use the previous question's details and show an instance XML document.

16. Create a Schema to describe a library. Library has one or more - books, members and staffs.

- Each book has BookID(Attribute), Title, one or more Authors, Publisher Year of Publication, ISBN and Price.

- Each Member has MemberID(Attribute), Name, Address, Phone number.
- Each Staff has StaffID(Attribute), Name, Address, Phone number.
- Each Author has AuthorID(Attribute), Name, Address, Phone number.
- Each Publisher has PublisherID(Attribute), Name, Address, Phone number.

Use the above DTD in a sample XML document.

17. Create a DTD to describe a bank that has one or more customers, accounts or Employee.

- Each Customer has a Customer ID, Name and address.
- Each account has an account ID, BranchID, CustomerID, AccountType and Balance.
- Each Employee has an EmpID, Name, Designation, DOJ, Salary and Address.

Use this DTD in a XML file.

18. Create Schema describe a bank that has one or more customers, accounts or depositors. Use the previous questions details. Also show a sample instance XML document.

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(CS20ASC601) Dev Ops

Course Objectives:

This course is designed to:

- Adapt the software Engineering practices that combine Software Development and IT operations for Quality Software
- Enumerate the principles of continuous development and deployment, automation of configuration management, inter-team collaboration, and IT service agility

UNIT I

Phases of Software Development life cycle. Values and principles of agile software development.

Learning Outcomes:

After completing this Unit, students will be able to:

1. Illustrate the Phases of Software Development life cycle (L2)
2. Appraise the Values and principles of agile software development (L5)

UNIT II

Fundamentals of DevOps: Architecture, Deployments, Orchestration, Need, Instance of applications, DevOps delivery pipeline, DevOps eco system.

Learning Outcomes:

After completing this Unit, students will be able to:

- Explain the Fundamentals of Software development and operations (L2)
- Create the Instance of applications (L6)

UNIT III

DevOps adoption in projects: Technology aspects, Agiling capabilities, Tool stack implementation, People aspect, processes

Learning Outcomes:

After completing this Unit, students will be able to:

- Understand the Technology aspects and Agile capabilities (L2)
- Interpret the aspects in user's context (L5)

UNIT IV

CI/CD: Introduction to Continuous Integration, Continuous Delivery and Deployment , Benefits of CI/CD, Metrics to track CICD practices

Learning Outcomes:

After completing this Unit, students will be able to:

- Explain CI/CD and its benefits (L2)
- Demonstrate the Continuous Integration, Delivery and Deployment (L2)

UNIT V

Devops Maturity Model: Key factors of DevOps maturity model, stages of Devops maturity model, DevOps maturity Assessment

Learning Outcomes:

After completing this Unit, students will be able to:

- Identify the Key factors of maturity model (L3)
- Estimate the DevOps maturity Assessment (L6)

Course Outcomes:

At the end of the course, student will be able to

- Explain how DevOps will balance the needs throughout the SDLC(L2)
- Demonstrate how DevOps improves the collaboration and productivity by automation.(L2)
- Adapt DevOps in real time projects. (L6)
- Illustrate the continuous integration tools and monitoring tools (L2)

Text Books:

1) The DevOps Handbook: How to Create World-Class Agility, Reliability, and Security in Technology Organizations, Gene Kim , John Willis , Patrick Debois , Jez H

Reference Books:

- 1) Building a DevOps Culture, 1st Edition, Mandi Walls, O'Reilly publications, 2013.
- 2) The DevOps 2.0 Toolkit: Automating the Continuous Deployment Pipeline With Containerized Microservices, 1st Edition, Viktor Farcic, CreateSpace Independent Publishing Platform publications, 2016
- 3) Continuous Delivery: Reliable Software Releases Through Build, Test, and Deployment Automation, 1st Edition, Jez Humble and David Farley, 2010.
- 4) Achieving DevOps: A Novel About Delivering the Best of Agile, DevOps, and microservices, 1st Edition, Dave Harrison, Knox Lively, Apress publications, 2019

e-Resources:

- 1) <https://www.javatpoint.com/devops>
- 2) <https://github.com/nkatre/Free-DevOps-Books-1/blob>

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B. Tech VI

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(BA20AMC501) MANDATORY COURSE: CONSTITUTION OF INDIA

Course Objectives:

- To enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and Election Commission of India.
- To understand the central-state relation in financial and administrative control

UNIT-I

Introduction to Indian Constitution – Constitution -Meaning of the term - Indian Constitution-Sources and constitutional history - Features– Citizenship – Preamble - Fundamental Rights and Duties-Directive Principles of State Policy.

Learning Outcomes:-

After completion of this unit student will

- Understand the concept of Indian constitution
- Apply the knowledge of directive principle of state policy
- Analyze the History and features of Indian constitution
- Learn about Preamble, Fundamental Rights and Duties

UNIT-II

Union Government and its Administration Structure of the Indian Union-Federalism -Centre-State relationship-President's Role, power and position-PM and Council of

ministers - Cabinet and Central Secretariat–Lok Sabha–Rajya Sabha - The Supreme Court and High Court-Powers

Learning Outcomes:-

After completion of this unit student will

- Understand the structure of Indian government
- Differentiate between the state and central government
- Explain the role of President and Prime Minister
- Know the Structure of Supreme Court and Highcourt

UNIT-III

State Government and its Administration - Governor - Role and Position -CM and Council of ministers –State Secretariat-Organization Structure and Functions

Learning Outcomes:-

After completion of this unit student will

- Understand the structure of state government
- Analyze the role of Governor and Chief Minister
- Explain the role of State Secretariat
- Differentiate between structure and functions of state secretariat

UNIT-IV

Local Administration-District's Administration Head-Role and Importance-Municipalities

- Mayor and role of Elected Representatives -CEO of Municipal Corporation
Panchayati Raj -Functions– PRI –ZillaParishath - Elected officials and their roles –
CEO, ZillaParishath –Block level Organizational Hierarchy-(Different departments)-
Village level –Role of Elected and Appointed officials-Importance of grass root
democracy

Learning Outcomes:-

After completion of this unit student will

- Understand the local Administration

- Compare and contrast district administration's role and importance
- Analyze the role of Mayor and elected representatives of Municipalities
- Learn about the role of Zilla Parishath block level organization

UNIT-V

Election Commission-Election Commission-Role of Chief Election Commissioner and Election Commissionerate -State Election Commission -Functions of Commissions for the welfare of SC/ST/OBC and Women

Learning Outcomes:-

After completion of this unit student will

- Know the role of Election Commission
- Contrast and compare the role of Chief Election commissioner and Commissionerate
- Analyze the role of state election commission
- Evaluate various commissions viz SC/ST/OBC and women

Course Outcomes:-

- At the end of the course, students will be able to
- Understand historical background of the constitution making and its importance for
- Building a democratic India.
- Understand the functioning of three wings of the government i.e., executive, legislative and judiciary.
- Understand the value of the fundamental rights and duties for becoming good citizen of India.
- Analyze the decentralization of power between central, state and local self-government

- Apply the knowledge in strengthening of the constitutional institutions like CAG,
- Election Commission and UPSC for sustaining democracy.

Textbooks:

- J.A. Siwach, "DynamicsofIndianGovernment&Politics".
- H.M.Sreevai, "ConstitutionalLawofIndia", 4theditionin3volumes(UniversalLawPublication)
- J.C.Johari, "IndianGovernment andPolitics", HansIndia
- M.V.Pylee, "IndianConstitution", DurgaDasBasu, HumanRightsinConstitutionalLaw, Prentice-Hall of India Pvt. Ltd. New Delhi

References:

- J.A. Siwach, "DynamicsofIndianGovernment&Politics".
- H.M.Sreevai, "ConstitutionalLawofIndia", 4theditionin3volumes(UniversalLawPublication)
- J.C.Johari, "IndianGovernment andPolitics", HansIndia
- M.V.Pylee, "IndianConstitution", DurgaDasBasu, HumanRightsinConstitutionalLaw, Prentice-Hall of India Pvt. Ltd. New Delhi

E-RESOURCES:

- nptel.ac.in/courses/109104074/8
- nptel.ac.in/courses/109104045/
- nptel.ac.in/courses/101104065/
- www.hss.iitb.ac.in/en/lecture-details

www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

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(AM20AMC601) ARTIFICIAL INTELLIGENCE TOOLS TECHNIQUES & APPLICATIONS

Course Outcomes:

At the end of the course, a student will be able to:

CO1: Demonstrate various AI applications, languages and Intelligent Agents.

CO2: Solve problems using search strategies and understand the basic process of Machine Learning. CO3: Apply classification and regression algorithms on real world data.

CO4: Develop an expert system.

CO5: Comprehend the structure of an artificial neural network and identify the building blocks of a convolutional neural network.

UNIT-I:

ARTIFICIAL INTELLIGENCE: Introduction, Definition of AI, Goals of AI, Turing Test, Applications of AI, AI Programming Languages; Introduction, Intelligent Systems, the Concept of rationality, types of Agents, Environments and its properties, PEAS.

Learning Outcomes:

At the end of the unit, student will be able to

1. classify various AI Applications. (L2)
2. list the AI Languages. (L1)
3. explain various types of Agents. (L2)

UNIT-II:

SEARCH STRATEGIES: Introduction, Brute Force or Blind Search, Breadth-First Search, Depth-First Search, Hill Climbing, Best-First Search.

MACHINE LEARNING: Introduction, Machine Learning Process, Feature Engineering- Feature Extraction, Feature Selection, Feature Engineering Methods, Feature Engineering, Data Visualization Line Chart, Bar Chart, Pie Chart, Histograms, Scatter Plot, Seaborn-Distplot, joint plot.

Learning Outcomes:

At the end of the unit, student will be able to

1. apply informed search techniques to problems. (L3)
2. interpret the features using feature engineering. (L2)
3. analyse the data using different visualization techniques. (L4)

UNIT-III:

REGRESSION: Simple Regression, Multiple Regression, Model Assessment-Training Error, Generalized Error, Testing Error, Bias-Variance Tradeoff

CLASSIFICATION: Linear Classification, Logistic Regression, Decision Trees

Learning Outcomes:

At the end of the unit, student will be able to

1. analyse different classification models and make recommendations towards learning. (L4)
2. solve real world data using classification techniques. (L3)
3. understand different regression models and about its problems. (L2)

UNIT-IV:

CLUSTERING: K-Means Clustering. **EXPERT SYSTEMS:** Introduction, Need and Justification of ES, Knowledge Representation, Knowledge Acquisition and Variation, Utilisation and Functionality, Basics of Prolog.

Learning Outcomes:

At the end of the unit, student will be able to

1. understand the concept of clustering over classification. (L2)
2. distinguish between expert systems and traditional systems. (L2)

3. identify different applications of expert systems. (L3)

UNIT-V:

ARTIFICIAL NEURAL NETWORKS (ANNs): Biological Neuron, Types of ANN, Optimization Techniques, Vanishing Gradient Problem, Exploding Gradient Problem, Weight Initialization.

CONVOLUTION NEURAL NETWORKS(CNNs): Introduction, Components of CNN Architecture Convolution Layer(with example), Pooling/Downsampling Layer, Flattening Layer, Fully Connected Layer; Rectified Linear Unit Layer, Exponential Linear Unit, Unique Properties of CNN, Architectures of CNNs, Applications of CNN. Learning Outcomes:

At the end of the unit, student will be able to

1. understand the architecture of an artificial neuron. (L2)
2. illustrate different artificial neural network architecture. (L2)
3. analyse the effect of different activation functions of a CNN unit. (L4)

TEXT BOOKS:

1. Dr.Nilakshi Jain, Artificial Intelligence, As per AICTE: Making a System Intelligent, Wiley Publications, 1st Edition, 2019.
2. Vijayvargia, Abhishek, Machine Learning with Python: An Approach to Applied Machine Learning, BPB Publications; 1st edition, 2018.
3. Dr.S.Lovelyn Rose, Dr. L.Ashok Kumar, Dr.D.Karthika Renuka, Deep Learning using Python, Wiley India Pvt. Ltd 2019.

REFERENCES:

1. Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, Pearson Publications, 4th Edition, 2020.
2. Saroj Kaushik, Artificial Intelligence, Cengage Learning India, 2011.

WEB REFERENCES: 1. <https://keras.io/> 2. <https://ai.google/> 3. <https://www.coursera.org/learn/neural-networks-deep-learning#syllabus> 4. https://swayam.gov.in/nd1_noc19_me71/preview

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech-IV Sem

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(MA20AMC301) Logical Skills for Professionals-II (Mandatory Course)

Course Objectives:

- To learn the basic methods to find HCF, LCM Factors, Simplification, Pipes, Alligation or Mixture, Table, Bar Graphs and Pie Chart concepts.
- To understand the logic behind the Syllogism, Calender, Clocks and Number Series Analogy concepts.

UNIT –I

HCF, LCM Factors:

- Find the HCF and LCM of the given numbers by using Factorization method.
- Find the HCF and LCM of the given numbers by using Division method.

Simplification:

- Using BODAMS rule to find out the value of a given expression.
- Using Vernacular rule to find out the value of a given expression.

UNIT – II

Pipes

- Find the how much time taken to fill the tank by opening one pipe, two pipe and one after another.

Alligation or Mixture

- Using Ratio and proportion to solve the mixture problems.
- To find quickly calculate the price of a mixture, given that it is a mix of two elements having different prices.

UNIT – III

Table, Bar Graphs

- Find the Average sales of all branches for the respective years.

- Find the ratio of the total sales of respective branches.

Pie Charts

- Study the Pie chart and the table answer the questions based on them.
- Find the central angle of the components.

UNIT –IV

Syllogism

- Type-I: Different types of Venn diagrams with their implications.
- Type-II: Analyse the figure carefully and then answer certain questions regarding the given data.

UNIT – V

Calendars

- Find the day of the week on a given date
- Find the ordinary year and Leap year

Clocks

- Find the angle between the hour hand and minute hand of a clock.
- When the hands are at right angles.

Number Series Analogy

- Choosing a similarly related pair as the given number pair on the basis of the relation between the numbers in each pair.
- Choosing a number similar to a group of numbers on the basis of certain common properties that they possess..

Course Outcomes (CO):

- Demonstrate knowledge basic mathematics to develop analytical skills to solving problems of HCF, LCM Factors and Simplification.
- Demonstrate knowledge basic mathematics to develop analytical skills to solving problems of Pipes, Alligation or Mixture.
- Demonstrate knowledge basic mathematics to develop analytical skills to solving problems of Table, Bar Graphs and Pie Chart.
- Analyze the techniques in Syllogism.
- Analyze the techniques in Calendar, Clocks and Number Series Analogy concepts.

Textbooks:

1. Quantitative Aptitude, 2012, Dr. R.S. Aggarwal, S. Chand and Company Ltd, New Delhi.
2. A Modern Approach to Verbal and Non-Verbal Reasoning, 2012, Dr. R.S. Aggarwal, S. Chand and Company Ltd, New Delhi.

Reference Books:

1. Quantitative Aptitude for Competitive Examinations, 14/e, 2010, AbhijitGuha, Tata McGraw Hill Publishers, New Delhi.
2. Course in Mental Ability & Quantitative Aptitude, 3/e, 2012, Edgar Thorpe, Tata McGraw Hill Publishers, New Delhi.
3. Fast Track Objective Arithmetic, 2012, Rajesh Verma, Arihant Publications, Meerut.
4. Reasoning and Aptitude, 2013, Nem Singh, Made Easy Publications, New Delhi.

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B.Tech VII Sem

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(CS20APE701) BLOCK CHAIN TECHNOLOGIES Professional Elective -III

Course Objectives:

This course is designed to:

- Understand the philosophy of Blockchain and the cutting edge technology behind its functions
- Illustrate how to setup Ethereum tools
- Explain the key vocabulary and concepts used in Blockchain for Business

UNIT-I

Block chain concepts: Blockchain, Blockchain application example: Escrow, Blockchain stack, from web 2.0 to the next generation decentralized web, domain specific Blockchain application, Blockchain benefits and challenges. Blockchain application templates: Blockchain application components, design methodology for Blockchain applications, Blockchain applications templates

Learning Outcomes:

After completing this Unit, students will be able to

- Outline the benefits and challenges of Block chain (L2)
- Design the Blockchain applications (L6)

UNIT-II

Setting up Ethereum development tools: Ethereum clients, Ethereum languages, TestRPC, MistEthereumwalle, meta mask, web3 JavaScript API, truffle.

Ethereum Accounts: Ethereum Accounts, keypairs, working with EOA Accounts, working with contract accounts.

Learning Outcomes:

After completing this Unit, students will be able to

- Illustrate the use of Ethereum development tools (L2)

- Create Ethereum accounts and work with them (L6)

UNIT-III

Smart contracts: Smart contract, structure of a contract, setting up and interacting with a contract using Geth client, setting up and interacting with a contract using Mist Wallet

Learning Outcomes:

After completing this Unit, students will be able to

- Make use of smart contracts(L3)
- Distinguish setting up and interacting with a contract using Geth client and Mist

Wallet.(L4)

UNIT-IV

Smart contracts (continued): Smart contract examples, Smart contract patterns. Decentralized Applications: implementing Dapps, case studies,

Learning Outcomes:

After completing this Unit, students will be able to

- Illustrate the Smart contract examples and patterns(L2)
- Develop Decentralized applications.(L6)

UNIT-V

Mining: Consensus on Blockchain network, mining, Block validation, state storage in Ethereum.

Learning Outcomes:

After completing this Unit, students will be able to

- Define Consensus on Blockchain network(L1)
- Demonstrate State Storage in Ethereum(L2)

Course outcomes:

Upon completion of the course, the students should be able to:

- Create customized blockchain solutions (L6)
- Make use of the specific mechanics of Ethereum(L3)
- Experiment with Smart contracts (L3)
- Develop Enterprise applications using Blockchain(L6)

Text books:

1. Arshadeepbahga, Vijay madiseti, "Blockchain Applications A hands-on approach", VPT 2017.
2. *Chandramouli Subramanian*, Asha A George, Abhilash K A and MeenaKarthikeyan, "Blockchain Technology", Universty Press, 2021

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(CS20APE702) Data Science Professional Elective -III

Course Objectives:

1. To provide necessary knowledge on data manipulation and to perform analysis on the practical problems using statistical and machine learning approach
2. To generate report and visualize the results in graphical form using programming tools.

Course Outcome:

- Ability to gain basic knowledge on data science
- Gain the insights from the data through statistical inferences
- Develop suitable models using machine learning techniques and to analyze its performance
- Analyze on the performance of the model and the quality of the results
- R tool for data Analysis and visualize the results 6. Demonstrate problem solving skills and provide solutions to real world problems

UNIT -I

Big Data and Data Science :Big Data Analytics, Business intelligence vs Big data, big data frameworks, Current landscape of analytics, data visualization techniques, visualization software.Exploratory Data Analysis (EDA), statistical measures, Basic tools (plots, graphs and summary statistics) of EDA, Data Analytics Lifecycle, Discovery.

Learning Outcomes:

- Ability to learn basic of Data Analytics.
- Ability to gain basic knowledge on data science.
- Apply data visualization in big-data analytics

UNIT -II

Basic Statistical Inference: Developing Initial Hypotheses, Identifying Potential Data Sources, EDA case study, testing hypotheses on means, proportions and variances.

Regression models: Regression models: Simple linear regression, least-squares principle, MLR, logistic regression, Multiple Correlations, Partial correlation.

Learning Outcomes:

- Ability to utilize EDA, statistical inference
- Ability to utilize and regression techniques.

UNIT-III

Linear Algebra Basics: Matrices to represent relations between data, Linear algebraic operations on matrices – Matrix decomposition: Singular Value Decomposition (SVD) and Principal Component Analysis (PCA).

Learning Outcomes:

- Ability to Utilize Matrix decomposition techniques to perform data analysis.
- Demonstrate with illustrative examples PCA.

UNIT-IV

Data Pre-processing and Feature Selection: Data cleaning - Data integration - Data Reduction - Data Transformation and Data Discretization, Feature Generation and Feature Selection, Feature Selection algorithms: Filters- Wrappers - Decision Trees - Random Forests.

Learning Outcomes:

- Able to understand data pre-processing techniques.
- Able to learn various feature selection techniques.

UNIT-V

Classifiers : Decision tree - Naive Bayes - k-Nearest Neighbors (k-NN), k-means – SVM Association Rule mining – Ensemble methods .

Case Study: Electricity consumption Data Analysis – Analysis of changes in pollution levels – Patient survival Analysis.

Learning Outcomes:

- Understand basic Machine Learning Algorithms.
- Demonstrate Case study for different applications..

Text Book(s)

- Mining of Massive Datasets. v2.1, Jure Leskovek, Anand Rajaraman and Jeffrey Ullman., Cambridge University Press. (2019). (free online)
- Big Data Analytics, paperback 2nd ed., Seema Acharya, Subhasini Chellappan, Wiley (2019).

Reference Books:

- Doing Data Science, Straight Talk From The Frontline, Cathy O'Neil and Rachel Schutt, O'Reilly (2014).
- Data Mining: Concepts and Techniques", Third Edition, 2 Jiawei Han, Micheline• Kamber and Jian Pei, ISBN 0123814790,(2011).
- Big Data and Business Analytics, Jay Liebowitz, CRC press (2013)
- Data mining methods,2 4 nd edition, C. Rajan, Narosa (2016)

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B.Tech VII Sem

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(CS20APE703) Data Visualization Techniques

Course Objectives:

1. Provide background to understand various aspects of Data Visualization
2. Discuss various principles of visualizing heterogeneous types of data

Unit-I

Visual Queries: Process of Seeing, the Act of Perception, Design Implications, Distributed Cognition, Visual Search Strategies

Data and Visualization: Data Type, Coordinate Systems, Scale.

Learning Outcomes:

- Able to learn visual queries
- Able to learn data types and coordinate systems of data visualization

Unit-II

Visualization Design: Amount, Distribution, Proportion, Trends, Time Series, Geospatial Narratives: Telling Stories with Data, Sequencing, Visualization Rhetoric, text visualization.

Learning Outcomes:

- **Able to learn visualization design.**
- **Able to learn visualization Rhetoric.**

Unit-III

Mapping and Cartography: The Cartogram, Value-by-Area mapping

Optimal Space Usage: Aspect Ratio Selection, Geometry & Aesthetics, Wilkinson's Algorithm and its extension.

Learning Outcomes:

- Able to learn Mapping and Cartography in Visualization.
- Able to learn Optimal Space Usage.

Unit-IV

Networks: Scalable, Versatile and Simple Constrained Graph Layout, Visualization of Adjacency, Multiple Network Analysis and Visualization, Visualizing Online Social Networks.

Learning Outcomes:

- Able to learn Networks in Visualization.
- Able to understand the advantages of Visualizing Online Social Networks.

Unit-V

Animation and Color: Trend Visualization, Transitions in Statistical Data Graphics, Graphs with Radial Layout, Cartoons, Color and Information, Info graphics.

Learning Outcomes:

- Able to apply Animations and color in Visualization.
- Able to apply cartoons with different data visualization.

Course Outcomes

The students are expected to have the ability to:

1. Present data with visual representations for the target audience, task, and data
2. Analyze, critique, and revise data visualizations
3. Apply appropriate design principles in the creation of presentations and visualizations

Textbooks

1. Tufte, E., (2001), The Visual Display of Quantitative Information, 2nd Edition, Graphics Press
2. Tufte, E., (1990), Envisioning Information, Graphics Press

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**(CS20APE706) Distributed Computing
Professional Elective -III**

Course Objectives

On completion of this subject the student will be able to

- understand emerging distributed technologies.
- Design large-scale distributed systems.
- Implement cluster and grid applications.

UNIT I

Introduction: The different forms of computing, The strengths and weaknesses of Distributed computing, Operating system concepts relevant to distributed computing, the architecture of distributed applications. Paradigms for Distributed Applications, choosing a Paradigm for an application (trade-offs).

Learning Outcomes:

- Ability to learn different forms of computing.
- Ability to gain basic knowledge on architecture of distributed computing.
- Understanding distributed applications.

UNIT II

Cluster Computing: Parallel computing overview, cluster computing – Introduction, Cluster Architecture, parallel programming models and Paradigms, Applications of Clusters.

Learning Outcomes:

- Ability to learn architecture of cluster computing.
- Ability to gain basic knowledge on cluster computing.

UNIT III

Grid Computing Introduction, Grid Computing Anatomy – Architecture, Architecture and relationship to other Distributed Technologies, Grid computing road map. Merging the Grid services Architecture with the Web Services Architecture.

Learning Outcomes:

- Ability to learn grid computing anatomy.
- Ability to gain basic knowledge on architecture of grid computing.

UNIT IV

Open Grid Service Architecture – Introduction, Architecture and Goal, Sample Use cases: Commercial Data Center, National Fusion Collaboratory, Online Media

and Entertainment. OGSA platform Components, Open Grid Services Infrastructure.

Learning Outcomes:

- Ability to learn basics of OGSA platform Components.
- Ability to gain basic knowledge on Open Grid Services.

UNIT V

Globus GT 3 Toolkit – Architecture, Programming Model, A sample implementation, High Level services, OGSI.NET Middleware Solutions.

Learning Outcomes:

- Ability to learn basics of Globus GT 3 Toolkit.
- Ability to gain basic knowledge on OGSI.NET Middleware Solutions.

TEXT BOOKS:

1. Grid Computing, Joshy. Joseph & Craig Fellenstein, Pearson education, 2004
2. Distributed Computing, Principles and Applications, M.L.Liu, Pearson Education, 2004.
3. High Performance Cluster Computing, Raj kumar Buyya, Pearson education.

REFERENCE BOOKS:

1. Grid Computing – Making the global infrastructure a reality, Fran Berman, Geoffrey C Fox, Anthony J G Hey, Wiley India, 2010
2. A Networking Approach to Grid Computing, D. Minoli, Wiley & sons, 2006
- Grid Computing: A Practical Guide to Technology and Applications, A. Abbas, Firewall Media, 2008.

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B.Tech VII Sem

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(CS20APE705) SERVICE ORIENTED ARCHITECTURE

Course Objectives:

The student should be made to:

- Learn XML fundamentals.
- Be exposed to build applications based on XML.
- Understand the key principles behind SOA.
- Be familiar with the web services technology elements for realizing SOA.
- Learn the various web service standards.

UNIT- I

INTRODUCTION TO XML: XML document structure – Well formed and valid documents – Namespaces – DTD – XML Schema – X-Files.

Learning Outcomes:

- Able to create XML documents.
- Able to learn DTD and XML schema.

UNIT- II

BUILDING XML- BASED APPLICATIONS: Parsing XML – using DOM, SAX – XML Transformation and XSL – XSL Formatting – Modeling Databases in XML.

Learning Outcomes:

- Able to build XML application.
- Able to build XSL modeling for XML database.

UNIT- III

SERVICE ORIENTED ARCHITECTURE: Characteristics of SOA, Comparing SOA with Client-Server and Distributed architectures – Benefits of SOA — Principles of Service orientation – Service layers.

Learning Outcomes:

- Understand service orientation, benefits of SOA.
- Understand the principles of service orientation.

UNIT- IV

WEB SERVICES : Service descriptions – WSDL – Messaging with SOAP – Service discovery – UDDI – Message Exchange Patterns – Orchestration – Choreography – WS Transactions.

Learning Outcomes:

- Understand web services and WS standards.
- Use web services extensions to develop solutions.

UNIT- V

BUILDING SOA-BASED APPLICATIONS: Service Oriented Analysis and Design – Service Modeling – Design standards and guidelines — Composition – WS-BPEL – WS-Coordination – WS-Policy – WS-Security – SOA support in J2EE.

Learning Outcomes:

- Understand and apply service modeling.
- Understand and apply service oriented analysis and design for application development.

Course Outcomes:

Students will be able to

- Build applications based on XML.
- Develop web services using technology elements.
- Build SOA-based applications for intra-enterprise and inter-enterprise applications.

TEXTBOOKS:

1. Ron Schmelzer et al. "XML and Web Services", Pearson Education, 2002.
2. Thomas Erl, "Service Oriented Architecture: Concepts, Technology, and Design", Pearson Education, 2005.

REFERENCES:

1. Frank P.Coyle, "XML, Web Services and the Data Revolution", Pearson Education, 2002
2. Eric Newcomer, Greg Lomow, "Understanding SOA with Web Services", Pearson Education.

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(CS20APE706) Advanced Language Processors

Course Objectives:

- A language processor is a software program designed or used to perform tasks such as processing program code to machine code
- To understand the basic principles of compiler design, its various constituent parts, algorithms and data structures required to be used in the compiler.

UNIT-I

Assembler

Overview of the assembly process – Design of two pass assembler- Single pass assembler- Macros – Macro definition and usage- schematics for Macro expansion – Design of a Macro pre-processor – Macro Assembler.

Learning Outcomes:

At the end of the unit, students will be able to:

1. Design of two pass assembler.
2. Design of a Macro pre-processor

UNIT-II

Introduction to Compilers

Compilers and Translators – Structure of a compiler – lexical analysis – syntax analysis – context free grammars – basic parsing techniques- top down and bottom up parsing (brief idea only)- Recursive Decent parser – Shift reduce parser.

Learning Outcomes:

At the end of the unit, students will be able to:

1. Understand structure of Compilers

2.Design the top down and bottom up parsing

UNIT-III

Storage allocation

Data descriptors- Static and Dynamic storage allocation – Storage allocation and access in block structured programming languages – Array allocation and access- Compilation of expressions – Handling operator priorities – Intermediate code forms for expressions –code generator.

Learning Outcomes:

At the end of the unit, students will be able to:

- 1.Understand Static and Dynamic storage allocation
- 2.Generate Intermediate code forms for expressions and code generator

UNIT-IV

Compilation of Control Structures

Control transfer- Conditional and Iterative constructs- Procedure calls – Code optimization – Optimization transformations – Local optimization and global optimization – Compiler writing tools – Incremental Compilers

Learning Outcomes:

At the end of the unit, students will be able to:

- 1.under stand Conditional and Iterative constructs
- 2.Apply Compiler writing tools

UNIT-V

Loaders and Linkers

Loading – Program relocatability – linking – various loading schemes – linkage editing – Design of linkage editor – dynamic loading – overlays – dynamic linking.

Learning Outcomes:

At the end of the unit, students will be able to:

1. understand various loading schemes
2. Design of linkage editor.

TEXT BOOKS:

1. System Programming and Operating Systems – Dhamdhere Mc Graw Hill
2. Principles of Compiler Design – Aho A.V., Ullman Narosa Publications

REFERENCE BOOKS:

1. Systems programming – Donovan, Mc. Graw Hill.
2. System Software – An Introduction to Systems Programming- Leland L. Beck, Addison Wesley.
3. Compilers Principles Techniques And Tools Aho, Sethi, Ullman, Pearson Education Asia

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B.Tech VII Sem

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(CS20APE706) Cyber Security

Course Objectives:

This course is designed to:

- Understand essential building blocks and basic concepts of cyber security
- Explore Web security and Network security
- Explain the measures for securing the networks and cloud
- Understand privacy principles and policies
- Describe the legal issues and ethics in computer security

UNIT I

Introduction: Introduction to Computer Security, Threats, Harm, Vulnerabilities, Controls, Authentication, Access Control, and Cryptography, Authentication, Access Control, Cryptography.

Programs and Programming: Unintentional (Non-malicious) Programming Oversights, Malicious Code—Malware, Countermeasures.

Learning Outcomes:

After completing this Unit, students will be able to

- Explain Vulnerabilities, threats and. Counter measures for computer security[L2]
- Interpret the design of the malicious code [L2]

UNIT II

Web Security: User Side, Browser Attacks, Web Attacks Targeting Users, Obtaining User or Website Data, Email Attacks. Operating Systems Security: Security in Operating Systems, Security in the Design of Operating Systems, Rootkit.

Learning Outcomes:

After completing this Unit, students will be able to

- Outline the attacks on browser, Web and email. [L2]
- Explain the security aspects of Operating Systems. [L3]

UNIT III

Network Security: Network Concepts, Threats to Network Communications, Wireless Network Security, Denial of Service, Distributed Denial-of-Service Strategic Defenses: Security Countermeasures, Cryptography in Network Security, Firewalls, Intrusion Detection

and Prevention Systems, Network Management .Cloud Computing and Security: Cloud Computing Concepts, Moving to the Cloud, Cloud Security Tools and Techniques, Cloud Identity Management, Securing IaaS.

Learning Outcomes:

After completing this Unit, students will be able to

- Identify the network security threats and attacks. [L3]
- Design the Counter measures to defend the network security attacks. [L6]
- Analyze the security tools and techniques for Cloud computing [L4]

UNIT IV

Privacy: Privacy Concepts, Privacy Principles and Policies, Authentication and Privacy, Data Mining, Privacy on the Web, Email Security, Privacy Impacts of Emerging Technologies, Where the Field Is Headed.

Management and Incidents: Security Planning, Business Continuity Planning, Handling Incidents, Risk Analysis, Dealing with Disaster.

Learning Outcomes:

After completing this Unit, students will be able to

- Interpret the need for Privacy and its impacts of Emerging Technologies. [L2]
- Explain how to handle incidents and deal with Disaster. [L2]

UNIT V

Legal Issues and Ethics: Protecting Programs and Data, Information and the Law, Rights of Employees and Employers, Redress for Software Failures, Computer Crime, Ethical Issues in Computer Security, Incident Analysis with Ethics, Emerging Topics: The Internet of Things, Economics, Computerized Elections, Cyber Warfare.

Learning Outcomes:

After completing this Unit, students will be able to

- Adapt legal issues and ethics in computer security. [L6]
- Elaborate on the Emerging topics. [L6]

Course Outcomes:

Upon completion of the course, the students should be able to:

- Illustrate the broad set of technical, social & political aspects of Cyber Security and security management methods to maintain security protection (L2)
- Assess the vulnerabilities and threats posed by criminals, terrorist and nation states to national infrastructure (L5)
- Identify the nature of secure software development and operating systems (L3)
- Demonstrate the role security management in cyber security defense (L2)
- Adapt the legal and social issues at play in developing solutions. (L6)

Text Books:

1. Pfleeger, C.P., Security in Computing, Prentice Hall, 2010, 5th edition.
2. Schneier, Bruce. Applied Cryptography, Second Edition, John Wiley & Sons, 1996

Reference Books:

1. Rhodes-Ousley, Mark. Information Security: The Complete Reference, Second Edition, Information Security Management: Concepts and Practice, McGraw-Hill, 2013.
2. Whitman, Michael E. and Herbert J. Mattord. Roadmap to Information Security for IT and Infosec Managers. Boston, MA: Course Technology, 2011.

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(CS20APE708) DEEPLARNING Professional Elective-IV

Course Objectives:

This course is designed to:

- Demonstrate the major technology trends driving Deep Learning
- Build, train and apply fully connected deep neural networks
- Implement efficient (vectorized) neural networks
- Analyze the key parameters and hyperparameters in a neural network's architecture

UNIT-I

Linear Algebra: Scalars, Vectors, Matrices and Tensors, Matrix operations, types of matrices, Norms, Eigendecomposition, Singular Value Decomposition, Principal Components Analysis.

Probability and Information Theory: Random Variables, Probability

Distributions, Marginal Probability, Conditional

Probability, Expectation, Variance and Covariance, Bayes' Rule, Information Theory.

Numerical Computation: Overflow and Underflow, Gradient-

Based Optimization, Constrained Optimization, Linear Least Squares.

Learning Outcomes:

After completing this Unit, students will be able to:

Understand linear algebra in the deep learning context (L2)

Utilize probability and information theory in machine/deep learning applications (L3)

UNIT- II

Machine Learning: Basics and Underfitting, Hyper parameters and Validation Sets, Estimators, Bias and Variance, Maximum Likelihood, Bayesian Statistics,

Supervised and Unsupervised Learning, Stochastic Gradient Descent, Challenges Motivating Deep Learning. Deep Feedforward Networks: Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and other Differentiation Algorithms.

Learning Outcomes:

After completing this Unit, students will be able to:

Illustrate machine learning basics leading to deep learning (L2)

Contrast upper and unsupervised learning (L2)

UNIT-III

Regularization for Deep

Learning: Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Multi-Task

Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging and Other

Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, Tangent Prop and Manifold Tangent Classifier. Optimization for Training Deep Models: Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies and Meta-Algorithms.

Learning Outcomes:

After completing this Unit, students will be able to:

Evaluate Regularization Problems for Deep learning (L5)

Apply optimization for Training Deep Learning models (L3)

UNIT- IV

Convolutional Networks: The Convolution Operation, Pooling, Convolution, Basic Convolution Functions, Structured

Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features, Basis for Convolutional Network

UNIT-V

Sequence Modeling: Recurrent and Recursive Nets: Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder-Decoder Sequence-to-Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks, Echo State Networks, LSTM, Gated RNNs, Optimization for Long-Term Dependencies, Autoencoders, Deep Generative Models.

Learning Outcomes:

After completing this Unit, students will be able to:

Illustrate Recurrent and Recursive Neural Networks (L2)

Apply Autoencoders and Deep Generative Models (L3)

Course Outcomes:

After completing this course, students will be able to:

Apply linear algebra and probability theory in the deep learning applications (L3)

Elaborate the challenges and motivation to Deep learning (L6)

Differentiate the architectures of deep neural network (L4)

Build a convolutional neural network (L6)

Build and train RNN and LSTMs (L6)

Text Books:

Ian Goodfellow, Yoshua Bengio, Aaron Courville, "Deep Learning", MIT Press, 2016.

Josh Patterson and Adam Gibson, "Deep learning: A practitioner's approach", O'Reilly Media, First Edition, 2017.

Reference Books:

1. Fundamentals of Deep Learning, Designing next-generation machine intelligence algorithms, Nikhil Buduma, O'Reilly, Shroff Publishers, 2019.

2.

Deep learning Cookbook, Practical recipes to get started quickly, Douwe Osinga, O'Reilly, Shroff Publishers, 2019.

e-Resources:

<https://keras.io/datasets/>

2) <http://deeplearning.net/tutorial/deeplearning.pdf>

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(CS20APE709) Full Stack Development

Course Objectives:

- Full-stack development refers to the method of applying both front-end and back development protocols to develop websites.
- This field has been gaining popularity in recent years due to the growing number of digital businesses.
- It combines the work of managing servers and databases and system engineering. Full-stack developers are in great demand across the world.
- A full stack developer is a web developer or engineer who works with both the front and back ends of a website or application.
- In this sense, they provide an end-to-end service, and can be involved in projects that involve databases and building user-facing websites.

UNIT-I

HTML:Introduction to HTML,Browsers and HTML,Editor's Offline and Online,Tags, Attribute and Elements,Doctype Element,Comments,Headings, Paragraphs, and Formatting Text,Lists and Links,Images and Tables.

Learning Outcomes:

At the end of the unit, students will be able to:

1. Understand what is HTML and its uses.
2. Explain about tags.

UNIT-II

CSS:Introduction to CSS,Applying CSS to HTML, Selectors Properties and Values ,CSS Colors and Backgrounds,CSS Box Model,CSS Margins, Padding, and BordersCSS Text and Font Properties,CSS General Topics

Learning Outcomes:

At the end of the unit, students will be able to:

1. Understand what is CSS and its uses
2. Apply different styles to HTML document.

UNIT-III

Javascript: Introduction to JavaScript, Applying JavaScript (internal and external), Understanding JS Syntax, Introduction to Document and Window Object, Variables and Operators, Data Types and Num Type Conversion.

Learning Outcomes:

At the end of the unit, students will be able to:

Understand what is the need of javascript.

Creating client side applications using HTML, CSS and Javascript.

Applying validations.

UNIT-IV

JavaScript Continuation: Conditional Statements Switch Case Looping in JS Functions, Math and String Manipulation, Date and Time..

BootStrap: Introduction to bootstrap, bootstrap basics, bootstrap grids, bootstrap themes, bootstrap Css.

Learning Outcomes:

At the end of the unit, students will be able to:

1. Distinguish HTML, CSS and Javascript.
2. Apply bootstrap techniques on the web page.

UNIT-V

Introduction to Java: Basic concepts of Java (Basic Program, variables data types, control statements), Steps to connect java with mysql.

SQL: Introduction to SQL, SQL datatypes, Creating tables, Accessing mysql database with php.

Learning Outcomes:

At the end of the unit, students will be able to:

1. Creating a table with mysql.
2. Connecting java with mysql.

TEXT BOOKS:

1. Learning Web Design: A Beginner's Guide To HTML, CSS, Javascript, And Web Graphics, By Jennifer Niederst Robbins
- 2 .Java: The Complete Reference (11th Edition)
3. <https://www.pdfdrive.com/bootstrap-e41430539.html>
4. Getting Started with SQL Author: Thomas Nield ,Edition: 1st Edition

REFERENCE BOOKS:

1. Twitter Bootstrap 4 – Peter Shaw

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(CS20APE710) Software Project Management

Course Objectives:

- Understanding the specific roles within a software organization as related to project and process management
 - Describe the principles, techniques, methods & tools for model-based management of software projects, assurance of product quality and process adherence (quality assurance), as well as experience-based creation & improvement of models (process management).
 - Understanding the basic infrastructure competences (e.g., process modeling and measurement)
 - Understanding the basic steps of project planning, project management, quality assurance, and process management and their relationships.

Course Outcomes:

- Describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project.
- Compare and differentiate organization structures and project structures
- Implement a project to manage project schedule, expenses and resources with the application of suitable project management tools.

UNIT -I

Conventional Software Management: The waterfall model, conventional software Management performance. Evolution of Software Economics: Software Economics, pragmatic software cost estimation.

Learning Outcomes:

- Able to learn Conventional Software Management.
- Able to learn evolution of software economics

UNIT- II

Improving Software Economics: Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving

required quality, peer inspections. The old way and the new: The principles of conventional software engineering, principles of modern software management, transitioning to an iterative process.

Learning Outcomes:

- Able to learn how to improve software economics.
- Able to learn principles of modern software management.

UNIT- III

Life cycle phases: Engineering and production stages, inception, Elaboration, construction, transition phases. Artifacts of the process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts. Model based software architectures: A Management perspective and technical perspective.

Learning Outcomes:

- Able to learn lifecycle phases of software process.
- Able to learn model-based software architectures.

UNIT -IV

Work Flows of the process: Software process workflows, Inter Trans workflows. Checkpoints of the Process: Major Mile Stones, Minor Milestones, Periodic status assessments.

Iterative Process Planning: Work breakdown structures, planning guidelines, cost and schedule estimating, Interaction planning process, Pragmatic planning. Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, evolution of Organizations. Process Automation: Automation Building Blocks, The Project Environment

Learning Outcomes:

- Able to learn process workflows.
- Able to learn iterative process planning.

UNIT- V

Project Control and Process instrumentation: The server care Metrics, Management indicators, quality indicators, life cycle expectations pragmatic Software Metrics, Metrics automation. Tailoring the Process: Process discriminates, Example.

Future Software Project Management: Modern Project Profiles Next generation Software economics, modern Process transitions.

Case Study: The Command Center Processing and Display System-Replacement (CCPDS-R)

Learning Outcomes:

- Able to learnt project control and process instrumentation.
- Able to learnt application of software project management.

Text Books:

1. Software Project Management, Walker Royce, Pearson Education.
2. Software Project Management, Bob Hughes & Mike Cotterell, fourth edition, Tata McGraw Hill

Reference Books:

1. Applied Software Project Management, Andrew Stellman & Jennifer Greene, O'Reilly, 2006
2. Head First PMP, Jennifer Greene & Andrew Stellman, O'Reilly, 2007
3. Software Engineering Project Managent, Richard H. Thayer & Edward Yourdon, second edition, Wiley India, 2004.
4. Agile Project Management, Jim Highsmith, Pearson education, 2004
5. The art of Project management, Scott Berkun, O'Reilly, 2005.
6. Software Project Management in Practice, Pankaj Jalote, Pearson Education, 2002

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(CS20APE711) AGILE METHODOLOGIE

Professional Elective -V

This course is designed to:

- Master the art of agile development.
- Understand how an iterative, incremental development process leads to faster delivery of more useful software.
- Elucidate the essence of agile development methods
- Explain the principles and practices of extreme programming

UNIT I:

Why Agile? , How to be Agile, Understanding XP, Values and Principles, Improve the Process, Eliminate Waste, Deliver Value.

Learning Outcomes:

After completing this Unit, students will be able to

Appraise the importance of Agile and the philosophy behind being Agile (L5)

Interpret the questions that help to eliminate waste from the process and increase one's agility (L2)

UNIT II:

Practicing XP-Thinking, Pair Programming, Energized Work, Informative Workspace, Root Cause Analysis, Retrospectives, Collaborating, Sit Together, Real Customer Involvement, Ubiquitous Language, Stand-Up Meetings, Coding Standards, Iteration Demo, Reporting.

Learning Outcomes:

After completing this Unit, students will be able to

- Apply practices to excel as mindful developers (L3)
- Illustrate the eight practices to help a team and its stakeholders collaborate efficiently and effectively (L2)

UNIT-III:

Releasing-Done Done, No Bugs, Version Control, Ten-Minute Build, Continuous Integration, Collective Code Ownership, Documentation.

LearningOutcomes:

After completing this Unit, students will be able to

- Examine pushing software into production(L4)
- Explain the importance of documentation in ensuring the long-term maintainability of the product at appropriate times.(L2)

UNIT IV:

Planning-

Vision,ReleasePlanning,RiskManagement,IterationPlanning,Stories,Estimating.

Learning Outcomes:

After completing this Unit, students will be able to

- List the eight practices that allows to control the chaos of end less possibility (L1)

UNI-TV:

Developing-Incremental Requirements, CustomerTests, Test-Driven Development, Refactoring, Incremental Design and Architecture, Spike Solutions, Performance Optimization.

LearningOutcomes:

After completing this Unit, students will be able to

- Outline the practices that keep the code clean and allow the entire team to contribute to development.(L2)

Courseoutcomes:

Upon completion of the course, the students shouldbe able to:

- Adopt Extreme Programming(L1)
- Create own agile method by customizing XP to a particular situation(L6)

Text Books:

1. James Shore and Shane Warden,"TheArtofAgileDevelopment", O'REILLY,2007.

References:

1. Robert C. Martin, "Agile Software Development, Principles, Patterns, and Practices", PHI,2002.
2. Angel Medinilla, "Agile Management: Leadership in an Agile Environment", Springer,2012.
3. Bhuvan Unhelkar, "The Art of Agile Practice: A Composite Approach for Projects and Organizations", CRC Press.
4. Jim High smith, "Agile Project Management", Pearson education, 2004.

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(CS20APE712) CLOUD COMPUTING **Professional Elective - I**

Course Objectives:

This course is designed to:

- Define cloud services and models
- Demonstrate design the architecture for new cloud application.
- Explain how to re-architect the existing application for the cloud.

Unit-I:

Introduction to Cloud Computing: Characteristics of Cloud Computing, Cloud Models, Cloud Services Examples, Cloud based services and Applications, Cloud Concepts and Technologies, Virtualization, Load Balancing, Scalability and Elasticity, Deployment, Replication, Monitoring, Software defined networking, Network function virtualization, Map Reduce, Identity and Access Management, Service Level Agreements, Billing.

Learning Outcomes

At the end of the unit, students will be able to:

- Outline the Cloud characteristics and models.(L2)
- Classify different models, different technologies in cloud.(L2)

Unit-II

Cloud Services and Platforms: Compute Services, Storage Services, Database Services, Application Services, Content Delivery Services, Analytics Services, Deployment and Management Services, Identity and Access Management Services, Open Source Private Cloud Software, Apache Hadoop, Hadoop MapReduce Job Execution, Hadoop Schedulers, Hadoop Cluster Setup.

LearningOutcomes:

At the end of the unit, students will be able to:

- Summarize the Services and Platform of cloud.(L2)
- Demonstrate Hadoop Cluster Setup.(L2)

Unit-III:

Cloud Application Design: Design Considerations, Reference Architectures, Cloud Application Design Methodologies, Data Storage Approaches, Multimedia Cloud: Introduction, Case Study: Live Video Streaming App, Streaming Protocols, Case Study: Video Transcoding APP.

LearningOutcomes:

At the end of the unit, students will be able to:

- Design and build cloud applications.(L6)
- Describe the multimedia cloud. (L2)

Unit-IV:

Python for Amazon Web Services, Python for Google Cloud Platform, Python for Windows Azure, Python for Map Reduce Python Packages of Interest Python Web Application Framework– Django, Designing a Restful WebAPI.

LearningOutcomes:

At the end of the unit, students will be able to:

- Select different cloud services from different vendors(L2)
- Utilize Python language to access cloud services(L3)

Unit-V:

Cloud Application Development in Python, Design Approaches, Image Processing APP, Document Storage App, Map Reduce App, Social Media Analytics App, Cloud Application Benchmarking and Tuning, Cloud Security, Cloud Computing for Education.

LearningOutcomes:

At the end of the unit, students will be able to:

- Investigate different Cloud applications.(L4)
- Design cloud applications using Python.(L6)

Course Outcomes:

Upon completion of the course, the students should be able to:

- Outline the procedure for Cloud deployment (L2)
- Distinguish different cloud service models and deployment models(L4)
- Compare different cloud services.(L5)
- Design applications for an organization which use cloud environment.
(L6)

Textbooks:

1. Arshadeep Bhaga, Vijay Madiseti, "Cloud Computing A Hands-on Approach", Universities Press, 2018.

References:

1. Chris Hay, Brian Prince, "Azure in Action" Manning Publications [ISBN: 9781935182481], 2010.
2. Henry Li, "Introducing Windows Azure" Apress; 1 edition [ISBN: 978-14302-2469-3], 2009.

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(CS20APE713)Malware Analysis

UNIT I

Introduction: The cyber kill chain, Definition of malware and its role in the kill chain, Different types of malware , The goal of malware analysis, Types of malware analysis ,Setting up a safe environment for malware analysis.

Learning Outcomes:

- Ability to learn basics of malware.
- Ability to gain basic knowledge on different types of malware.

UNIT II

Analyzing malicious Windows programs: The Portable Executable file format, PE header and sections, The Windows loader, Windows API, Import Address Table, Import functions, Export functions, System architecture, processes, threads, memory management, registry, PE files on disk and in memory.

Learning Outcomes:

- Ability to learn memory management.
- Demonstrate windows loader , windows API.

UNIT III

Basic analysis: Basic static analysis - Introducing concepts and tools for basic static analysis: hash functions, Virus Total, strings, PEiD, PE Explorer, CFF Explorer, and Resource Hacker. - Identifying file obfuscation techniques: packers and cryptors. - Introduction to Yara.

Basic dynamic analysis - Introducing concepts and tools for basic dynamic analysis: Sysinternals tools, sandboxes. - Persistence techniques.

Network analysis - Faking a network for safe malware analysis. - Introduction to Wireshark. - Command and Control communication of malware.

Learning Outcomes:

- Ability to learn basic analysis.
- Ability to gain basic knowledge on static and dynamic analysis.

UNIT IV

Advanced analysis: Introduction to x86 architecture - Memory, instructions, opcodes, operands, registers, functions, stack. - The difference between source code and compiled code. Examining simple examples using different compilers. **Advanced static analysis** - Introduction to disassemblers and decompilers. - Static code analysis with IDA/Ghidra. - Obfuscation techniques.

Advanced dynamic analysis - Introduction to debuggers. - Dynamic analysis with OllyDbg. - Process injection techniques and hooking. - User mode and kernel mode debugging.

Ransomware analysis - Cryptographic algorithms used by ransomware. - Cryptographic flaws in ransomware.

Learning Outcomes:

- Ability to learn basics of x86 architecture.
- Ability to gain basic knowledge on disassemblers and decompilers.

UNIT V

Analysis of malicious documents: File formats: OLE2, OOXML, RTF and PDF. Malicious macro, Document exploits, e.g. exploit example for Equation editor vulnerability (CVE-2017-11882), Introduction to oletools.

Learning Outcomes:

- Ability to learn malicious documents.
- Ability to gain basic knowledge on introduction to oletools.

Text Books:

1. Michael Sikorski and Andrew Honig: Practical Malware Analysis, The Hands-On Guide to Dissecting Malicious Software. No Starch Press. ISBN: 978-1-593-27290-6
2. Monnappa K A: Learning Malware Analysis: Explore the concepts, tools, and techniques to analyze and investigate Windows malware. Packt Publishing. ISBN: 978-1788392501
3. Michael Hale Ligh, Steven Adair, Blake Hartstein and Matthew Richard: Malware Analyst's Cookbook and DVD: Tools and Techniques for Fighting Malicious Code. Wiley. ISBN: 978-0-470-61303-0.
4. Chris Eagle: The IDA Pro Book: The Unofficial Guide to the World's Most Popular Disassembler Second Edition. No Starch Press. ISBN: 978-1-59327-289-0

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(CS20APE714) NATURAL LANGUAGE PROCESSING

Course Objectives:

This course is designed to:

- Explain and apply fundamental algorithms and techniques in the area of natural language processing (NLP)
- Discuss approaches to syntax and semantics in NLP.
- Examine current methods for statistical approaches to machine translation.
- Explore machine learning techniques used in NLP.

UNIT-I:

Introduction to Natural language

The Study of Language, Applications of NLP, Evaluating Language Understanding Systems, Different Levels of Language Analysis, Representations and Understanding, Organization of Natural Language Understanding Systems, Linguistic Background: An outline of English Syntax.

Learning Outcomes:

At the end of the module, students will be able to:

- Classify various NLP Applications (L2)
- Apply the logic by using Python Programming(L3)
- List the AI Languages (L1)
- Outline the Linguistic Background (L2)

Unit-II:

Grammars and Parsing

Grammars and Parsing-Top-Down and Bottom-Up Parsers, Transition Network Grammars, Feature Systems and Augmented Grammars, Morphological Analysis and the Lexicon, Parsing with Features, Augmented Transition Networks, Bayes Rule, Shannon game, Entropy and Cross Entropy.

Learning Outcomes:

At the end of the module, students will be able to:

- Demonstrate the Top- Down and Bottom-Up Parsing techniques (L2)
- Apply Bayes Rule, Shannon game, Entropy and Cross Entropy. (L3).
- Develop game playing strategies using Shannon game. (L3)

UNIT-III:

Grammars for Natural Language

Grammars for Natural Language, Movement Phenomenon in Language, Handling questions in Context Free Grammars, Hold Mechanisms in ATNs, Gap Threading, Human Preferences in Parsing, Shift Reduce Parsers , Deterministic Parsers.

Learning Outcomes:

At the end of the module, students will be able to:

- Classify Grammars for Natural Language (L2)
- Explain Hold Mechanisms in ATNs. (L2)

- Explain Human Preferences in Parsing. (L2)

UNIT-IV:

Semantic Interpretation

Semantic & Logical form, Word senses & ambiguity, The basic logical form language, Encoding ambiguity in the logical Form, Verbs & States in logical form, Thematic roles, Speech acts & embedded sentences, Defining semantics structure model theory.

Language Modeling

Introduction, n-Gram Models, Language model Evaluation, Parameter Estimation, Language Model Adaption, Types of Language Models Language-Specific Modeling Problems , Multilingual and Cross lingual Language Modeling.

Learning Outcomes:

At the end of the module, students will be able to:

- Distinguish Language model Evaluation (L4)
- List the types of Language Models (L1)

UNI-TV:

Machine Translation

Survey: Introduction, Problems of Machine Translation, Is Machine Translation Possible, Brief History, Possible Approaches, Current Status. Anusaraka or Language Accessor: Background, Cutting the Gordian Knot, The Problem, Structure of Anusaraka System, User Interface, Linguistic Area, Giving up Agreement in Anusarsaka Output, Language Bridges.

Multilingual Information Retrieval

Introduction , Document Preprocessing, Monolingual Information Retrieval, CLIR, MLIR, Evaluation in Information Retrieval, Tools, Software and Resources.

Multilingual Automatic Summarization

Introduction, Approaches to Summarization, Evaluation, How to Build a Summarizer, Competitions and Datasets.

Learning Outcomes:

At the end of the module, students will be able to:

- Apply Machine Translation techniques. (L3)
- Elaborate Multilingual Information Retrieval and Multilingual Automatic Summarization. (L6)

Course Outcomes:

At the end of the module, students will be able to:

- Build NLP applications using Python. (L6)
- Apply various Parsing techniques, Bayes Rule, Shannon game, Entropy and Cross Entropy. (L3)
- Explain the fundamentals of CFG and parsers and mechanisms in ATN's. (L2)
- Apply Semantic Interpretation and Language Modeling..(L3)
- Interpret Machine Translation and multilingual Information Retrieval systems and Automatic Summarization.(L2)

TEXTBOOKS:

1. James Allen, Natural Language Understanding, 2nd Edition, 2003, Pearson Education.
2. Multilingual Natural Language Processing Applications: From Theory To Practice- Daniel M. Bikel and Imed Zitouni, Pearson Publications.
3. Natural Language Processing, A paninian perspective, Akshar Bharathi, Vineeth Chaitanya, Prentice-Hall of India.

REFERENCES BOOKS:

1. Charniak, Eugene, Statistical Language Learning, MIT Press, 1993.
2. Jurafsky, Dan and Martin, James, Speech and Language Processing, 2nd Edition, Prentice Hall, 2008.
3. Manning, Christopher and Henrich, Schutze, Foundations of Statistical Natural Language Processing, MIT Press, 1999.

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(CS20APE715)Reinforcement Learning

UNIT I

The Reinforcement Learning Problem: Reinforcement Learning, Elements of Reinforcement Learning, Limitations and Scope, An Extended Example: Tic-Tac-Toe

Learning Outcomes:

- Ability to learn basics of Reinforcement Learning.
- Ability to gain basic knowledge on applications of reinforcement learning.

UNIT II

Tabular Solution Methods: An n-Armed Bandit Problem, Action-Value Methods, Incremental Implementation, Tracking a Non stationary Problem, Optimistic Initial Values, Upper-Confidence-Bound Action Selection, Gradient Bandits.

Learning Outcomes:

- Ability to learn n-Armed Bandit Problem.
- Demonstrate tracking a non stationary Problem.

UNIT III

Finite Markov Decision Processes - The Agent–Environment Interface, Goals and Rewards, The Markov Property, Markov Decision Processes, Optimal Value Functions, Optimality and Approximation.

Learning Outcomes:

- Ability to learn The Markov Property.
- Ability to gain basic knowledge on Markov Decision Processes.

UNIT IV

Dynamic Programming: Policy Evaluation, Policy Improvement, Policy Iteration, Value Iteration, Asynchronous Dynamic Programming, Generalized Policy Iteration, Efficiency of Dynamic Programming.

Learning Outcomes:

- Ability to learn basics of Policy Evaluation.
- Ability to gain basic knowledge on generalized policy iteration.

UNIT V

Monte Carlo Methods: Monte Carlo Prediction, Monte Carlo Estimation of Action Values, Monte Carlo Control, Monte Carlo Control without Exploring Starts.

Temporal-Difference Learning: TD Prediction, Advantages of TD Prediction Methods, Optimality of TD(0), Sarsa: On-Policy TD Control, Q-Learning: Off-Policy TD Control, Games, Afterstates, and Other Special Cases.

Learning Outcomes:

- Ability to learn Monte Carlo Prediction.
- Ability to gain basic knowledge on temporal-difference learning.

Text Books:

5. Reinforcement Learning: An Introduction by Richard S. Sutton and Andrew G. Barto.

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(CE20AOE701) Air Pollution and Quality Control

Course Objectives:

After studying this course, students will be able to:

- The objectives of the course are to understand the Air pollution Concepts
- Identify the source of air pollution
- To know about Air pollution Control devices and distinguish the Air quality monitoring devices

UNIT –I

Introduction to Air Pollution

Introduction: Sources, effects on ecosystems, classification and characterization of air pollutants, Air Pollution Episodes of environmental importance. Indoor air pollution –sources, Effects.

Learning outcomes:

- Understanding the basic Air pollution concepts
- Identifying the source of air pollution

- To understand the character of atmospheric pollutants and their effects

UNIT II

Effects of Air Pollution

Effects of Air pollutants on man, material and vegetation: Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holes etc.

Learning outcomes:

- To know effects of air pollution on man
- To know effects of air pollution on material and vegetation

UNIT – III

Plume Behavior

Meteorology and plume Dispersion; properties of atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity, Influence of Meteorological phenomena on Air Quality-wind rose diagram.

Learning outcomes:

- Understand the composition and structure of atmosphere
- To Understand the wind rose diagram

UNIT – IV

Control Techniques

Particulate matter and gaseous pollutants- settling chambers, cyclone separators, scrubbers, filters & ESP.

Learning outcomes:

- Learning about air pollution control techniques
- Study on latest devices and advancements in existing devices
- Choose and design control techniques for particulate and gaseous emissions.

UNIT –V

Noise Pollution

Noise pollution–Sources, Measurements, effects and control, noise standards. Environmental issues, global episodes, laws, acts, protocols.

Learning outcomes:

- Learning about noise pollution.

- Understand the laws, acts and protocols related to noise pollution & control

Course Outcomes (CO):

After studying this course, students will be able to:

- Identify the major sources of air pollution
- Understand their effects on health and environment.
- Evaluate the dispersion of air pollutants in the atmosphere and to develop air quality models.
- Choose and design control techniques for particulate and gaseous emissions.
- Understand the noise pollution and control methods.

Textbooks:

1. Noel De Nevers, "Air Pollution Control Engineering", Waveland Pr Inc 2016
2. Anjaneyulu Y, "Text book of Air Pollution and Control Technologies", Allied Publishers
3. M.N. Rao and HVN Rao, Air Pollution, Tata McGraw Hill Publishers 2017

Reference Books:

1. Nevers, "Air Pollution Control Engineering", McGraw-Hill, Inc., 2000.
2. Dr. B.S.N. Raju, "Fundamentals of Air Pollution" Oxford & I.B.H.
3. T. Holgate, Hillel S. Koren, Jonathan M. Samet, Robert L. "Air Pollution and Health" Maynard publisher Academic Press.

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B.Tech- VII Sem

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(EE20AOE603) OPTIMIZATION TECHNIQUES THROUGH MATLAB (OPEN ELECTIVE)

Course Objectives

- Introduce basics of MATLAB
- Familiarize the fundamentals of optimization
- Explain single variable optimization using various methods
- Implement multi variable optimization using various methods
- Train various evolutionary algorithms.

UNIT -I

Introduction to MATLAB: Overview, MATLAB Preliminaries, Basics of MATLAB, Beyond the Basics of MATLAB, Popular Functions and Commands, Plotting using MATLAB, Optimization with MATLAB.

UNIT -II

Introduction to Optimization: Statement of an optimization problem, Classifications of optimization Problems: Single variable optimization, Multi variable optimization with no constraints, Multi variable optimization with equality

constraints, Multi variable optimization with inequality constraints, Convex and Concave programming.

UNIT -III

Single Variable Optimization: Finite difference method, Central difference method, Runge-Kutta method, interval halving method, golden section method with MATLAB code.

UNIT- IV

Multi Variable Optimization: Conjugate gradient method, Newton's method, Powell's method, Fletcher- Reeves method, Hook and Jeeves method, interior penalty function with

UNIT -V

Evolutionary Algorithms: Overview, Genetic Algorithms: Basics of Genetic Algorithms, Options in MATLAB, Multi Objective Optimization using Genetic Algorithms, Ant Colony Optimization, Simulated Annealing, Particle Swarm Optimization.

Course Outcomes:

After completion of this course the student can be able to

- CO1:**Use optimization terminology and concepts, and understand how to classify an optimization problem.
- CO2:**Apply optimization methods to engineering problems.
- CO3:**Implement optimization algorithms.
- CO4:**Compare different genetic algorithms.
- CO5:**Solve multivariable optimization problems.

TEXT BOOKS:

1. Rao V.Dukkipati, MATLAB: "An Introduction with Applications", Anshan, 2010.
2. Achille Messac, "Optimization in practice with MATLAB", Cambridge University Press, 2015.
3. Jasbir S Arora, "Introduction to optimum design", 2nd edition. Elsevier, 2004.

REFERENCES:

1. Cesar Perez Lopez, "MATLAB Optimization Techniques", Academic press, Springer publications, 2014.

2. Steven C.Chapra, "Applied Numerical Methods with MATLAB for Engineers and scientists": 4th edition, McGraw-Hill Education, 2018.

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B.Tech- VI Sem

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(ME20AOE602) POWER GENERATION TECHNOLOGIES

Pre-requisite: Thermal Engineering& Basic Mechanical Engineering

Course Objectives:

- Familiarize the sources of energy, power plant economics and environmental aspects.
- Outline the working components of different power plant.
- Explain renewable energy sources; characteristics, working principle, classify types, layouts, and plant operations.
- Impart types of nuclear power plants, and outline working principle and advantages and hazards.

UNIT – 1:

Introduction to the Sources of Energy Resources and Development of Power in India. Layouts of Steam, Hydel, MHD, and Nuclear Power Plants - Selection.

Power Plant Economics and Environmental Considerations: Capital Cost, Investment of Fixed Charges, Operating Costs, General Arrangement of Power Distribution, Definitions of Connected Load, Load Factor, Diversity Factor - Pollution Standards - Methods of Pollution Control.

Learning Outcomes:

At the end of this unit, the student will be able to

- Outline sources of energy, compare and selection of power plants. (L2)
- Explain cost factors, load and power distribution factors. (L2)
- Select tariff based on load and demand factors. (L3)
- Summarize the impact of power plant on the environment, pollution mitigation and regulations. (L2)

UNIT – 2:

Steam Power Plant: Introduction to Boilers- Modern High Pressure and Supercritical Boilers - Waste Heat Recovery, Fluidized Bed Boilers., Fuel and Handling Equipments, Types of Coals, Coal Handling, Choice of Handling Equipment, Coal Storage, Ash Handling Systems.

Combustion Process: Properties of Coal - Overfeed and Under Feed Fuel Beds, Types of Stokers, Pulverized Fuel Burning System and Its Components, Combustion Needs and Draught System, Cyclone Furnace, Design and Construction, Dust Collectors, Cooling Towers And Heat Rejection.

Learning Outcomes:

At the end of this unit, the student will be able to

- Demonstrate latest high-pressure boilers, power plant cycles and their improvements. (L2)
- Explain various types of coals, coal handling operations (L2)
- Outline and compare types of feeders, stokers, combustion systems. (L2)
- Illustrate draught, dust collector, furnace, cooling tower and heat rejection systems. (L2)
- Evaluate pollution levels from power plants, pollution control methods, and application of pollution recorders. (L4)

UNIT – 3:

Diesel Power Plant: Diesel Power Plant, Construction, Plant lay out with auxiliaries, fuel storage.

Gas Turbine Plant: Introduction - Classification - Construction - Layout with Auxiliaries - Principles of Working Closed and Open Cycle Gas Turbines. Advantages And Disadvantages Combined Cycle Power Plants.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain working principle and compare types of diesel power plant. (L2)

- Outline the diesel power plant layout with its supporting equipment. (L2)
- Illustrate the working principle of open cycle and closed cycle gas turbine. (L2)
- Demonstrate combined cycle power plants with benefits and shortcomings. (L2)

UNIT – 4:

Hydro Electric Power Plant: Waterpower - Hydrological Cycle / Flow Measurement - Drainage Area Characteristics - Hydrographs - Storage and Pondage - Classification of Dams and Spill Ways.

Hydro Projects And Plant: Classification - Typical Layouts - Plant Auxiliaries - Plant Operation Pumped Storage Plants.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain hydrological cycle, infer flow measurements from hydrographs. (L2)
- Summarize working principle of hydroelectric power plant. (L2)
- Illustrate typical layout of hydroelectric power plant, and its auxiliary equipment's. (L2)

UNIT – 5:

Power from Non-Conventional Sources: Utilization of Solar Collectors- Working Principle, Wind Energy - Types of Turbines -Tidal Energy. MHD power Generation.

Nuclear Reactors : Nuclear Fuel - Nuclear Fission- Types of Nuclear reactors - Radiation Hazards and Shielding - Radioactive Waste Disposal.

Learning Outcomes

At the end of this unit, the student will be able to

- Familiarize the source of Renewable sources in India (L2)
- principle of nuclear power plants, nuclear fuels, and reactor operations. (L2)
- Outline the various types of nuclear reactors, their applications, and limitations. (L2)
- Summarize the hazards of nuclear reactors and significance of nuclear waste disposal. (L2)

Textbooks:

1. P.K. Nag, "Power Plant Engineering", 3rd edition, TMH, 2013.
2. Wakil, "Power plant technology", M.M.EI TMH Publications.

Reference Books:

1. Rajput, "A Text Book of Power Plant Engineering: 4th edition, Laxmi Publications, 2012.
3. Ramalingam, "Power plant Engineering", Scietech Publishers, 2013
4. P.C. Sharma, "Power Plant Engineering", S.K. Kataria Publications, 2012.
5. Arora and S.Domakundwar, "A course in Power Plant Engineering", Dhanpat Rai & Co (p).

Course Outcomes:

At the end of this course, the student will be able to

- **Outline** sources of energy, power plant economics, and environmental aspects. (L2)
- **Explain** power plant economics and environmental considerations. (L2)
- **Describe** working components of a steam power plant. (L2)
- **Illustrate** the working mechanism of gas turbine power plants. (L2)
- **Summarize** types of renewable energy sources and their working principle. (L2)

Demonstrate the working principle of nuclear power plants. (L4)

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B.Tech-VII Sem

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(EC20AOE702) PRINCIPLES OF COMMUNICATION ENGINEERING

Course Objectives:

1. To understand the concept of various modulation schemes and multiplexing.
2. To apply the concept of various modulation schemes to solve engineering problems.
3. To analyze various modulation schemes.
4. To evaluate various modulation scheme in real time applications.

UNIT I

Amplitude Modulation

Introduction, An overview of Electronic Communication Systems. Need for Frequency Translation, classification of modulation schemes, Amplitude Modulation: DSB-FC, DSB-SC, SSB-SC and VSB, Modulators and demodulators. The Superheterodyne Receiver.

UNIT II

Angle Modulation

Basic definitions, Frequency Modulation: Narrow Band FM, Wide Band FM, Transmission bandwidth of FM Signals, Generation of FM Signals, Demodulation of FM Signals, FM Stereo Multiplexing, Phase modulation, AM vs PM.

UNIT III

Pulse Modulation

Sampling Theorem, Quantization, Pulse Amplitude Modulation, Pulse Width Modulation, Pulse position modulation, Pulse code modulation.

Concept of Time Division Multiplexing, Frequency Division Multiplexing.

UNIT IV

Digital Modulation

Digital Representation of Analog Signals. Phase shift keying-Binary Amplitude Shift Keying, Binary Phase Shift Keying, Differential phase shift keying, and Quadrature Phase Shift Keying, Frequency Shift Keying— Comparison.

UNIT V

MULTI-USER RADIO COMMUNICATION

Global System for Mobile Communications (GSM), Mobile & Cellular communication Concept – Overview of Multiple Access Schemes – Code division multiple access (CDMA), Frequency division multiple access (FDMA), Satellite Communication – Bluetooth. (Block diagram approach only).

Note: The main emphasis is on qualitative treatment. Complex mathematical treatment may be avoided.

Textbooks:

1. Herbert Taub, Donald L Schilling and Goutam Saha, "Principles of Communication Systems", 3rd Edition, Tata McGraw-Hill Publishing Company Ltd., 2008.
2. Simon Haykin, "Communication Systems", 4th Edition, John Wiley & Sons, 2004

References:

1. B. P. Lathi, Zhi Ding and Hari M. Gupta, "Modern Digital and Analog Communication Systems", 4th Edition, Oxford University Press, 2017.
2. K. Sam Shanmugam "Digital and Analog Communication Systems", Wiley India Edition, 2008.
3. Martin S.Roden, "Analog and Digital Communication System", 3rd Edition, Prentice Hall of India, 2002.

Course Outcomes:

- CO1.** Analyze and design of various continuous wave modulation and demodulation techniques.
- CO2.** Attain the knowledge about angle modulation and FM Transmitters and Receivers.
- CO3.** Analyze and design the various Pulse Modulation Techniques.
- CO4.** Understand the concepts of Digital Modulation Techniques and Baseband transmission.
- CO5.** Comprehend the principles of radio communication systems like GSM.CDMA, Bluetooth, Mobile and satellite communications etc.,

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(EE20AOE701) EMBEDDED SYSTEMS (OPEN ELECTIVE)

Course Objectives:

The objective of this course is to

- 1.** To understand the basics of an embedded system and RTOS.
- 2.** To introduce the typical components of an embedded system and different communication interfaces.
- 3.** To provide knowledge on the design process of embedded system

UNIT I - Introduction to Embedded Systems

Definition of Embedded System, Embedded Systems Vs General Computing Systems, History and classification of Embedded Systems, Major Application Areas, Characteristics and Quality Attributes of Embedded Systems.

UNIT II - Typical Embedded System

Core of the Embedded System - General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory - ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: Onboard and External Communication Interfaces

UNIT III - Embedded Firmware

Fundamental issues in hardware software co-design, Embedded Firmware Design Approaches and Development Languages.

UNIT-IV - RTOS based Embedded System Design

Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.

UNIT-V - Task Communication

Task Communication - Shared Memory, Message Passing, Remote Procedure Call and Sockets, Task Synchronization - Task Communication/Synchronization Issues, Task Synchronization Techniques, Device Drivers, Methods to Choose an RTOS.

Text Books:

1. Introduction to Embedded Systems - Shibu K.V, Mc Graw Hill.
2. An Embedded software primer - David E. Simon, Pearson Ed. 2005.

References:

1. Embedded Systems - Raj Kamal, TMH.
2. Embedded System Design - A Unified Hardware/Software Introduction - Frank Vahid, Tony d. Givargis, John Wiley, 2002.

Course Outcomes:

After completion of the course, student will be able to:

CO1: Understand the selection procedure of Processors in the embedded domain.

CO2: Explain different components of embedded system.

CO3: Design Procedure for Embedded Firmware.

CO4: Describe the role of Real time Operating Systems in Embedded Systems.

CO5: Evaluate the Correlation between task synchronization and latency issues.

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B.Tech- VII Sem

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(EC20AOE705)INTRODUCTION TO IMAGE PROCESSING

Course Objectives:

1. To introduce fundamentals of Image Processing
2. To expose various relationships between pixels
3. To describe various intensity transformations in spatial domains.
4. To describe various spatial and frequency domain filters.
5. To disseminate various segmentation and compression techniques for image processing.

Unit I

Fundamentals of Image Processing – I:

Introduction, A simple image model, Components of image processing system, Fundamental Steps in digital image processing, image sensing and acquisition, Applications of image processing.

Unit II

Fundamentals of Image Processing – II:

Image sampling and quantization, basic relationships between pixels – neighbourhood, adjacency, connectivity, distance measures, mathematical operations in image processing.

Unit III

Image Enhancement in spatial domain:

Introduction to gray level transformations, Point processing - Image negative, contrast stretching, intensity slicing, Bit plane slicing and grey level slicing, Histogram Processing, Histogram equalization and Specifications.

Unit IV

Image Enhancement in frequency domain:

Spatial Filtering, Smoothing filters, Sharpening filters, Enhancement in Frequency domain –image smoothing, image sharpening and Homomorphic filtering.

Unit V

Image Segmentation and compression:

Point, Line and Edge Detection, Fundamentals of Compression, Image compression model, Types of Redundancy – Coding, Inter pixel and Psycho visual, Lossless compression – Huffman coding, Shannon-Fano coding.

Text Books:

1. Rafael C. Gonzalez, Richard E woods and Steven L. Eddins, "Digital Image processing using MATLAB", Tata McGraw Hill, 2010.
2. S. Jayaraman, S.Esakkirajan, T.Veerakumar, "Digital Image processing", Tata McGraw Hill.

References:

1. Milan Sonka, Vaclav Hlavac, Roger Boule, Image Processing, Analysis, and Machine Vision, Third Edition, Cengage Learning, 2016.
2. William K. Pratt, "Digital Image Processing", John Wiley, 3rd Edition, 2004

Course Outcomes:

- CO1:** Understand fundamentals of digital image processing and apply engineering mathematics in processing of digital image.
- CO2:** Compute the relationship between the pixels in image processing
- CO3:** Analyze different image enhancement techniques in spatial domain.
- CO4:** Describe various image spatial filters and Analyze different image enhancement techniques in frequency domain
- CO5:** Analyze various techniques in image segmentation and apply various algorithms to perform image compression.

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IVB.Tech-ISem

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(CE20AOE705)Low Cost Housing Techniques

CourseObjectives:

- The objective of the course is to:
- Have comprehensive knowledge of planning, design, evaluation, construction and financing of housing projects.
- Focuses on cost effective construction materials and methods.
- Enable students to identify low cost housing techniques.
- Have knowledge on alternative building materials for low cost housing.
- Give the knowledge on principles of sustainable housing policies and programmes.
- Enable students in a position to adopt the suitable techniques in rural and disaster prone areas.

UNIT –I

Introduction to Housing scenario

Definition of Basic Terms – House, Home, Household, Apartments, Multi storied Buildings, Special Buildings, Objectives and Strategies of National Housing Policies including Slum Housing Policy. Status of urban housing - Status of Rural Housing

Learning Outcomes:

At the end of the unit student can

- Understand the basics of housing and housing programmes.
- Get knowledge on slum housing policies and slum improvement.

UNIT – II

Development and adoption of low cost housing technology

Introduction - Adoption of innovative cost effective construction techniques - Adoption of precast elements - Adopting of total prefabrication of mass housing in

India- General remarks on pre-cast roofing/flooring systems - Fly ash gypsum thick for masonry - Stone Block masonry - Adoption of precast R.C. plank and join system for roof/floor in the building.

Learning Outcomes:

At the end of the unit student can

- Gain Knowledge about the usage of various low cost housing techniques.
- Adopt the suitable techniques in rural and urban housing.
- Understand the adoption of innovative cost effective construction techniques

UNIT – III

Alternative building materials for low cost housing

Introduction - Substitute for scarce materials – Ferrocement - Gypsum boards - Timber substitutions - Industrial wastes - Agricultural wastes

Low cost Infrastructure services:

Introduce - Present status - Technological options - Low cost sanitation - Domestic wall - Water supply, energy.

Learning Outcomes:

At the end of the unit student can

- Understand the various types of alternative building materials like ferrocement, gypsum boards.
- Gain knowledge about the alternative building materials for low cost housing.
- Understand the low cost infrastructure services and water supply.

UNIT –IV

Rural Housing:

Introduction traditional practice of rural housing continuous - Mud Housing technology - Mud roofs - Characteristics of mud - Fire treatment for thatch roof - Soil stabilization - Rural Housing programs.

Learning Outcomes:

At the end of the unit student can

- Understand the rural housing and rural housing programs.
- Gain the knowledge about mud housing technology and mud roofs.

UNIT – V

Housing in Disaster prone areas:

Introduction – Earthquake - Damages to houses - Traditional prone areas - Type of Damages and Railways of non-engineered buildings - Repair and restore action of earthquake Damaged non-engineered buildings recommendations for future constructions.

Learning Outcomes:

At the end of the unit student can

- Get knowledge about disasters like earthquakes, floods, cyclones.
- Understand the types of damages on non-engineering buildings.
- Get knowledge about Repair and restore action on damaged non-engineered buildings.
- Analyse the safety requirements and strengthening measures of disaster prone area.

Course Outcomes (CO):

On the completion of the course, students will be able to:

- Understand the planning, design, evaluation, construction and financing of housing projects with cost effective housing techniques.
- Have knowledge on living condition of slum, slum housing policies, and slum improvement.
- Know the usage of various low cost housing techniques.
- Understand about alternative building materials for low cost housing and Rural housing.
- Adopt the suitable techniques in rural and disaster prone areas by using locally available materials.

Textbooks:

1. A.K.Lal "Hand book of Low Cost Housing" – New Age International publishers.
2. G.C. Mathur "Low cost Housing".
3. A.G. MadhavaRao, D.S. Ramachandra Murthy & G. Annamalai "Modern trends in housing in developing countries".

Reference Books:

1. Rajib Shaw "Disaster Management", Universities Press, India.
2. Tushar Bhattacharya "Disaster Science and Management", TMH Publications.

3. Neville A.M. "Properties of Concrete" –Pitman Publishing Limited, London.
4. Kiado, Rudhai.G"Light Weight Concrete", – Publishing home of Hungarian Academy of Sciences 1963.

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B.Tech - VII Sem

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(ME20AOE702) ROBOTICS IN INDUSTRIAL USAGE

(Open Elective – IV)

Course Objectives:

The course should enable the students to:

- I. Develop the knowledge in various robot structures and their workspace.
- II. Develop the skills in performing kinematics analysis of robot systems.
- III. Provide the knowledge of the dynamics associated with the operation of robotic systems.
- IV. Provide the knowledge and analysis skills associated with trajectory planning.
- V. Understand material handling and robot applications in industries.

UNIT– 1:

INTRODUCTION TO ROBOTICS: Introduction: Automation and robotic, an overview of robotics, classification by coordinate system and control systems; Components of the industrial robotics: Degrees of freedom, end effectors: Mechanical gripper, magnetic, vacuum cup and other types of grippers, general consideration on gripper selection and design.

Learning Outcomes:

1. Differentiate between automation and robotics.
2. Classify robots and describe its anatomy
3. Classify various grippers

UNIT – 2:

MOTION ANALYSIS AND KINEMATICS: Motion analysis: Basic rotation matrices, composite rotation matrices, Euler angles, equivalent angle and axis, homogeneous transformation, problems; Manipulator kinematics: D-H notations, joint coordinates and world coordinates, forward and inverse kinematics, problems.

Learning Outcomes

1. Discuss about motion analysis of robot.
2. Understand methods for calculating the kinematics and inverse kinematics of a robot manipulator.
3. Describe D-H notations, joint coordinates and. world coordinates
4. Discuss about homogeneous transformation.

UNIT – 3:

Differential kinematics: Differential kinematics of planar and spherical manipulators, Jacobians problems. Robot dynamics: Lagrange, Euler formulations, Newton-Euler formulations, problems on planar two link manipulators

1. Describe the differential kinematics of planar manipulators.
2. Illustrate Lagrange-Euler formulation.
3. Discuss jacobian and robot dynamics. 4. Illustrate Newton-Euler formulation.

UNIT – 4:

Trajectory planning: Joint space scheme, cubic polynomial fit, avoidance of obstacles, types of motion: Slew motion, joint interpolated motion, straight line motion, problems, Robot actuators and feedback components; Actuators: pneumatic and hydraulic actuators.

Learning Outcomes:

1. Describe joint space scheme.
2. Illustrate cubic polynomial fit.
3. Classify types of motion.

UNIT – 5:

Electric actuators: DC servo motors, stepper motors, feedback components: position sensors, potentiometers, resolvers and encoders, velocity sensors, tactile sensor; Robot application in manufacturing: Material handling, assembly and inspection

Learning Outcome:

1. Explain actuators and classify them.
2. Illustrate various robot applications in manufacturing.

3. Discuss the role of robots in material handling.
4. Explain work cell design.
5. Discuss the role of robots in assembly and inspection

Textbooks:

1. Groover M. P, "Industrial Robotics", TataMcGraw-Hill, 1 st Edition, 2013.
2. J.J Criag, "Introduction to Robotic Mechanics and Control", Pearson, 3rd Edition, 2013.

Reference Books:

1. Richard D. Klafter, "Robotic Engineering", Prentice Hall, 1st Edition, 2013.
2. Fu K S, "Robotics", McGraw-Hill, 1st Edition, 2013.

Course Outcomes:

At the end of the course, the student will be able to:

CO1 Understand characteristic features of robots and usage of different grippers for industrial applications.

CO2 Understand direct and inverse kinematics of robot structure.

CO3 Illustrate Differential Kinematics of planar and spherical manipulators.

CO4 Understand classification of robot actuators and trajectory planning.

CO5 Remember material handling and applications in manufacturing.

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B. Tech VII

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(BA20AHS701) BUSINESS ETHICS AND CORPORATE GOVERNANCE

Course Objectives:

- To make the student understand the principles of business's ethics
- To enable the min knowing the ethics in management
- To facilitate the student role in corporate culture
- Impart knowledge about the fair trade practices
- Encourage the student in knowing them about the corporate governance

UNIT-I

BUSINESS ETHICS AND CORPORATE GOVERNANCE– Introduction – Meaning - Nature and Scope – Loyalty and Ethical Behavior, Values across Cultures; Business Ethics– Ethical Practices in Management .Types of Ethics–Characteristics – Factors influencing ,Business Ethics – Importance of Business Ethics -Arguments for and against business ethics Basics of business ethics Corporate Social Responsibility– Issues of Management–Crisis Management

Learning Outcomes:

After completion of this unit student will

- Understand the meaning of loyalty and ethical Behavior
- Explain various types of Ethics
- Know about the factors influencing business ethics
- Understand the corporate social responsibility of management

UNIT-II

ETHICS IN MANAGEMENT– Introduction – Ethics in HRM – Marketing Ethics – Ethical aspects of Financial Management-Technology Ethics and Professional ethics. The Ethical Value System–Universalism, Utilitarianism, Distributive Justice,

Social Contracts, Individual Freedom of Choice, Professional Codes; Culture and Ethics–Ethical Values in different Cultures, Culture and Individual Ethics.

Learning Outcomes:

After completion of this unit student will

- Understand the meaning of Marketing Ethics
- Analyze Differentiate between Technical ethics and professional ethics
- Know about the ethical value system
- Understand the Code and culture
-

UNIT-III

ROLE OF CORPORATE CULTURE IN BUSINESS– Meaning– Functions– Impact of corporate culture–cross cultural issues in ethics, Emotional Honesty – Virtue of humility– Promote happiness–karma yoga – proactive – flexibility and purity of mind. The Ethical Value System–Universalism, Utilitarianism, Distributive Justice, Social Contracts, Individual Freedom of Choice, Professional Codes; Culture and Ethics – Ethical Values in different Cultures, Culture and Individual Ethics.

Learning Outcomes:

After completion of this unit student will

- Understand the corporate culture in business
- Analyze Ethical Value System Know about the ethical value system
- Know Universalism, Utilitarianism, Distributive Justice
- Differentiate Ethical Values in different Cultures

UNIT-IV

Leadership: Differences between Leader & Manager - Leadership – Leadership styles Leadership theories – Managerial Grid – Transactional Vs Transformational Leadership – Qualities of a good leader- Women Leadership in India.

LearningOutcomes:

After completion of this unit student will

- Understand Law and Ethics
- Analyze Social Responsibilities of Business
- Know Environmental Protection and Fair Trade Practices
- Implementing National Safe guarding Health and well being of Customers

UNIT-V

Organisational Behaviour–Organizing Process – Depart mentation Types - Decentralization– Making Organizing Effective – Organisational culture- Types of culture – Organisational Culture Vs Organizational climate - Conflict management - Change Management.

Learning Outcomes:

After completion of this unit student will

- Understand corporate governance code
- Analyze role of auditors, board of directors and shareholders
- Know accounting and regulatory framework
- Implementing corporate social responsibility

Course Outcomes:

- At the end of the course, students will be able to
- Understand business ethics and ethical practices in management.
- Understand the role of ethics in management
- Apply the knowledge in cross cultural ethics
- Analyze law and ethics
- Evaluate corporate governance

Textbooks:

- MurthyCSV: "BusinessEthicsandCorporateGovernance", HPH
- BholananthDutta, S.K. Podder- "CorporationGovernance", VBH.

References:

- Dr.K.Nirmala, KarunakaraReaddy: "BusinessEthicsandCorporateGovernance", HPH
- H.R.Machiraju: "CorporateGovernance"
- K.Venkataramana, "CorporateGovernance", SHBP.
- N.M.Khandelwal: "IndianEthosandValuesforManagers"

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B. Tech- VII Sem

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(BA20AHS705) MANAGEMENT SCIENCE

Course Objectives:

- To provide fundamental knowledge on Management, Administration, Organization & its concepts.
- To make the students understand the role of management in Production
- To impart the concept of HR in order to have an idea on Recruitment, Selection, Training & Development, job evaluation and Merit rating concepts
- To create awareness on identify Strategic Management areas & the PERT/CPM for better Project Management
- To make the students aware of the contemporary issues in management

UNIT-I

INTRODUCTION TO MANAGEMENT: Management-Concept and meaning-Nature-Functions-Management as a Science and Art and both. Schools of Management Thought - Taylor's Scientific Theory-Henry Fayol's principles - Elton Mayo's Human relations - Systems Theory - Organisational Designs - Line organization - Line & Staff Organization-Functional Organization-Matrix Organization-Project Organization-Committee form of Organization - Social responsibilities of Management.

UNIT-II

OPERATIONS MANAGEMENT- Principles and Types of Plant Layout - Methods of Production (Job, batch and Mass Production), Work Study - Statistical Quality Control- Deming's contribution to Quality. Material Management -Objectives - Inventory-Functions - Types, Inventory Techniques - EOQ-ABC Analysis - Purchase Procedure and Stores Management-Marketing Management-Concept-Meaning-Nature-Functions of Marketing - Marketing Mix- Channels of Distribution - Advertisement and Sales Promotion-Marketing Strategies based on Product Life Cycle.

UNIT-III

HUMAN RESOURCES MANAGEMENT(HRM)– HRM - Definition and Meaning - Nature - Managerial and Operative functions - Evolution of HRM -Job Analysis - Human Resource Planning(HRP) - Employee Recruitment-Sources of Recruitment - Employee Selection-Process and Tests in Employee Selection-Employee Training and Development-On-the-job& Off-the-job training methods-Performance Appraisal Concept-Methods of Performance Appraisal–Placement-Employee Induction-Wage and Salary Administration

UNIT-IV

STRATEGIC&PROJECT MANAGEMENT: Differences between Leader & Manager - Leadership - Leadership styles Leadership theories - Managerial Grid - Transactional Vs Transformational Leadership - Qualities of a good leader- Women Leadership in India.

UNIT-V

CONTEMPORARY ISSUES IN MANAGEMENT –The concept of Management Information System(MIS) - Materials Requirement Planning (MRP) -Customer Relations Management(CRM) - Total Quality Management (TQM) - Six Sigma Concept –Supply Chain Management(SCM)-Enterprise Resource Planning(ERP)-Performance Management- Business Process Outsourcing (BPO) - Business Process Re-engineering and Bench Marking –Balanced Score Card -Knowledge Management.

Course Outcomes:

- Understand the concepts & principles of management and designs of organization in a practical world
- Apply the knowledge of Work-study principles & Quality Control techniques in industry
- Analyze the concepts of HR Min Recruitment, Selection and Training& Development.
- Evaluate PERT/CPM Techniques for projects of an enterprise and estimate time & cost of project & to analyze the business through SWOT.
- Create Modern technology in management science.

Textbooks:

- A.R.Aryasri, "Management Science", TMH, 2013
- Stoner, Freeman, Gilbert, Management, Pearson Education, New Delhi, 2012.

References:

- Koontz & Weihrich, "Essentials of Management", 6th edition, TMH, 2005.
- Thomas N. Duening & John M. Ivancevich,
"Management Principles and Guidelines", Biztantra.
- Kanishka Bedi, "Production and Operations Management",
Oxford University Press, 2004.
- Samuel C. Certo, "Modern Management", 9th edition, PHI, 2005

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B. Tech- V Sem

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(BA20AHS706) STRATEGICMANAGEMENT

Course Objectives:

- To introduce the concepts of strategic management and understand its nature in

Competitive and organizational landscape
- To provide an understanding of internal and external analysis of a firm/individual
- To provide understanding of strategy formulation process and framework
- Impart knowledge of corporate culture
- Encourage the student in understanding SWOT analysis BCGMatrix

UNIT-I

Introduction of Strategic Management: meaning, nature, importance and relevance. The Strategic Management Process: – Corporate, Business and Functional Levels of strategy. Vision, mission and purpose –Business definition, objectives and goals – Stakeholders in business and their roles in strategic management Balance score card.

Learning Outcomes:

After completion of this unit student will

- Understand the meaning and importance of strategic management
- Explain Strategic Management Process and Corporate, Business
- Know about the Business definition, objectives and goals
- Understand Stakeholders their roles in strategic management

UNIT-II

External and Internal Analysis: The Strategically relevant components of a Company's External Environment Analysis, Industry Analysis - Porter's Five Forces model - Industry driving forces-Key Success Factors. Analyzing a company's resources and competitive position

Learning Outcomes:

After completion of this unit student will

- Understand the components of a Company's environment
- Explain External Environment Analysis, Industry Analysis
- Know how to analyze industry competition through the Porter's Five Forces model
- Analyze Key Success Factors in a company's competitive position

UNIT-III

Competitive Strategies: Generic Competitive Strategies: Low cost, Differentiation, Focus. Grand Strategies: Stability, Growth (Diversification Strategies, Vertical Integration Strategies, Mergers, Acquisition & Take over Strategies, Strategic Alliances & Collaborative Partnerships), Retrenchment, Outsourcing Strategies. Tailoring strategy to fit specific industry- Life Cycle Analysis- Emerging, Growing, and Mature & Declining Industries.

Learning Outcomes:

After completion of this unit student will

- Understand the Competitive Strategies
- Explain Stability, Growth Mergers, Acquisition & Take over Strategies
- Know about the Retrenchment, Outsourcing Strategies
- Differentiate Life Cycle Analysis, Mature & Declining Industries

UNIT-IV

Strategy Implementation and control - Strategy implementation; Organization Structure -Matching structure and strategy Behavioral issues in implementation- Corporate culture-Mc Kinsey's 7s Framework. Functional issues - Functional plans and policies - Financial, Marketing, Operations, Personnel,IT.

Learning Outcomes:

After completion of this unit student will

- Understand the Organization Structure
- Explain Matching structure and strategy
- Know about the Corporate culture
- Analyze Functional plans and policies

UNIT-V

Strategy Evaluation: Strategy Evaluation–Operations Control and Strategic Control-Relationship between a Company's Strategy and its Business Model.- SWOT analysis – Value Chain Analysis –Benchmarking-Portfolio Analysis: BCG Matrix– GE9 Cell Model.

Learning Outcomes:

After completion of this unit student will

- Understand the Operations Control and Strategic Control
- Explain Company's Strategy and its Business Model
- Know about the SWOT analysis

Course Outcomes:

1. Demonstrate an appreciation of areas which are fundamental to the development of successful strategy
2. Outline and critique the major perspectives on the conduct of strategy
3. Explain and use the most common tools of strategic analysis
4. Demonstrate an understanding of, and ability to assess the complexities of strategic decision making
5. Understand functional areas and appreciate the role of functional areas in both the formulation and the implementation of a firm's vision, mission and strategy
6. Integrate strategic thinking into the holistic management of an organization

Textbooks:

- Strategic Management – J.S.Chandan&Nitishsen Gupta, Vikas
- Business Strategy: Managing Uncertainty, Opportunity, and Enterprise by J.C. Spender

References:

- Strategic Management Concepts and Cases, Fred. R David, PHI.
- Strategic Management,Hill, Ireand, manikutty, Cengage.
- Concepts in Strategic Management and Business Policy,Wheelen& Hunger, Pearson Education.
- Strategic Management – Text and Cases, V.S.P. Rao, Excel.
- Strategic Management – Theory and Application, Habergerg, Rieple, oxford .
- Strategic Management, P. SubbaRao, Himalaya.
- Business policy and strategic management, SukulLomash, P.K.Mishra, Vikas

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B. Tech- VII Sem

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(CS20ASC701)Digital Marketing Syllabus(Skill Oriented Course)

Course Objectives:

Digital marketing objectives should be SMART (Specific, Measurable, Achievable, Relevant and Time Related); and you should benchmark against your competitors to ensure that you are more effective.

Module 1: Introduction to Digital Marketing:

- What is digital marketing?
- How is it different from traditional marketing?
- ROI between Digital and traditional marketing?
- Discussion on Ecommerce
- Discussion on new trends and current scenario of the world?
- Digital marketing a boon or a Bane?
- How can digital marketing be a tool of success for companies?
- Video on importance of digital marketing
- Analysis of recent info graphics released by companies about digital marketing?
- How did digital marketing help the small companies and top inc
 - Categorization of digital marketing for the business
- Swot analysis of business, present website and media or promotion plan.
- Setting up vision,mission,and goals of digital marketing
- **Understanding a website**
 - What is a website?
 - Levels of websites?
 - Diff b/w Blog, Portal and Website?
 - Diff b/w websites either static or dynamic

Module 2: Search Engine Optimization (SEO):

- On page optimization techniques
- Off page Optimization techniques
- Reports

Module 3: Social Media Optimization (SMO):

- Introduction to social Media Marketing
- Advanced Facebook Marketing
- Word Press blog creation
- Twitter marketing
- LinkedIn Marketing
- Google plus marketing
- Social Media Analytical Tools

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First Year MCA

Course Structures and Syllabi under R20 Regulations

SRI VENKATESWARA COLLEGE OF ENGINEERING

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Karakambadi Road, TIRUPATI – 517507

Master of Computer Applications

Semester - 1 (Theory - 6, Lab - 3)

S No	Course No	Course Name	Category	L-T-P	Credits
1.	CA20FPC101	Computer Organization	PC	3-0-0	3
2.	CA20FPC102	Data Structures Using C	PC	3-0-0	3
3.	CA20FPC103	Database Management Systems	PC	3-0-0	3
4.	BA20FHS101	Accounting and Financial Management	HS	3-0-0	3
5.	CA20FPC104	Mathematical Foundations for Computer Science	PC	3-0-0	3
6.	CA20FPC105	Computer Networks	PC	3-0-0	3
7.	CA20FPC106	Database Management Systems Lab	PC	0-0-4	2
8.	CA20FPC107	Data Structures Using C Lab	PC	0-0-4	2
9.	CA20FPC108	Office Automation & Troubleshooting Lab	PC	0-0-4	2
10.	CA20FMC101	Mandatory Course(Corporate Communication Skills)	MC	3-0-0	0
Total					24

Semester - 2 (Theory - 6, Lab - 3)

S.No	Course No	Course Name	Category	L-T-P/D	Credits
1.	CA20FPC201	Operating Systems	PC	3-0-0	3
2.	CA20FPC202	Python Programming	PC	3-0-0	3
3.	CA20FPC203	OOPS through JAVA	PC	3-0-0	3
4.	MA20FBS201	Probability and Statistics	BS	3-0-0	3
5.	CA20FPC204	Software Engineering	PC	3-0-0	3
6.	CA20FPC205 CA20FPC206 CA20FPC207 CA20FPC208 CA20FPC209	Elective-I a. Automata Theory b. Soft Computing c. Artificial Intelligence d. Linux Programming e. Ethical Hacking	PC	3-0-0	3
7.	CA20FPC210	Operating Systems Lab	PC	0-0-4	2
8.	CA20FPC211	Python Programming Lab	PC	0-0-4	2
9.	CA20FPC212	Java Programming Lab	PC	0-0-4	2
Total					24

Semester-3 (Theory -6, Lab-3)

S.No	Course No	Course Name	Category	L-T-P	Credits
1.	CA20FPC301	Design and Analysis of Algorithms	PC	3-0-0	3
2.	CA20FPC302	Data Science & Analytics	PC	3-0-0	3
3.	CA20FPC303	Web Technologies	PC	3-0-0	3
4.	CA20FPC304	Cloud Computing	PC	3-0-0	3
5.	CA20FPC305 CA20FPC306 CA20FPC307 CA20FPC308 CA20FPC309	Elective II a. Software Testing b. Cryptography and Network Security c. Internet of Things d. Software Project Management e. .NET Framework and c#	PC	3-0-0	3
6.	CA20FPC310 CA20FPC311 CA20FPC312 CA20FPC313 CA20FPC314	Elective III a. Mobile Application Development b. Natural Language Processing c. Big data Analytics d. Distributed systems e. Data Warehousing and Data Mining	PC	3-0-0	3
7.	CA20FPC315	Design and Analysis of Algorithms Lab	PC	0-0-4	2
8.	CA20FPC316	Data Science and Analytics Lab	PC	0-0-4	2
9.	CA20FPC317	Web Technologies Lab	PC	0-0-4	2
10.	CA20FMC318	Mandatory Course(Universal Human Values)	MC	3-0-0	0
				Total	24

Semester-4

S.No	Course No	Course Name	Category	L-T-P	Credits
1.	CA20FIP401	Internship	IP	0-0-0	2
2.	CA20FTS402	Seminar	TS	0-0-0	2
3.	CA20PWC03	Project Work	WC	0-0-0	16
Total					20

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(CA20FPC101)COMPUTER ORGANIZATION

Course Objectives:

1. To understand the structure, function, characteristics and performance issues of computer systems.
2. To understand the design of the various functional units of digital computers.
3. To understand the basic processing unit and how they are connected and how it generates control signals (using hardwired and micro programmed approaches).
4. To understand the different types of memory and how they are related.
5. To learn basics of Parallel Computing and Pipelining.

Course Outcomes:

1. Explain the organization of basic computer, its design & the design of control unit and trade-offs between hardware and software.
2. Students will formulate and solve problems, understand the performance requirement of the systems and the operations & languages of the register transfer, micro operations and input-output organization.
3. Students can understand how computer stores positive and negative numbers.
4. Understand the organization of memory and memory management hardware.
5. Elaborate advanced concepts of computer architecture, Parallel Processing, inter-processor communication and synchronization.

UNIT-1

BASIC STRUCTURE OF COMPUTERS: Computer Types, Functional unit, Basic operational concepts, Bus structures, Software, Performance, multiprocessors and multi computers.

DATA REPRESENTATION: Fixed Point Representation, Floating Point Representation. Error Detection codes.

UNIT-2

REGISTER TRANSFER LANGUAGE AND MICROOPERATIONS: Register Transfer language, Register Transfer, Bus and memory transfers, Arithmetic Micro operations, logic micro operations, shift micro operations

BASIC COMPUTER ORGANIZATION AND DESIGN: Instruction codes, Computer Registers, Computer instructions, Instruction cycle, Memory- reference instructions, Input – Output and Interrupt.

UNIT-3

CENTRAL PROCESSING UNIT: Stack organization, Instruction formats, Addressing modes, Data transfer and manipulation, Program control, Reduced Instruction set computer

COMPUTER ARITHMETIC: Fixed point operations - Addition and subtraction, multiplication, Division Algorithms

UNIT-4

THE MEMORY SYSTEM: Basic concepts, semiconductor RAM memories, Read-only memories, Cache memories, performance considerations

UNIT-5

PIPELINE AND VECTOR PROCESSING: Parallel processing, Arithmetic pipeline, Instruction Pipeline, RISC Pipeline, Vector processing, Array Processors.

MULTI PROCESSORS: Characteristics of Multi Processors, Inter Connection Structures, Inter Processor Arbitration, Inter Processor Communication & Synchronization, Cache Coherence

Text Books:

1. Computer Systems Architecture – M. Moris Mano, IIIrd Edition, Pearson/PHI
2. Computer Organization – V Carl Hamacher, Zvonko Vranesic, Safwal G Zaky, Vth Edition, McGraw Hill.

Reference Books:

1. Computer Organization and Architecture–William Stallings Sixth Edition, Pearson / PHI

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(CA20FPC102)DATA STRUCTURES USING C

Course Objectives:

1. To illustrate the basic concepts of C programming language.
2. To discuss the concepts of Functions, Arrays, Pointers and Structures.
3. To familiarize with Stack, Queue and Linked lists data structures.
4. To explain the concepts of non-linear data structures like graphs and trees.
5. To learn the different types of searching and sorting techniques.

Course Outcomes:

1. Analyze the basic concepts of C Programming language.
2. Design applications in C, using functions, arrays, pointers and structures.
3. Apply various operations of Stacks and Queues in solving the problems.
4. Explain operations on Linked lists.
5. Demonstrate various tree traversals and graph traversal techniques.
6. Design searching and sorting methods

UNIT -1

Introduction to C Language - C Language Elements, Variable Declarations and Data Types, Operators and Expressions, Decision Statements - If and Switch Statements, Loop Control Statements - while, for, do-while Statements.

Introduction to Functions, Storage classes, Arrays, Structures, Unions, Pointers, Strings and Command line arguments.

UNIT -2

Data Structures, Stacks and Queues- Overview of Data Structure, Representation of a Stack, Stack Related Terms, Operations on a Stack, Implementation of a Stack, Evaluation of Arithmetic Expressions, Infix, Prefix, and Postfix Notations, Evaluation of Postfix Expression, Conversion of Expression from Infix to Postfix, Recursion, Queues - Various Positions of Queue, Representation of Queue, Insertion, Deletion, Searching Operations.

UNIT -3

Linked Lists–Pointers, Singly Linked List, Dynamically Linked Stacks and Queues, Polynomials Using Singly Linked Lists, Using Circularly Linked Lists, Insertion, Deletion and Searching Operations, Doubly linked lists and its operations, Circular linked lists and its operations.

UNIT -4

Trees- Tree terminology, representation, Binary tree, representation, Binary tree traversals. Binary Tree Operations, **Graphs**- Graph terminology, Graph representation, Elementary Graph Operations, Breadth first search (BFS) and Depth first search (DFS), Connected Components, and Spanning Trees.

UNIT -5

Searching and Sorting–Sequential, Binary, Exchange (Bubble) Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort. Searching- Linear and Binary Search Methods.

Text Books:

1. The C Programming Language, Brian W Kernighan and Dennis M Ritchie, Second Edition, Prentice Hall Publication.
2. Fundamentals of Data Structures in C, Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, Computer Science Press.
3. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education.
4. B.A.Forouzan and R.F. Gilberg, "COMPUTER SCIENCE: A Structured Programming Approach Using C", Third edition, CENGAGE Learning, 2016.
5. Richard F. Gilberg&Behrouz A. Forouzan, "Data Structures: A Pseudocode Approach with C", Second Edition, CENGAGE Learning, 2011.

Reference Books:

1. PradipDey and ManasGhosh, Programming in C, Oxford University Press, 2nd Edition 2011
2. E.Balaguruswamy, "C and Data Structures", 4th Edition, Tata McGraw Hill.
3. A.K.Sharma, Computer Fundamentals and Programming in C, 2nd Edition, University Press.
4. M.T.Somashekara, "Problem Solving Using C", PHI, 2nd Edition 2009.

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(CA20FPC103)DATABASE MANAGEMENT SYSTEMS

Course Objectives:

1. Train in the fundamental concepts of database management systems, database modeling and design, SQL, PL/SQL and system implementation techniques.
2. Enable students to model ER diagram for any customized application
3. Inducting appropriate strategies for optimization of queries.
4. Provide knowledge on concurrency techniques
5. Demonstrate the organization of Databases

Course Outcomes:

1. Design a database for a real-world information system
2. Define transactions which preserve the integrity of the database
3. Generate tables for a database
4. Organize the data to prevent redundancy
5. Pose queries to retrieve the information from database.

UNIT -1

Introduction: Database systems applications, Purpose of Database Systems, view of Data, Database Languages, Database Design, Database Engine, Database and Application Architecture, Database Users and Administrators.

Introduction to Relational Model: Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages, Relational Algebra

At the end of the Unit, students will be able to:

- Distinguish between Database and File System
- Categorize different kinds of data models
- Define functional components of DBMS

UNIT - 2

Introduction to SQL: Overview of the SQL Query Language, SQL Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions, Nested Sub-queries, Modification of the Database.

Intermediate SQL: Joint Expressions, Views, Transactions, Integrity Constraints, SQL Data Types and Schemas, Index Definition in SQL, Authorization.

Advanced SQL: Accessing SQL from a Programming Language, Functions and Procedures, Triggers, Recursive Queries, Advanced Aggregation Features.

At the end of the Unit, students will be able to:

- Outline the elements of the relational model such as domain, attribute, tuple, relation and entity
- Distinguish between various kinds of constraints like domain, key and integrity
- Define relational schema
- Develop queries using Relational Algebra and SQL
- Perform DML operations on databases

UNIT - 3

Database Design and the E-R Model: Overview of the Design Process, The Entity-Relationship Model, Complex Attributes, Mapping Cardinalities, Primary Key, Removing Redundant Attributes in Entity Sets, Reducing E-R Diagrams to Relational Schemas, Extended E-R Features, Entity-Relationship Design Issues, Alternative Notations for Modeling Data, Other Aspects of Database Design.

Relational Database Design:

Features of Good Relational Designs, Decomposition Using Functional Dependencies, Normal Forms, and Functional-Dependency Theory, Algorithms for Decomposition using Functional Dependencies, Decomposition Using Multivalued Dependencies, More Normal Forms, Atomic Domains and First Normal Form, Database-Design Process, Modeling Temporal Data, Indexing.

At the end of the Unit, students will be able to:

- Develop E-R model for the given problem
- Derive tables from E-R diagrams
- Differentiate between various normal forms based on functional dependency
- Apply normalization techniques to eliminate redundancy

UNIT -4

Query Processing: Overview, Measures of Query cost, Selection Operation, Sorting, Join Operation, Other Operations, Evaluation of Expressions, Query Processing in Memory.

Query optimization: Overview, Transformation of Relational Expressions, Estimating Statistics of Expression Results, Choice of Evaluation Plans, Materialized views, Advanced Topics in Query Optimization.

At the end of the Unit, students will be able to:

1. Identify variety of methods for effective processing of given queries.
2. Obtain knowledge related to optimization techniques.

UNIT - 5

Transaction Management:

Transactions: Transaction Concept, A Simple Transactional Model, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation, Serializability, Transaction Isolation and Atomicity, Transaction Isolation Levels, Implementation of Isolation Levels, Transactions as SQL Statements.

Concurrency Control: Lock-Based Protocols, Deadlock Handling, Multiple Granularity, Insert Operations. Delete Operations and Predicate Reads, Timestamp-Based Protocols, Validation- Based Protocols, Multi-version Schemes, Snapshot Isolation, Weak Levels of Consistency in Practice, Advanced Topics in Concurrency.

Recovery System: Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm, Buffer Management, Failure with Loss of Non-Volatile Storage, High Availability Using Remote Backup Systems, Early Lock Release and Logical Undo Operations, ARIES, Recovery in Main-Memory Databases.

At the end of the Unit, students will be able to:

1. Understand various properties of transaction.
2. Design atomic transactions for an application.
3. Gain the knowledge about log mechanism and check pointing techniques for system recovery.

Text Books:

1. A.Silberschatz, H.F.Korth, S.Sudarshan, "Database System Concepts", 7/e, TMH 2020

Reference Books:

1. Shamkant B. Navathe, "Database Management System" 6/e Ramez Elmasri PEA
2. "Database Principles Fundamentals of Design Implementation and Management", Carlos
3. Coronel, Steven Morris, Peter Robb, Cengage Learning.
4. Raghurama Krishnan, Johannes Gehrke, "Database Management Systems", 3/e, TMH

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(BA20FHS101)ACCOUNTING AND FINANCIAL MANAGEMENT

Course Objective:

1. The objective of the course is to familiarize the student with the fundamentals of accounting principles and Financial Management for making sound financial decisions.

Course Outcomes:

1. The student will be able to understand the basic accounting principles
2. Get exposure to the fundamental concepts, techniques and tools of Financial Management,
3. Enable to prepare and analyze financial statements of business enterprises for taking sound financial decisions.

UNIT - 1

Introduction to Accounting: Definition of Accounting- Accounting concepts –Principles- Double entry system of accounting- classification of accounts- Books of accounts - Journal entries- Ledger books – preparation of financial statements and accounts-Trial Balance- Trading account-Profit and Loss account - Balance sheet (Simple problems with adjustments).

UNIT - 2

Cost Accounting and Marginal Costing: Nature- importance- Scope- difference between financial accounting and cost accounting- principles-Absorption costing- Marginal Costing - Concept of Break Even Analysis - Margin of Safety and P/V ratio- Break Even Point-Determination of BEP- Cost-Volume-Profit Analysis – managerial applications of BEP and application of marginal costing techniques (Simple problems).

UNIT - 3

Financial Analysis and Interpretations: Funds flow and cash flow statements meaning-importance-statement of changes in working capital - sources and

application of funds - Funds Flow and Cash flow analysis-Financial analysis through Ratios-liquidity ratios- solvency ratios – Profitability ratio, Activity ratio (Simple problems).

UNIT- 4

Financial Management: Definition-objectives- finance functions-importance-Profit and wealth maximization- Sources of capital- concept of Leverage and types of Leverage- Over Capitalization and Under Capitalization- Time Value of money -Present value of Money and Future Value of Money.

UNIT- 5

Capital Budgeting and Budgeting Techniques: Definition- Features- Significance-methods of evaluation of capital budgeting proposals - Payback Period-Accounting Rate of Return (ARR)- Net Present Value Method (NPV) and Internal Rate of Return (IRR)- (Simple problems),

Text Books:

1. M.N.Arora, Accounting for Management, , HPH, 2012.
2. T.S.Reddy and Y.Hari Prasad Reddy, Accounting and Financial Management, Margham Publications.

Reference Books:

1. Khan M.Y, Jain P.K, Management Accounting, 5th Edition , Tata McGraw Hill, 2012.
2. S.N.Maheshwari, Financial Accounting, 4th Edition, Vikas Publications, 2012.
3. Khan M.Y, Jain P.K, Financial Statement Analysis, PHI, 2009.
4. I.M.Pandey, Financial Management,10th Edition, Vikas Publications, 2011.
5. Financial Management, 7th Edition, TMH, 2011.

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(CA20FPC104)MATHEMATICAL FOUNDATIONS FOR COMPUTER SCIENCE

Course Objectives:

1. Apply logical reasoning to solve a variety of problems.
2. Understand and apply methods of discrete mathematics such as proofs, counting principles, number theory, logic and set theory to mathematical problems in a creative way.
3. To apply the abstract concepts of graph theory in modelling and solving non-trivial problems in different fields of study.

Course Outcomes:

1. Able to apply mathematical concepts and logical reasoning to solve problems in different fields of Computer science and information technology.
2. Able to apply the concepts in courses like Computer Organization, DBMS, Analysis of Algorithms, Theoretical Computer Science, Cryptography, Artificial Intelligence

UNIT – 1

Sets and Propositions: Introduction, Combination of Sets, Finite and Infinite Sets, Uncountably Infinite Sets, Mathematical Induction, Principle of Inclusion and Exclusion, Multisets, Propositions, Logical Connectives, Conditional and Biconditionals, Well-Formed Formulas, Tautologies, Logical Equivalences.

Relations and Functions: Introduction, Properties of Binary Relations, Closure of Relations.

UNIT – 2

Groups: Introduction, Groups, Subgroups, Generators and Evaluations of Powers, Cosets and Lagranges's Theorem, Permutations Groups and Burnside's Theorem, Codes and Group Codes, Isomorphisms and Automorphisms, Homomorphisms and Normal Subgroups.

UNIT – 3

Permutations, Combinations, and Discrete Probability: Introduction, the Rules of Sum and Product, Permutations, Combinations, Generation of Permutations and Combinations, Discrete Probability, Conditional Probability.

Recurrence Relations and Recursive Algorithms: Introduction, Recurrence Relations, Linear Recurrence Relations with Constant Coefficients, Homogeneous Solutions, Particular Solutions, Total Solutions.

UNIT – 4

Graphs: Introduction, Basic Terminology, Multigraphs and Weighted Graphs, Digraphs and Relations, Representation of Graphs, Operations on Graphs, Paths and Circuits, Graph Traversals, Shortest Paths in Weighted Graphs, Eulerian Paths and Circuits, Hamiltonian Paths and Circuits.

UNIT – 5

Trees: Trees, Rooted Trees, Path Lengths in Rooted Trees, Prefix Codes, Binary Search Trees, Spanning Trees and Cut sets, Minimum Spanning Trees, Kruskal's Algorithm, Prim's Algorithm.

Discrete Numeric Functions: Introduction, Manipulation of Numeric Functions, Asymptotic Behavior of Numeric Functions.

Text Book:

1. C L Liu and D Mohapatra "Elements of Discrete Mathematics", Tata Mcgraw Hill, 2009.

Reference Books:

1. Discrete and Combinatorial Mathematics, Fifth Edition, R. P. Grimaldi, B.V. Ramana, Pearson
2. Discrete Mathematics Theory and Applications, D.S Malik and M.K. Sen, Cengage Learning
3. J .L.Mott, A.Kandel, T.P .Baker, Discrete Mathematics for Computer Scientists and Mathematicians, second edition 1986, Prentice Hall of India
4. C.L.Liu, Elements of Discrete Mathematics, Second Edition 1985, McGraw-Hill Book Company. Reprinted 2000
5. Discrete Mathematics, Norman L. Biggs, Second Edition, OXFORD Indian Edition.
6. Graph Theory with Applications to Engineering & Computer Science: Narsingh Deo, PHI (2004) "Discrete Mathematical Structures" Jayant Ganguly, Sanguine.

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(CA20FPC105)COMPUTER NETWORKS

Course Objectives:

1. Study the evolution of computer networks and future directions.
2. Study the concepts of computer networks from layered perspective.
3. Study the issues open for research in computer networks.

Course Outcomes:

1. Ability to choose the transmission media depending on the requirements.
2. Ability to design new protocols for computer network.
3. Ability to configure a computer network logically.

UNIT - 1

Introduction: Networks, Network Types, Internet History, Standards and Administration, Network Models: Protocol Layering, TCP/IP Protocol Suite, The ISO Model.

The Physical layer: Data and Signals, Transmission impairment, Data rate limits, Performance, Transmission media: Introduction, Guided Media, Unguided Media, Switching: Introduction, Circuit, Switched Networks, Packet switching.

UNIT - 2

The Data Link Layer: Introduction, Link layer addressing, Error detection and Correction: Cyclic codes, Checksum, Forward error correction, Data link control: DLC Services, Data link layer protocols, HDLC, Point to Point Protocol, Media Access control: Random Access, Controlled Access, Channelization, Connecting devices and virtual LANs: Connecting Devices.

UNIT - 3

The Network Layer: Network layer design issues, Routing algorithms, Congestion control algorithms, Quality of service, Internetworking, The network layer in the

Internet: IPV4 Addresses, IPV6, Internet Control protocol, OSPF, BGP, IP, ICMPv4, IGMP.

UNIT - 4

The Transport Layer: The Transport Service, Elements of Transport Protocols, Congestion Control, The internet transport protocols: UDP, TCP, Performance problems in computer networks, Network performance measurement.

UNIT - 5

The Application Layer: Introduction, Client Server Programming, WWW and HTTP, FTP, e-mail, TELNET, Secure Shell, Domain Name System, SNMP.

Text Books:

1. "Data communications and networking", Behrouz A. Forouzan, McGraw Hill Education, 5th edition, 2012.
2. "Computer Networks", Andrew S. Tanenbaum, Wetherall, Pearson, 5th edition, 2010.

Reference Books:

1. Data Communication and Networks, Bhushan Trivedi, Oxford
2. "Internetworking with TCP/IP – Principles, protocols, and architecture- Volume 1, Douglas E.Comer, 5th edition, PHI
3. "Computer Networks", 5E, Peterson, Davie, Elsevier.
4. "Introduction to Computer Networks and Cyber Security", Chawan- Hwa Wu, Irwin, CRC Publications. "Computer Networks and Internets with Internet Applications", Comer.

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(CA20FPC106)DATABASE MANAGEMENT SYSTEMS LAB

Course Objectives:

1. To implement the basic knowledge of SQL queries and relational algebra.
2. To construct database models for different database applications.
3. To apply normalization techniques for refining of databases.
4. To practice various triggers, procedures, and cursors using PL/SQL.
5. To design and implementation of a database for an organization

Course Outcomes:

1. Design database for any real world problem
2. Implement PL/SQL programs
3. Define SQL queries
4. Decide the constraints
5. Investigate for data inconsistency

Week-1: CREATION OF TABLES

1. Create a table called Employee with the following structure.

Name	Type
Empno	Number
Ename	Varchar2(20)
Job	Varchar2(20)
Mgr	Number
Sal	Number

- a. Add a column commission with domain to the Employee table.
- b. Insert any five records into the table.
- c. Update the column details of job
- d. Rename the column of Employ table using alter command.
- e. Delete the employee whose empno is19.

2. Create department table with the following structure.

Name	Type
Deptno	Number
Deptname	Varchar2(20)
location	Varchar2(20)

- Add column designation to the department table.
- Insert values into the table.
- List the records of emp table grouped by dept no.
- Update the record where dept no is 9.
- Delete any column data from the table

3. Create a table called Customer table

Name	Type
Cust name	Varchar2(20)
Cust street	Varchar2(20)
Cust city	Varchar2(20)

- Insert records into the table.
- Add salary column to the table.
- Alter the table column domain.
- Drop salary column of the customer table.
- Delete the rows of customer table whose ust_city is 'hyd'.
- Create a table called branch table.

Name	Type
Branch name	Varchar2(20)
Branch city	Varchar2(20)
asserts	Number

4. Increase the size of data type for asserts to the branch.
- Add and drop a column to the branch table.
 - Insert values to the table.
 - Update the branch name column

d. Delete any two columns from the table

5. Create a table called sailor table

Name	Type
Sid	Number
Sname	Varchar2(20)
rating	Varchar2(20)

a. Add column age to the sailor table.

b. Insert values into the sailor table.

c. Delete the row with rating>8.

d. Update the column details of sailor.

e. Insert null values into the table.

6. Create a table called reserves table

Name	Type
Boat id	Integer
sid	Integer
day	Integer

a. Insert values into the reserves table.

b. Add column time to the reserves table.

c. Alter the column day data type to date.

d. Drop the column time in the table.`

e. Delete the row of the table with some condition.

Week-2: QUERIES USING DDL AND DML

- Create a user and grant all permissions to the user.
 - Insert the any three records in the employee table and use rollback. Check the result.
 - Add primary key constraint and not null constraint to the employee table.
 - Insert null values to the employee table and verify the result.
- Create a user and grant all permissions to the user.
 - Insert values in the department table and use commit.
 - Add constraints like unique and not null to the department table.
 - Insert repeated values and null values into the table.

3.
 - a. Create a user and grant all permissions to the user.
 - b. Insert values into the table and use commit.
 - c. Delete any three records in the department table and use rollback.
 - d. Add constraint primary key and foreign key to the table.

4.
 - a. Create a user and grant all permissions to the user.
 - b. Insert records in the sailor table and use commit.
 - c. Add save point after insertion of records and verify save point.
 - d. Add constraints not null and primary key to the sailor table.

5.
 - a. Create a user and grant all permissions to the user.
 - b. Use revoke command to remove user permissions.
 - c. Change password of the user created.
 - d. Add constraint foreign key and no tnull.

6.
 - a. Create a user and grant all permissions to the user.
 - b. Update the table reserves and use save point and rollback.
 - c. Add constraint primary key , foreign key and not null to the reserves table
 - d. Delete constraint not null to the table column

Week-3: QUERIES USING AGGREGATE FUNCTIONS

1.
 - a. By using the group by clause, display the names who belongs to dept no 10 along with average salary.
 - b. Display lowest paid employee details under each department.
 - c. Display number of employees working in each department and their department number.
 - d. Using built in functions, display number of employees working in each department and their department name from dept table. Insert dept name to dept table and insert dept name for each row, do the required thing specified above.
 - e. List all employees which start with either B or C.
 - f. Display only these ename of employees where the maximum salary is greater than or equal to 5000.

2.
 - a. Calculate the average salary for each different job.
 - b. Show the average salary of each job excluding manager.

- c. Show the average salary for all departments employing more than three people.
 - d. Display employees who earn more than the lowest salary in department 30
 - e. Show that value returned by sign (n) function.
 - f. How many days between day of birth to current date.
3.
 - a. Show that two substring as single string.
 - b. List all employee names, salary and 15% rise in salary.
 - c. Display lowest paid emp details under each manager
 - d. Display the average monthly salary bill for each deptno.
 - e. Show the average salary for all departments employing more than two people.
 - f. By using the group by clause, display the eid who belongs to dept no 05 along with average salary.
4.
 - a. Count the number of employees in department20
 - b. Find the minimum salary earned by clerk.
 - c. Find minimum, maximum, average salary of all employees.
 - d. List the minimum and maximum salaries for each job type.
 - e. List the employee names in descending order.
 - f. List the employee id, names in ascending order by empid.
5.
 - a. Find the sids, names of sailors who have reserved all boats called "INTERLAKE
Find the age of youngest sailor who is eligible to vote for each rating level with at least two such sailors.
 - b. Find the sname, bid and reservation date for each reservation.
 - c. Find the ages of sailors whose name begin and end with B and has at least 3characters.
 - d. List in alphabetic order all sailors who have reserved red boat.
 - e. Find the age of youngest sailor for each rating level.
6.
 - a. List the Vendors who have delivered products within 6 months from or derdate.
 - b. Display the Vendor details who have supplied both Assembled and Subparts.
 - c. Display the Sub parts by grouping the Vendor type (Local or Non Local).
 - d. Display the Vendor details in ascending order.
 - e. Display the Sub part which costs more than any of the Assembled parts.
 - f. Display the second maximum cost Assembled part

Week-4: PROGRAMS ON PL/SQL

1. a. Write a PL/SQL program to swap two numbers.
b. Write a PL/SQL program to find the largest of three numbers.
2. a. Write a PL/SQL program to find the total and average of 6 subjects and display the grade.
b. Write a PL/SQL program to find the sum of digits in a given number.
3. a. Write a PL/SQL program to display the number in reverse order.
b. Write a PL/SQL program to check whether the given number is prime or not.
4. a. Write a PL/SQL program to find the factorial of a given number.
b. Write a PL/SQL code block to calculate the area of a circle for a value of radius varying from 3 to 7. Store the radius and the corresponding values of calculated area in an empty table named areas, consisting of two columns radius and area.
5. a. Write a PL/SQL program to accept a string and remove the vowels from the string. (When 'hello' passed to the program it should display 'Hll' removing e and o from the worldHello).
b. Write a PL/SQL program to accept a number and a divisor. Make sure the divisor is less than or equal to 10. Else display an error message. Otherwise Display the remainder in words.

Week-5: PROCEDURES AND FUNCTIONS

1. Write a function to accept employee number as parameter and return Basic +HRA together as single column.
2. Accept year as parameter and write a Function to return the total net salary spent for a given year.
3. Create a function to find the factorial of a given number and hence find NCR.
4. Write a PL/SQL block to print prime Fibonacci series using local functions.
5. Create a procedure to find the lucky number of a given birth date.
6. Create function to the reverse of given number

Week-6: TRIGGERS

1. Create a row level trigger for the customers table that would fire for INSERT or UPDATE or DELETE operations performed on the CUSTOMERS table. This trigger will display the salary difference between the old values and new values:

CUSTOMERS table:

ID	NAME	AGE	ADDRESS	SALARY
1	Alive	24	Khammam	2000
2	Bob	27	Kadappa	3000
3	Catri	25	Guntur	4000
4	Dena	28	Hyderabad	5000
5	Eeshwar	27	Kurnool	6000
6	Farooq	28	Nellur	7000

- Creation of insert trigger, delete trigger, update trigger practice triggers using the passenger database. Passenger(Passport_ id INTEGER PRIMARY KEY, Name VARCHAR (50) NotNULL, Age Integer Not NULL, Sex Char, Address VARCHAR (50) NotNULL);
 - Write a Insert Trigger to check the Passport_id is exactly six digits or not.
 - Write a trigger on passenger to display messages '1 Record is inserted', '1 record is deleted', '1 record is updated' when insertion, deletion and updation are done on passenger respectively.
- Insert row in employee table using Triggers. Every trigger is created with name any trigger have same name must be replaced by new name. These triggers can raised before insert, update or delete rows on data base. The main difference between a trigger and a stored procedure is that the former is attached to a table and is only fired when an INSERT, UPDATE or DELETE occurs.
- Convert employee name into uppercase whenever an employee record is inserted or updated. Trigger to fire before the insert or update.
- Trigger before deleting a record from emp table. Trigger will insert the row to be deleted into table called delete_emp and also record user who has deleted the record and date and time of delete.
- Create a transparent audit system for a table CUST_MSTR. The system must keep track of the records that are being deleted or updated

Week-7: PROCEDURES

- Create the procedure for palindrome of given number.
- Create the procedure for GCD: Program should load two registers with two

Numbers and then apply the logic for GCD of two numbers. GCD of two numbers is performed by dividing the greater number by the smaller number till the remainder is zero. If it is zero, the divisor is the GCD if not the remainder and the divisors of the previous division are the new set of two numbers. The process is repeated by dividing greater of the two numbers by the smaller number till the remainder is zero and GCD is found.

3. Write the PL/SQL programs to create the procedure for factorial of given number.
4. Write the PL/SQL programs to create the procedure to find sum of N natural number.
5. Write the PL/SQL programs to create the procedure to find Fibonacci series.
6. Write the PL/SQL programs to create the procedure to check the given number is perfect or not

Week-8: CURSORS

1. Write a PL/SQL block that will display the name, dept no, salary of first highest paid employees.
2. Update the balance stock in the item master table each time a transaction takes place in the item transaction table. The change in item master table depends on the item id is already present in the item master then update operation is performed to decrease the balance stock by the quantity specified in the item transaction in case the item id is not present in the item master table then the record is inserted in the item master table.
3. Write a PL/SQL block that will display the employee details along with salary using cursors.
4. To write a Cursor to display the list of employees who are working as a Managers or Analyst.
5. To write a Cursor to find employee with given job and dept no.
6. Write a PL/SQL block using implicit cursor that will display message, the salaries of all the employees in the 'employee' table are updated. If none of the employee's salary are updated we get a message 'None of the salaries were updated'. Else we get a message like for example, 'Salaries for 1000 employees are updated' if there are 1000 rows in 'employee' table

Week-9: CASE STUDY: BOOK PUBLISHING COMPANY

A publishing company produces scientific books on various subjects. The books are written by authors who specialize in one particular subject. The company employs

editors who, not necessarily being specialists in a particular area, each take sole responsibility for editing one or more publications.

A publication covers essentially one of the specialist subjects and is normally written by a single author. When writing a particular book, each author works with one editor, but may submit another work for publication to be supervised by other editors. To improve their competitiveness, the company tries to employ a variety of authors, more than one author being a specialist in a particular subject for the above case study, do the following:

1. Analyze the data required.
2. Normalize the attributes.

Create the logical data model using E-R diagrams

Week-10: CASE STUDY GENERAL HOSPITAL

A General Hospital consists of a number of specialized wards (such as Maternity, Pediatric, Oncology, etc). Each ward hosts a number of patients, who were admitted on the recommendation of their own GP and confirmed by a consultant employed by the Hospital. On admission, the personal details of every patient are recorded. A separate register is to be held to store the information of the tests undertaken and the results of a prescribed treatment. A number of tests may be conducted for each patient. Each patient is assigned to one leading consultant but may be examined by another doctor, if required. Doctors are specialists in some branch of medicine and may be leading consultants for a number of patients, not necessarily from the same ward. For the above case study, do the following.

1. Analyze the data required.
2. Normalize the attributes.

Create the logical data model using E-R diagrams

Week-11: CASE STUDY: CAR RENTAL COMPANY

A database is to be designed for a car rental company. The information required includes a description of cars, subcontractors (i.e. garages), company expenditures, company revenues and customers. Cars are to be described by such data as: make, model, year of production, engine size, fuel type, number of passengers, registration number, purchase price, purchase date, rent price and insurance details. It is the company policy not to keep any car for a period exceeding one year. All major repairs and maintenance are done by subcontractors (i.e. franchised garages), with whom CRC has long-term agreements. Therefore the data about garages to be kept in the

database includes garage names, addresses, range of services and the like. Some garages require payments immediately after a repair has been made; with others CRC has made arrangements for credit facilities. Company expenditures are to be registered for all outgoings connected with purchases, repairs, maintenance, insurance etc. Similarly the cash inflow coming from all sources: Car hire, car sales, insurance claims must be kept of file. CRC maintains a reasonably stable client base. For this privileged category of customers special credit card facilities are provided. These customers may also book in advance a particular car. These reservations can be made for any period of time up to one month. Casual customers must pay a deposit for an estimated time of rental, unless they wish to pay by credit card. All major credit cards are accepted. Personal details such as name, address, telephone number, driving license, number about each customer are kept in the database. For the above case study, do the following:

1. Analyze the data required.
2. Normalize the attributes.

Create the logical data model using E-R diagrams

Week-12: CASE STUDY: STUDENT PROGRESS MONITORING SYSTEM

A database is to be designed for a college to monitor students' progress throughout their course of study. The students are reading for a degree (such as BA, BA (Hons) M.Sc., etc) within the framework of the modular system. The college provides a number of modules, each being characterized by its code, title, credit value, module leader, teaching staff and the department they come from. A module is coordinated by a module leader who shares teaching duties with one or more lecturers. A lecturer may teach (and be a module leader for) more than one module. Students are free to choose any module they wish but the following rules must be observed: Some modules require pre-requisites modules and some degree programmes have compulsory modules. The database is also to contain some information about students including their numbers, names, addresses, degrees they read for, and their past performance i.e. modules taken and examination results. For the above case study, do the following:

1. Analyze the data required.
2. Normalize the attributes.
3. Create the logical data model i.e., ER diagrams.
4. Comprehend the data given in the case study by creating respective tables with primary keys and foreign keys wherever required.

5. Insert values into the tables created (Be vigilant about Master- Slave tables).
6. Display the Students who have taken M.Sc course
7. Display the Module code and Number of Modules taught by each Lecturer.
8. Retrieve the Lecturer names who are not Module Leaders.
9. Display the Department name which offers 'English' module.
10. Retrieve the Prerequisite Courses offered by every Department (with Department names).
11. Present the Lecturer ID and Name who teaches 'Mathematics'.
12. Discover the number of years a Module is taught.
13. List out all the Faculties who work for 'Statistics' Department.
14. List out the number of Modules taught by each Module Leader.
15. List out the number of Modules taught by a particular Lecturer.
16. Create a view which contains the fields of both Department and Module tables.
(Hint- The fields like Module code, title, credit, Department code and its name).
17. Update the credits of all the prerequisite courses to 5. Delete the Module 'History' from the Module table.

Reference Books:

1. Ramez Elmasri, Shamkant, B. Navathe, "Database Systems", Pearson Education, 7th Edition, 2020.
2. Peter Rob, Carles Coronel, "Database System Concepts", Cengage Learning, 7th Edition, 2008.

Web References:

1. <http://www.scoopworld.in>

SRI VENKATESWARA COLLEGE OF ENGINEERING

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MCA- I Sem

L T P C

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(CA20FPC107)DATA STRUCTURES USING C LAB

Course Objectives:

1. To get familiar with the basic concepts of C programming.
2. To design programs using arrays, strings, pointers and structures.
3. To illustrate the use of Stacks and Queues
4. To apply different operations on linked lists.
5. To demonstrate the Binary tree traversal techniques.
6. To design searching and sorting techniques.

Course Outcomes:

1. Demonstrate basic concepts of C programming language.
2. Develop C programs using functions, arrays, structures and pointers.
3. Illustrate the concepts Stacks and Queues.
4. Design operations on Linked lists.
5. Apply various Binary tree traversal techniques.
6. Develop searching and sorting methods.

Week 1

Write C programs that use both recursive and non-recursive functions

- i) To find the factorial of a given integer.
- ii) To find the GCD (greatest common divisor) of two given integers.
- iii) To solve Towers of Hanoi problem.

Week 2

- a) Write a C program to find both the largest and smallest number in a list of integers.
- b) Write a C program that uses functions to perform the following:
 - i) Addition of Two Matrices
 - ii) Multiplication of Two Matrices

Week 3

- a) Write a C program that uses functions to perform the following operations:
- i) To insert a sub-string in to a given main string from a given position.
 - ii) To delete n Characters from a given position in a given string.

Week 4

- a) Write a C program that displays the position or index in the string S where the string T begins, or – 1 if S doesn't contain T.
- b) Write a C program to count the lines, words and characters in a given text.

Week 5

- a) Write a C Program to perform various arithmetic operations on pointer variables.
- b) Write a C Program to demonstrate the following parameter passing mechanisms:
- i) call-by-value
 - ii) call-by-reference

Week 6

Write a C program that uses functions to perform the following operations:

- i) Reading a complex number
- ii) Writing a complex number
- iii) Addition of two complex numbers
- iv) Multiplication of two complex numbers

(Note: represent complex number using a structure.)

Week 7

Write C programs that implement stack (its operations) using

- i) Arrays
- ii) Pointers

Week 8

Write C programs that implement Queue (its operations) using

- i) Arrays
- ii) Pointers

Week 9

Write a C program that uses Stack operations to perform the following:

- i) Converting infix expression into postfix expression

- ii) Evaluating the postfix expression

Week 10

Write a C program that uses functions to perform the following operations on singly linked list.

- i) Creation ii) Insertion iii) Deletion iv) Traversal

Week 11

Write a C program that uses functions to perform the following operations on Doubly linked list.

- i) Creation ii) Insertion iii) Deletion iv) Traversal

Week 12

Write a C program that uses functions to perform the following operations on Circular linked list.

- i) Creation ii) Insertion iii) Deletion iv) Traversal

Week 13

Write a C program that uses functions to perform the following:

- i. Creating a Binary Tree of integers
- ii. Traversing the above binary tree in preorder, inorder and postorder.

Week 14

Write C programs that use both recursive and non-recursive functions to perform the following searching operations for a Key value in a given list of integers:

- i) Linear search
- ii) Binary search

Week 15

Write a C program that implements the following sorting methods to sort a given list of integers in ascending order

- i) Bubble sort
- ii) Selection sort

Week 16

Write a C program that implements the following sorting methods to sort a given list of integers in ascending order

- i) Insertion sort
- ii) Merge sort
- iii) Quick sort

Text Books:

1. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education.
2. B.A.Forouzon and R.F. Gilberg, "COMPUTER SCIENCE: A Structured Programming Approach Using C", Third edition, CENGAGE Learning, 2016.
3. Richard F. Gilberg&Behrouz A. Forouzan, "Data Structures: A Pseudocode Approach with C", Second Edition, CENGAGE Learning, 2011.

Reference Books:

1. PradipDey and ManasGhosh, Programming in C, Oxford University Press, 2nd Edition 2011.
2. E.Balaguruswamy, "C and Data Structures", 4th Edition, Tata McGraw Hill.
3. A.K.Sharma, Computer Fundamentals and Programming in C, 2nd Edition, University Press.
4. M.T.Somashekara, "Problem Solving Using C", PHI, 2nd Edition 2009.

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MCA- I Sem

L T P C

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(CA20FPC108)OFFICE AUTOMATION & TROUBLE SHOOTING LAB

Course Objectives:

1. This course is designed to prepare technicians with specialized skills, knowledge and attitude to work in finance and accounting field.
2. Being a practical oriented program, the focus will be more on practical training. The candidate shall undergo practical training of the computer laboratory.

Course Outcomes

1. Booting Linux, Maintaining User accounts Creating folders, renaming folders and files Copying, moving, deleting files Taking backups and restoration of files Practicing the commands like passwd, who, whoami, kill, write etc
2. Preparing a Govt. Order / Official Letter / Business Letter / Circular Letter Covering formatting commands - font size and styles - bold, underline, upper case, lower case, superscript, subscript, indenting paragraphs, spacing between lines and characters, tab settings etc.
3. Creating and using styles and templates To create a style and apply that style in a document To create a template for the styles created and assemble the styles for the template.
4. Creating and editing the table To create a table using table menu To create a monthly calendar using cell editing operations like inserting, joining, deleting, splitting and merging cells To create a simple statement for math calculations viz. Totalling the column.
5. Creating numbered lists and bulleted lists To create numbered list with different formats (with numbers, alphabets, roman letters) To create a bulleted list with different bullet characters.
6. Printing envelopes and mail merge. To print envelopes with from addresses and to addresses to use mail merge facility for sending a circular letter to many persons to use mail merge facility for printing mailing labels.
7. Using the special features of word to find and replace the text to spell check and correct. To generate table of contents for a document to prepare index

for a document.

8. Create an advertisement Prepare a resume. Prepare a Corporate Circular letter inviting the shareholders to attend the Annual Meeting
9. Using formulas and functions: To prepare a Worksheet showing the monthly sales of a company in different branch offices (Showing Total Sales, Average Sales). Prepare a Statement for preparing Result of 10 students in 5 subjects (using formula to get Distinction, I Class, II Class and Fail under Result column against each student).
10. Operating on the sheets: Finding, deleting and adding records, formatting columns, row height, merging, splitting columns etc. Connecting the Worksheets and enter the data.
11. Creating a Chart: To create a chart for comparing the monthly sales of a company in different branch offices.
12. Troubleshoot the following OS problems Unable to copy and paste Replacing Windows Splash Screens Out of memory error Windows cannot find Program.exe to open ... Windows Installer error
13. Basic floppy disk drive troubleshooting Bad floppy diskette Not setup in CMOS Conflicion with other hardware Not connected properly
14. General scanner troubleshooting Verify cables connected properly to the back of the scanner Ensure that the scanner is getting power Additional parallel port scanner troubleshooting Verify the LPT port mode
15. General microphone troubleshooting Sound drivers not setup properly Not connected properly Issues with microphone

Reference Book:

1. G.Dalin. M.Sc software engineering, HSI PUBLICATIONS

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MCA- I Sem

L T P C

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(CA20FMC101) CORPORATE COMMUNICATION SKILLS

Course Objectives:

1. To enhance speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations
2. Write well-structured paragraphs on specific topics
3. To improve the fluency in spoken English and neutralize mother tongue influence
4. To train students to use language appropriately for interview skills, group discussion and public speaking

Course Outcomes:

1. Understand verbal and non-verbal features of communication and hold formal / informal conversations
2. The significance of paralinguistic features will be understood by the students and they will try to be intelligible.
3. Become good at Inter-personal skills
4. Achieve neutral accent and be free from mother tongue influence
5. Being an active participant in debates and group discussion, showing ability to express agreement, argument to summarize ideas to elicit the views of others and present own ideas.

UNIT- 1**Introduction to communication skills**

Introducing oneself - Introducing others – Greetings

Role play / Situational Dialogues

Just A Minute (JAM)

UNIT – 2**Art of Writing**

Technical Report Writing

Curriculum Vitae / Resume Writing

Email Writing

UNIT – 3**Presentation skills Oral Presentations Powerpoint Presentation**

Non- Verbal Communication Skills

UNIT – 4

Corporate skills

Time Management

Stress Management

Team Building

UNIT – 5

Career skills

Group Discussions

Types of Interviews

Pre- Interview Skills & Post Interview Skills

FAQs & Quick tips

Reference Books:

1. Soft Skills, revised 2nd edition, K.Alex, S.Chand&Company, New Delhi.
2. Speaking English Effectively, 2nd Edition Krishna Mohan & NP Singh, 2011. (Mcmillan).
3. A Hand book for English language skills, E.Sureshkumar, P.Sreehari, Foundation Books,2011
4. Basics of Communication in English, Soundararaj, Francis. 2012.. New Delhi: Macmillan
5. Spoken English (CIEFL) in 3 volumes with 6 cassettes, OUP.

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L T P C

3 0 0 3

(CA20FPC201) OPERATING SYSTEMS

Course Objectives:

1. To make the students understand the basic operating system concepts such as processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection.
2. To get acquaintance with the class of abstractions afford by general purpose operating systems that aid the development of user applications.

Course Outcomes:

1. Able to use operating systems effectively.
2. Write System and application programs to exploit operating system functionality.
3. Add functionality to the exiting operating systems
4. Design new operating systems

UNIT - 1

Operating Systems Overview: Operating system functions, Operating system structure, operating systems Operations, protection and security, Computing Environments, Open- Source Operating Systems

System Structures: Operating System Services, User and Operating-System Interface, systems calls, Types of System Calls, system programs, operating system structure, operating system debugging, System Boot.

Processes: Process concept, process Scheduling, Operations on processes, Inter process Communication, Examples of IPC systems.

UNIT - 2

Threads: overview, Multicore Programming, Multithreading Models, Thread Libraries, Implicit Threading, Threading Issues.

Process Synchronization: The critical-section problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic problems of synchronization, Monitors, Synchronization examples, Alternative approaches.

CPU Scheduling: Scheduling-Criteria, Scheduling Algorithms, Thread Scheduling, Multiple-Processor Scheduling, Real-Time CPU Scheduling, Algorithm Evaluation.

UNIT - 3

Memory Management: Swapping, contiguous memory allocation, segmentation, paging, structure of the page table.

Virtual memory: demand paging, page-replacement, Allocation of frames, Thrashing, Memory-Mapped Files, Allocating Kernel Memory

Deadlocks: System Model, deadlock characterization, Methods of handling Deadlocks, Deadlock prevention, Detection and Avoidance, Recovery from deadlock.

UNIT - 4

Mass-storage structure: Overview of Mass-storage structure, Disk structure, Disk attachment, Disk scheduling, Swap-space management, RAID structure, Stable-storage implementation.

File system Interface: The concept of a file, Access Methods, Directory and Disk structure, File system mounting, File sharing, Protection.

File system Implementation: File-system structure, File-system Implementation, Directory Implementation, Allocation Methods, Free-Space management.

UNIT - 5

I/O systems: I/O Hardware, Application I/O interface, Kernel I/O subsystem, Transforming I/O requests to Hardware operations.

Protection: Goals of Protection, Principles of Protection, Domain of protection, Access Matrix, Implementation of Access Matrix, Access control, Revocation of Access Rights, Capability- Based systems, Language – Based Protection

Security: The Security problem, Program threats, System and Network threats, Cryptography as a security tool, User authentication, Implementing security defenses, Firewalling to protect systems and networks, Computer–security classifications.

Text Book:

1. Operating System Concepts, Abraham Silberchatz, Peter B. Galvin, Greg Gagne, Wiley , Eight Edition, 2014.

Reference Books:

1. Operating systems by A K Sharma, Universities Press,
2. Operating Systems, S.Haldar, A.A.Aravind, Pearson Education.
3. Modern Operating Systems, Andrew S Tanenbaum, Second Edition, PHI.
4. Operating Systems, A.S.Godbole, Second Edition, TMH.
5. An Introduction to Operating Systems, P.C.P. Bhatt, PHI.
6. Operating Systems, G.Nutt, N.Chaki and S.Neogy, Third Edition, Pearson Education.
7. Operating Systems, R.Elmasri, A.G.Carrick and D.Levine, McGraw Hill.
8. Principles of Operating Systems, B.L.Stuart, Cengage learning, India Edition.
9. Operating System Design, Douglas Comer, CRC Press, 2nd Edition.

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(CA20FPC202)PYTHON PROGRAMMING

Course Objectives:

1. To learn the fundamentals of Python
2. To elucidate problem-solving using a Python programming language
3. To introduce a function-oriented programming paradigm through python
4. To get training in the development of solutions using modular concepts
5. To introduce the programming constructs of python

Course Outcomes:

1. Apply the features of Python language in various real applications.
2. Select appropriate data structure of Python for solving a problem.
3. Design object-oriented programs using Python for solving real-world problems.
4. Apply modularity to programs.

UNIT – 1

Introduction: What is a program, Running python, Arithmetic operators, Value and Types.

Variables, Assignments and Statements: Assignment statements, Script mode, Order of operations, string operations, comments.

Functions: Function calls, Math functions, Composition, Adding new Functions, Definitions and Uses, Flow of Execution, Parameters and Arguments, Variables and Parameters are local, Stack diagrams, Fruitful Functions and Void Functions, Why Functions.

UNIT – 2

Conditionals and Recursion: floor division and modulus, Boolean expressions, Logical operators, Conditional execution, Alternative execution, Chained conditionals, Nested conditionals, Recursion, Infinite Recursion, Keyboard input.

Fruitful Functions: Return values, Incremental development, Composition, Boolean functions, More recursion, Leap of Faith, Checking types,

UNIT – 3

Iteration: Reassignment, Updating variables, The while statement, Break, Square roots, Algorithms.

Strings: A string is a sequence, len, Traversal with a for loop, String slices, Strings are immutable, Searching, Looping and Counting, String methods, The in operator, String comparison.

Case Study: Reading word lists, Search, Looping with indices.

Lists: List is a sequence, Lists are mutable, Traversing a list, List operations, List slices, List methods, Map filter and reduce, Deleting elements, Lists and Strings, Objects and values, Aliasing, List arguments.

UNIT – 4

Dictionaries: A dictionary is a mapping, Dictionary as a collection of counters, Looping and dictionaries, Reverse Lookup, Dictionaries and lists, Memos, Global Variables.

Tuples: Tuples are immutable, Tuple Assignment, Tuple as Return values, Variable-length argument tuples, Lists and tuples, Dictionaries and tuples, Sequences of sequences.

Files: Persistence, Reading and writing, Format operator, Filename and paths, Catching exceptions, Databases, Pickling, Pipes, Writing modules.

Python Packages: Introduction to PIP, Installing Packages via PIP, Using Python Packages.

UNIT – 5

Classes and Objects: Programmer-defined types, Attributes, Instances as Return values, Objects are mutable, Copying.

Classes and Functions: Time, Pure functions, Modifiers, Prototyping versus Planning

Classes and Methods: Object oriented features, Printing objects, The init method, The str method, Operator overloading, Type-based Dispatch, Polymorphism, Interface and Implementation

Inheritance: Card objects, Class attributes, Comparing cards, decks, Printing the Deck, Add Remove shuffle and sort, Inheritance, Class diagrams, Data encapsulation.

The Goodies: Conditional expressions, List comprehensions, Generator expressions, any and all, Sets, Counters, defaultdict, Named tuples, Gathering keyword Args,

Case study: The turtle module, Simple Repetition, Encapsulation, Generalization, Interface design, Refactoring, docstring.

Text Book:

1. Allen B. Downey, "Think Python", 2nd edition, SPD/O'Reilly, 2016.

Reference Books:

1. Martin C. Brown, "The Complete Reference: Python", McGraw-Hill, 2018.
2. Kenneth A. Lambert, B.L. Juneja, "Fundamentals of Python", CENGAGE, 2015.
3. R. Nageswara Rao, "Core Python Programming", 2nd edition, Dreamtech Press, 2019

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L T P C

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(CA20FPC203)OOPS THROUGH JAVA

Course Objectives:

1. Study the syntax, semantics and features of Java Programming Language
2. Study the Object-Oriented Programming Concepts of Java Programming language
3. Learn the method of creating Multi-threaded programs and handle exceptions
4. Learn Java features to create GUI applications & perform event handling

Course Outcomes:

1. Use object-oriented approach for solving problems and implementing them
2. Ability to write Efficient programs that handle exceptions
3. Create user friendly interface

UNIT – 1

The Java Language, The key attributes of object oriented programming language, JDK, simple program, Java keywords, identifiers in java, the java class libraries, introducing data types and operators, program control structures

UNIT – 2

Introducing classes, objects, and methods, Arrays, multidimensional arrays, strings, a closer look at methods and classes, Inheritance

UNIT – 3

Interface fundamentals, creating and implementing an interface, using interface references, implementing multiple interfaces, constants in interfaces, interfaces can be extended, nested interfaces, final thoughts on interface, packages, Exception handling

UNIT – 4

Byte streams and character streams, byte and character stream classes, using byte streams for reading and writing, reading and writing binary data, random access

files, using character streams for file i/o, Multi-threaded programming, Applet basics, a complete applet skeleton, applet initialization and termination, requesting repainting, using the status window, passing parameters to applets

UNIT – 5

Swings – the origin and design philosophy of swing, components and containers, layout managers, event handling, using a push button, jtextfield, jlabel and image icon, the swing buttons, jtext field, jscrollpane, jlist, jcombobox, trees, jtable, an overview of jmenubar, jmenu and jmenuitem, creating a main menu, showmessagedialog, showconfirmdialog, showinputdialog, showoptiondialog, jdialog, create a modeless dialog

Text Book:

1. "Java Fundamentals A Comprehensive Introduction" Herbert Schildt and Dale Skrien, McGraw Hill.
2. "Java – How to Program", Paul Deitel, Harvey Deitel, PHI

Reference Books:

1. "Programming with Java" T.V.Suresh Kumar, B.Eswara Reddy, P.Raghavan Pearson Edition.
2. "Core Java", Nageswar Rao, Wiley Publishers.
3. "Thinking in Java", Bruce Eckel, Pearson Education.
4. "Programing In java", Malhotra, Oxford University Press
5. "Head First Java", Kathy Sierra, Bert Bates, O'Reilly
6. "SCJP – Sun Certified Programmer for Java Study guide" – Kathy Sierra, Bert Bates, McGrawHill
7. "Java in Nutshell", David Flanagan, O'Reilly
8. "Core Java : Volume I – Fundamentals, Cay S. Horstmann, Gary Cornell, The Sun Micro Systems Press

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MCA- II Sem

L T P C

3 0 0 3

(MA20FBS201) PROBABILITY AND STATISTICS

Course Objective:

1. To help the students in getting a thorough understanding of the fundamentals of probability and usage of statistical techniques like testing of hypothesis and Queuing theory.

Course Outcomes:

Upon successful completion of this course, the student should be able to

1. Make use of the concepts of probability and their applications
2. Apply discrete and continuous probability distributions to analyze statistical data.
3. Design the components of a classical hypothesis test for large samples.
4. Infer the statistical inferential methods based on small sampling tests.
5. Utilize the basic characteristic features of a queuing system and acquire skills in analyzing queuing models.

UNIT - 1: Probability.

Basic concepts of probability, Conditional probability, Baye's theorem, Random variables (discrete and continuous), probability density functions, properties.

UNIT - 2: Probability distributions.

Discrete distribution - Binomial, Poisson approximation to the binomial distribution and their properties. Continuous distribution: Normal distribution and their properties.

UNIT - 3: Testing of hypothesis, large sample tests.

Formulation of null hypothesis, alternative hypothesis, the critical and acceptance regions, level of significance, two types of errors and power of the test. Large Sample Tests: Test for single proportion, difference of proportions, test for single mean and difference of means.

UNIT - 4:

Small sample tests

Student t-distribution (test for single mean, two means and paired t-test), testing of equality of Variances (F-test), χ^2 - test for Goodness of Fit, χ^2 - Test for Independence of Attributes.

UNIT - 5:

Queuing Theory:

Queuing Theory: Pure Birth and Death process, M/M/1 and M/M/S models and related problems.

Text Books:

1. Miller and Freunds, Probability and Statistics for Engineers, 7/e, Pearson, 2008.
2. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.

Reference Books:

1. S. Ross, a First Course in Probability, Pearson Education India, 2002.
2. W. Feller, an Introduction to Probability Theory and its Applications, 1/e, Wiley, 1968.
3. Peyton Z. Peebles, Probability, Random Variables & Random Signal Principles -, McGraw Hill Education, 4th Edition, 2001.

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(CA20FPC204) SOFTWARE ENGINEERING

Course Objectives

1. To understand the software life cycle models.
2. To understand the software requirements and SRS document.
3. To understand the importance of modelling and modelling languages.
4. To design and develop correct and robust software products.
5. To understand the quality control and how to ensure good quality software.
6. To understand the planning and estimation of software projects.
7. To understand the implementation issues, validation and verification procedures.
8. To understand the maintenance of software

Course Outcomes

1. Define and develop a software project from requirement gathering to implementation.
2. Ability to code and test the software
3. Ability to plan, Estimate and Maintain software systems

UNIT - 1

Software and Software Engineering: The Nature of Software, The Unique Nature of WebApps, Software Engineering, The Software Process, Software Engineering Practice, Software Myths

Process Models: A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Process Technology, Product and Process.

Agile Development: Agility, Agility and the Cost of Change, Agile Process, Extreme Programming, Other Agile Process Models

UNIT - 2

Understanding Requirements: Requirements Engineering, Establishing the groundwork, Eliciting Requirements, Developing Use Cases, Building the requirements model, Negotiating Requirements, Validating Requirements.

Requirements Modeling (Scenarios, Information and Analysis Classes):

Requirements Analysis, Scenario-Based Modeling, UML Models that Supplement the Use Case, Data Modeling Concepts, Class-Based Modeling.

Requirements Modeling (Flow, Behavior, Patterns and WEBAPPS):

Requirements Modeling Strategies, Flow-Oriented Modeling, Creating a Behavioral Model, Patterns for Requirements Modeling, Requirements Modeling for WebApps.

UNIT - 3

Design Concepts: Design with Context of Software Engineering, The Design Process, Design Concepts, The Design Model.

Architectural Design: Software Architecture, Architecture Genres, Architecture Styles, Architectural Design, Assessing Alternative Architectural Designs, Architectural Mapping Using Data Flow.

Component-Level Design: Component, Designing Class-Based Components, Conducting Component-level Design, Component Level Design for WebApps, Designing Traditional Components, Component-Based Development.

UNIT - 4

User Interface Design: The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, WebApp Interface Design, Design Evaluation.

WebApp Design: WebApp Design Quality, Design Goal, A Design Pyramid for WebApps, WebApp Interface Design, Aesthetic Design, Content Design, Architecture Design, Navigation Design, Component-Level Design, Object-Oriented Hypermedia Design Method(OOHMD).

UNIT - 5

Software Testing Strategies: A strategic Approach to Software Testing, Strategic Issues, Test Strategies for Conventional Software, Test Strategies for Object-Oriented Software, Test Strategies for WebApps, Validation Testing, System Testing, The Art of Debugging.

Testing Conventional Applications: Software Testing Fundamentals, Internal and External Views of Testing, White-Box Testing, basic Path testing, Control Structure Testing, Black-Box Testing, Model-based Testing, Testing for Specialized Environments, Architectures and Applications, Patterns for Software Testing. Testing Object-Oriented Applications: Broadening the View of Testing, Testing with OOA and OOD Models, Object-Oriented Testing Strategies, Object-Oriented Testing Methods, Testing Methods Applicable at the Class level, Interclass Test-Case Design.

Text Book:

1. "Software engineering A practitioner's Approach", Roger S. Pressman, McGraw Hill International Education, Seventh Edition, 2016.

Reference Books:

1. Fundamentals of Software Engineering, Fourth Edition, Rajib Mall, PHI,
2. Software Engineering, Ninth Edition, IAN Sommerville, Pearson, Ninth edition.
3. Software Engineering, A Precise Approach, PankajJalote, Wiley India,2010.
4. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.
5. Software Engineering1: Abstraction and modeling, Diner Bjorner, Springer International edition, 2006.
6. Software Engineering2: Specification of systems and languages, Diner Bjorner, Springer International edition, 2006.
7. Software Engineering Foundations, Yingxu Wang, Auerbach Publications,2008.
8. Software Engineering Principles and Practice, Hans Van Vliet,3rd edition, John Wiley & Sons Ltd.
9. Software Engineering 3: Domains, Requirements, and Software Design, D.Bjorner, Springer International Edition.
10. Introduction to Software Engineering R.J.Leach, CRC Press

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(CA20FPC205) AUTOMATA THEORY

3 0 0 3

Elective-I

Course objectives:

1. The objective of this course is to explore the theoretical foundations of computer science from the perspective of formal languages and classify machines by their power to recognize languages.

Course Outcomes:

1. The student will be able to understand the basic properties of formal languages and grammars. differentiate regular, context-free and recursively enumerable languages
2. Make grammars to produce strings from a specific language

UNIT -1

Introduction to formal proof – Additional forms of proof – Inductive proofs –Finite Automata (FA) – Deterministic Finite Automata (DFA) – Non-deterministic Finite Automata (NFA) – Finite Automata with Epsilon transitions.

UNIT - 2

Regular Expression – FA and Regular Expressions – Proving languages not to be regular – Closure properties of regular languages – Equivalence and minimization of Automata.

UNIT - 3

Context-Free Grammar (CFG) – Parse Trees – Ambiguity in grammars and languages – Definition of the Pushdown automata – Languages of a Pushdown Automata – Equivalence of Pushdown automata and CFG– Deterministic Pushdown Automata.

UNIT- 4

Normal forms for CFG – Pumping Lemma for CFL – Closure Properties of CFL – Turing Machines – Programming Techniques for TM.

UNIT – 5

A language that is not Recursively Enumerable (RE) – An undecidable problem that is RE – Undecidable problems about Turing Machine – Post's Correspondence Problem – The classes P and NP.

Text Book:

1. J.E. Hopcroft, R. Motwani and J.D. Ullman, "Introduction to Automata Theory, Languages and Computations", second Edition, Pearson Education, 2007.

Reference Books:

1. H.R. Lewis and C.H. Papadimitriou, "Elements of the theory of Computation", Second Edition, Pearson Education, 2003.
2. Thomas A. Sudkamp, "An Introduction to the Theory of Computer Science, Languages and Machines", Third Edition, Pearson Education, 2007.
3. Raymond Greenlaw and H. James Hoover, "Fundamentals of Theory of Computation, Principles and Practice", Morgan Kaufmann Publishers, 1998.
4. Michael Sipser, "Introduction of the Theory and Computation", Thomson

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(CA20FPC206)SOFT COMPUTING

Elective-I

Course Objective

1. To impart knowledge in Fuzzy Set Theory, Optimization, Neural Networks, Neuro Fuzzy Modeling and Application of Computational Intelligence.

Course Outcomes:

1. To know the basics of soft computing techniques and also their use in some real life situations
2. To learn the key aspects of Soft computing
3. To understand the features of neural network and its applications
4. To learn the key aspects of Fuzzy Systems

UNIT - 1

FUZZY SET THEORY

Introduction to Neuro – Fuzzy and Soft Computing – Fuzzy Sets – Basic Definition and Terminology – Set – Theoretic Operations – Member Function Formulation and Parameterization – Fuzzy Rules and Fuzzy Reasoning – Extension Principle and Fuzzy Relations – Fuzzy If Then Rules – Fuzzy Reasoning – Fuzzy Inference Systems – Mamdani Fuzzy Models – Sugeno Fuzzy Models – Tsukamoto Fuzzy Models – Input Space Partitioning and Fuzzy Modeling.

UNIT - 2

OPTIMIZATION : Derivative based Optimization – Descent Methods – The Method of Steepest Descent – Classical Newton's Method – Step Size Determination – Derivative Free Optimization – Genetic Algorithms – Simulated Annealing – Random Search – Downhill Simplex Search.

UNIT - 3

NEURAL NETWORKS: Supervised Learning Neural Networks – Perceptrons – Adaline Back propagation Multilayer perceptrons – Radial Basis Function Networks – Unsupervised Learning and Other Neural Networks – Competitive Learning Networks –

Kohonen Self – Organizing Networks – Learning Vector Quantization – Hebbian Learning.

UNIT - 4

NEURO FUZZY MODELING: Adaptive Neuro – Fuzzy Inference Systems – Architecture – Hybrid Learning Algorithm – Learning Methods that Cross fertilize ANFIS and RBFN – Coactive Neuro Fuzzy Modeling – Framework – Neuron Functions for Adaptive Networks – Neuro Fuzzy Spectrum.

UNIT - 5

APPLICATION OF COMPUTATIONAL INTELLIGENCE: Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency Prediction – Soft Computing for Color Recipe Prediction.

Text Book:

1. J.S.R. Jang, C.T. Sun and E. Mizutani, "Neuro Fuzzy and Soft Computing", PHI, Pearson Education, 2004.

Reference Books:

1. By L. Fortuna, G..Rizzotto, M. Lavorgna, G. Nunnari, M.G. Xibilia, Riccardo Caponetto, Soft Computing: New Trends and Applications, Springer 2012
2. Timothy J. Ross, "Fuzzy Logic with Engineering Application, "McGraw Hill, 1977.
3. Davis E. Goldberg, "Genetic Algorithms Search, Optimization and Machine Learning", Addison Wesley, 1989.
4. S. Rajasekaran and G.A.V. Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 2003. Emereo Pty Limited, July 2008..

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(CA20FPC207)ARTIFICIAL INTELLIGENCE

Elective-I

Course Objectives:

1. To learn the difference between optimal reasoning Vs human like reasoning
2. To understand the notions of state space representation, exhaustive search, heuristic search along with the time and space complexities
3. To learn different knowledge representation techniques
4. To understand the applications of AI namely, Game Playing, Theorem Proving, Expert Systems, Machine Learning and Natural Language Processing

Course Outcomes:

1. Possess the ability to formulate an efficient problem space for a problem expressed in English
2. Possess the ability to select a search algorithm for a problem and characterize its time and space complexities.
3. Possess the skill for representing knowledge using the appropriate technique
4. Possess the ability to apply AI techniques to solve problems of Game Playing, Expert Systems and Machine Learning.

UNIT – 1

Foundations of AI: What is AI, History of AI, Strong and weak AI, The State of the Art.

Intelligent Agents: Agents and Environments, Good Behavior: The Concept of Rationality, The Nature of Environments, The Structure of Agents.

UNIT – 2

Solving Problems by Searching: Problem – Solving Agents, Example Problems, Searching for Solutions, uniformed search Strategies, Informed (Heuristic) Search Strategies, Heuristic Functions.

UNIT – 3

Knowledge Representation: Ontological Engineering, Categories and Objects, Events, Mental Events and Mental Objects, Reasoning Systems for Categories, Reasoning with Default Information, The Internet Shopping World.

UNIT – 4

Learning from Examples: Forms of Learning, Supervised Learning, Learning Decision Trees, Evaluating and Choosing the Best Hypothesis, The Theory of Learning, Regression and Classification with Learner Models, Nonparametric Models, Support Vector Machines, Ensemble Learning, Practical Machine Learning.

UNIT – 5

Learning Probabilistic Models: Statistical Learning, Learning with Complete data, Learning with Hidden variables: The EM Algorithm.

Text Books:

1. "Artificial Intelligence A Modern Approach", Stuart J. Russell & Peter Norvig – Pearson.
2. "Artificial Intelligence", Elaine Rich, Kevin Knight & Shivashankar B Nair – McGraw Hill Education.

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(CA20FPC208)Linux Programming

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Elective-I

Course Objectives:

1. To understand the UNIX system structure.
2. To understand and use command line shell.
3. To make effective use of UNIX utilities and Shell scripting language such as bash.
4. To produce programs similar to standard UNIX utilities such as ls, mv, cp etc. using Unix system calls.
5. To develop the skills necessary for Unix systems programming including file system programming, process and signal management, and inter-process communication.
6. To develop the basic skills required to write network programs using Sockets.

Course Outcomes:

1. Able to describe and use the UNIX operating system.
2. Able to describe and use the fundamental UNIX system tools and utilities.
3. Able to describe and write shell scripts in order to perform basic shell programming.
4. Able to describe and understand the UNIX file system.

UNIT - 1

Linux Utilities-File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking commands, Filters, Text processing utilities and Backup utilities.

Sed-Scripts, Operation, Addresses, Commands, Applications, awk-Execution, Fields and Records, Scripts, Operation, Patterns, Actions, Associative Arrays, String and Mathematical functions, System commands in awk, Applications.

Shell programming with Bourne again shell (bash) - Introduction, shell responsibilities, pipes and Redirection, here documents, running a shell script, the shell as a programming language, shell meta characters, file name substitution, shell variables, command substitution, shell commands, the environment, quoting, test

command, control structures, arithmetic in shell, shell script examples, interrupt processing, functions, debugging shell scripts.

Review of C programming concepts-arrays, strings (library functions), pointers, function pointers, structures, unions, libraries in C.

UNIT - 2

Files and Directories- File Concept, File types, File System Structure, file metadata-Inodes, kernel support for files, system calls for file I/O operations- open, create, read, write, close, lseek, dup2,file status information-stat family, file and record locking-lockf and fcntl functions,file permissions - chmod, fchmod,file ownership-chown, lchown, fchown, links-soft links and hard links – symlink, link, unlink.

Directories-Creating, removing and changing Directories-mkdir, rmdir, chdir, obtaining current working directory-getcwd, Directory contents, Scanning Directories-opendir, readdir, closedir, rewinddir, seekdir,telldir functions.

UNIT - 3

Process – Process concept, Layout of a C program image in main memory, Process environment-environment list, environment variables, getenv, setenv, Kernel support for process, process identification, process hierarchy, process states, process control - process creation, replacing a process image, waiting for a process, process termination, zombie process, orphan process, system call interface for process management-fork, vfork, exit, wait, waitpid, exec family, system, I/O redirection, Process Groups, Sessions and Controlling Terminal, Differences between threads and processes.

Signals – Introduction to signals, Signal generation and handling, Kernel support for signals, Signal function, unreliable signals, reliable signals, kill, raise , alarm, pause, abort, sleep functions.

UNIT - 4

Inter-process Communication - Introduction to IPC, IPC between processes on a single computer system, IPC between processes on different systems, pipes-creation, IPC between related processes using unnamed pipes, FIFOs-creation, IPC between unrelated processes using FIFOs (Named pipes), differences between unnamed and named pipes, popen and pclose library functions.

Message Queues- Kernel support for messages, APIs for message queues, client/server example.

Semaphores-Kernel support for semaphores, APIs for semaphores, file locking with semaphores.

UNIT - 5

Shared Memory- Kernel support for shared memory, APIs for shared memory, shared memory example.

Sockets- Introduction to Berkeley Sockets, IPC over a network, Client-Server model, Socket address structures (UNIX domain and Internet domain), and Socket system calls for connection oriented protocol and connectionless protocol, example-client/server programs-Single Server-Client connection, Multiple simultaneous clients, Comparison of IPC mechanisms.

Text Books:

1. Unix System Programming using C++, T.Chan, PHI.
2. Unix Concepts and Applications, 4th Edition, Sumitabha Das, TMH, 2006.
3. Beginning Linux Programming, 4th Edition, N.Matthew, R.Stones,Wrox, Wiley India Edition,rp-2008.
4. Unix Network Programming, W.R.Stevens,PHI.
5. Unix and Shell programming, B.A.Forouzan and R.F.Gilberg, Cengage Learning.

Reference Books:

1. Linux System Programming, Robert Love, O'Reilly, SPD, rp-2007.
2. Unix for programmers and users, 3rd Edition, Graham Glass, King Ables, Pearson Education, 2003.
3. Advanced Programming in the Unix environment, 2nd Edition, W.R.Stevens, Pearson Education.
4. System Programming with C and Unix, A.Hoover, Pearson.
5. Unix System Programming, Communication, Concurrency and Threads, K.A.Robbins and S.Robbins, Pearson Education.
6. Unix shell Programming, S.G.Kochan and P.Wood, 3rd edition, Pearson Education.
7. Shell Scripting, S.Parker, Wiley India Pvt. Ltd.
8. C Programming Language, Kernighan and Ritchie, PHI

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(CA20FPC209) ETHICAL HACKING

Elective-I

Course Objectives:

1. The purpose of ethical hacking is to evaluate the security of and identify vulnerabilities in systems, networks or system infrastructure.
2. It includes finding and attempting to exploit any vulnerabilities to determine whether unauthorized access or other malicious activities are possible.

Course Outcomes:

1. Demonstrate Knowledge on: · Network and Computer attacks · OS Vulnerabilities · Hacking web servers, Hacking wireless network
2. Analyze system and network vulnerabilities.
3. Design security solutions for risks that arise from hacking.
4. Use appropriate ethical hacking technique to solve security problems.
5. Apply Contextual Knowledge to assess safety and legal issues in ethical hacking.
6. Inculcate use of ethical hacking practices while maintaining professional ethics.

UNIT -1

Ethical Hacking Overview: Ethical hacking, Certification programs for network security personnel, Hacker Vs Cracker. Network and Computer Attacks: Malicious software, Protection against malware, Intruder attacks on networks and computers, addressing physical security.

UNIT - 2

Footprinting and Social Engineering: Using web tools for footprinting, Conducting competitive intelligence, Using domain name system zone transfers, Introduction to social engineering. Case Study: Social Engineering. Port Scanning: Port scanning, Using port scanning tools, Conducting ping sweeps, Understanding scripting.

UNIT - 3

Enumeration: Enumeration, Enumerating windows operating systems, Netware operating system and Unix operating system. Desktop and Server OS Vulnerabilities: Windows OS vulnerabilities, Tools for identifying vulnerabilities in windows, Best practices for hardening windows systems, Linux OS vulnerabilities.

UNIT -4

Hacking Web Servers: Understanding web applications, Web application vulnerabilities, Tools for web attackers and Security testers. Hacking Wireless Network: Understanding wireless technology, Wireless network standards, Authentication, War driving, Wireless hacking.

UNIT - 5

Cryptography: Understanding cryptography basics , Substitution and Transposition ciphers, DES, Cryptography attacks. Network Protection System: Understanding routers, Firewalls, Intrusion detection and prevention systems, Honeypots.

Text Book:

1. Michael T. Simpson, Kent Backman and James E. Corley, "Hands-On Ethical Hacking and Network Defense," Cengage Learning, 2013.

Reference Books:

1. Kimberly graves, "CEH Official Certified Ethical Hacker Review Guide," Wiley Publications, 2007.
2. Michael Gregg, "Certified ethical hacker (CEH) Cert guide," Pearson Education, 2014.

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(CA20FPC210)OPERATING SYSTEMS LAB

Course Objectives:

1. To understand the design aspects of operating system
2. To solve various synchronization problems

Course Outcomes:

1. Ensure the development of applied skills in operating systems related areas.
 2. Able to write software routines modules or implementing various concepts of operating system.
-
1. Simulate the following CPU scheduling algorithms
 - a) Round Robin
 - b) SJF
 - c) FCFS
 - d) Priority
 2. Simulate all file allocation strategies
 - a) Sequential
 - b) Indexed
 - c) Linked
 3. Simulate MVT and MFT
 4. Simulate all File Organization Techniques
 - a) Single level directory
 - b) Two level
 - c) Hierarchical
 - d) DAG
 5. Simulate Bankers Algorithm for Dead Lock Avoidance
 6. Simulate Bankers Algorithm for Dead Lock Prevention
 7. Simulate all page replacement algorithms
 - a) FIFO
 - b) LRU
 - c) LFU Etc. ...
 8. Simulate Paging Technique of memory management
 9. Control the number of ports opened by the operating system with
 - a) Semaphore
 - b) monitors
 10. Simulate how parent and child processes use shared memory and address space
 11. Simulate sleeping barber problem
 12. Simulate dining philosopher's problem
 13. Simulate producer and consumer problem using threads (use java)
 14. Simulate little's formula to predict next burst time of a process for SJF scheduling algorithm.
 15. Develop a code to detect a cycle in wait-for graph

16. Develop a code to convert virtual address to physical address
17. Simulate how operating system allocates frame to process
18. Simulate the prediction of deadlock in operating system when all the processes announce their resource requirement in advance.

Reference Books:

1. "Operating System Concepts", Abraham Silberchatz, Peter B. Galvin, Greg Gagne, Eighth edition, John Wiley.
2. "Operating Systems: Internals and Design Principles", Stallings, Sixth Edition-2009, Pearson Education
3. "Modern Operating Systems", Andrew S Tanenbaum, Second Edition, PHI.
4. "Operating Systems", S.Haldar, A.A.Aravind, Pearson Education.
5. "Principles of Operating Systems", B.L.Stuart, Cengage learning, India Edition.2013-2014
6. "Operating Systems", A.S.Godbole, Second Edition, TMH.
7. "An Introduction to Operating Systems", P.C.P. Bhatt, PHI.

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(CA20FPC211)PYTHON PROGRAMMING LAB

Course Objectives:

1. To train the students in solving computational problems
2. To elucidate solving mathematical problems using Python programming language
3. To understand the fundamentals of Python programming concepts and its applications.
4. Practical understanding of building different types of models and their evaluation

Course Outcomes:

1. Use python basic concepts to develop problems to solve computational problems.
 2. Apply lists, dictionaries, sets and functions in python programming
 3. Experiment module design and text files in python programming
-
1. Install Python ecosystem and execute "Hello World" program.
 2. Practice
 - a. Python literals, variables, identifiers and data types
 - b. Different numeric data types
 - c. Python operators
 - d. Input and output statements.
 - e. Control statements.
 3. Practice Python Programs on Numbers
 - a. Prime Numbers
 - b. Armstrong Numbers
 - c. Fibonacci Numbers and Series
 - d. Sum of squares for the first n natural numbers.
 - e. Reverse of a number.
 4. Write a program to create, append, and remove lists in Python.
 5. Practice python programs on sets and dictionaries.
 6. Write a program to demonstrate working with tuples in Python.
 7. Write a program to demonstrate working with dictionaries in Python.
 8. Implement python program on temperature conversion.
 9. Implement the python program to convert age in seconds.

10. Practice python programs on various types of triangle patterns.
11. Implement python programs to find factorial and Fibonacci number using recursion.
12. Practice python programs on functions and their implementation.
13. Write a program to demonstrate a) arrays b) array indexing such as slicing, integer array indexing and Boolean array indexing along with their basic operations in NumPy.
14. Write a program to compute summary statistics such as mean, median, mode, standard deviation and variance of the given different types of data.
15. Write a script named copyfile.py. This script should prompt the user for the names of two text files. The contents of the first file should be the input that to be written to the second file.
16. Practice any one python program on module design.
17. Practice python programs on text files, string processing.
18. Practice python program on exception handling.

Reference Books:

1. Francois Chollet, Deep Learning with Python, 1/e, Manning Publications Company, 2017
2. Peter Wentworth, Jeffrey Elkner, Allen B. Downey and Chris Meyers, "How to Think Like a Computer Scientist: Learning with Python 3", 3rd edition, Available at <http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf>
3. Paul Barry, "Head First Python a Brain Friendly Guide" 2nd Edition, O'Reilly, 2016
4. DainelY.Chen "Pandas for Everyone Python Data Analysis" Pearson Education, 2019

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(CA20FPC212)JAVA PROGRAMMING LAB

Course Objectives:

1. To introduce java compiler and eclipse platform
2. To impart hand on experience with java programming

Course Outcomes:

1. Solve simple problems using the fundamental syntax and semantics of Java
2. Analyze and design Java programs using object-oriented principles
3. Develop simple GUI interfaces with event handling capabilities
4. Develop and debug java programs using an IDE

Note:

1. IDEs are not mandatory, encourage the use of Eclipse or Netbean platform
2. The list suggests the minimum program set. Hence, the concerned staff is requested to add more problems to the list as needed

Week-1:

1. Use Eclipse or Netbean platform and acquaint with the various menus. Create a test project, add a test class and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods and classes. Try debug step by step with java program to find prime numbers between 1 to n.

Week-2:

1. Write a Java program that prints all real and imaginary solutions to the quadratic equation $ax^2 + bx + c = 0$. Read in a, b, c and use the quadratic formula.
2. Write a Java program for sorting a given list of names in ascending order
3. Write a java program to accept a string from user and display number of vowels, consonants, digits and special characters present in each of the words of the given text.

Week -3:

1. Write a java program to make rolling a pair of dice 10,000 times and counts the number of times doubles of are rolled for each different pair of doubles.
Hint: Math.random()
2. Write java program that inputs 5 numbers, each between 10 and 100 inclusive. As each number is read display it only if it's not a duplicate of any number already read display the complete set of unique values input after the user enters each new value.
3. Write a java program to read the time intervals (HH:MM) and to compare system time if the system time between your time intervals print correct time and exit else try again to repute the same thing. By using StringTokenizer class

Week-4:

1. Write a java program to split a given text file into n parts. Name each part as the name of the original file followed by .part<n> where n is the sequence number of the part file.
2. Write java program to create a super class called Figure that receives the dimensions of two dimensional objects. It also defines a method called area that computes the area of an object. The program derives two subclasses from Figure. The first is Rectangle and second is Triangle. Each of the sub class overridden area() so that it returns the area of a rectangle and a triangle respectively.
3. Write a Java program that creates three threads. First thread displays "Good Morning" every one second, the second thread displays "Hello" every two seconds and the third thread displays "Welcome" every three seconds

Week-5:

1. Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication
2. Write a java program to find and replace pattern in given file,
3. Use inheritance to create an exception super class called ExceptionA and exception sub class ExceptionB and ExceptionC, where ExceptionB inherits from ExceptionA and ExceptionC inherits from ExceptionB. Write a java program to demonstrate that the catch block for type ExceptionA catches exception of type ExceptionB and ExceptionC

Week-6:

1. Write a java program to convert an ArrayList to an Array.
2. Write a Java Program for waving a Flag using Applets and Threads
3. Write a Java Program for Bouncing Ball (The ball while moving down has to increase the size and decrease the size while moving up)

Week-7:

1. Write a Java Program for stack operation using Buttons and JOptionPane input and Message dialog box.
2. Write a Java Program to Addition, Division, Multiplication and subtraction using JOptionPane dialog Box and Textfields.

Week-8:

1. Write a Java Program for the blinking eyes and mouth should open while blinking.
2. Implement a Java Program to add a new ball each time the user clicks the mouse. Provided a maximum of 20 balls randomly choose a color for each ball.

Week-9:

1. Suppose that a table named Table.txt is stored in a text file. The first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas. Write a java program to display the table using Jtable component
2. Write a program that creates a user interface to perform integer divisions. The user enters two numbers in the textfields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a NumberFormatException. If Num2 were Zero, the program would throw an ArithmeticException Display the exception in a message dialog box.

Week-10:

1. Write a Java Program to implement the opening of a door while opening man should present before hut and closing man should disappear.

Week-11:

1. Write a Java code by using JTextField to read decimal value and converting a decimal number into binary number then print the binary value in another JTextField

Week-12:

1. Write a java program establish a JDBC connection, create a table student with properties name, register number, mark1, mark2, mark3. Insert the values into the table by using the java and display the information of the students at front end.

Reference Books:

1. Introduction to Java programming, Sixth edition, Y. Daniel Liang, Pearson Education
2. Programming in java Sachine
3. Big Java, 2nd edition, Cay Horstmann, Wiley Student Edition, Wiley India Private Limited.
4. Introduction to Programming with Java, J. Dean & R. Dean, McGraw Hill education.
5. Java Programming, D S Malik, cengage learning, India Edition

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(CA20FPC301)DESING AND ANALYSIS OF ALGORITHMS

Course Objectives:

1. To teach techniques for effective problem solving in computing.
2. The use of different paradigms of problem solving will be used to illustrate clever and efficient ways to solve a given problem.
3. In each case emphasis will be placed on rigorously proving correctness of the algorithm.
4. In addition, the analysis of the algorithm will be used to show the efficiency of the algorithm over the naive techniques.

Course Outcomes:

1. Ability to analyse the performance of algorithms.
2. Ability to choose appropriate algorithm design techniques for solving problems.
3. Ability to understand how the choice of data structures and the algorithm design methods impact the performance of programs.

UNIT-1

Introduction: Algorithm, Pseudo code for expressing algorithms; Performance Analysis: Space complexity, Time complexity; Asymptotic analysis: Big oh notation, Omega notation and Theta notation, Probabilistic analysis, Amortized analysis. Mathematical analysis of Non-Recursive and recursive Algorithms with Examples. Fundamental Data Structures: Stacks, Queues, Graphs, Trees, Sets and Dictionaries.

UNIT-2

Divide and Conquer Algorithm: Introduction, Recurrence and different methods to solve recurrence, Multiplying large Integers Problem, Problem Solving using divide and conquer algorithm - Binary Search, Max-Min problem, Sorting (Merge Sort, Quick Sort), Matrix Multiplication.

Greedy Algorithm - Activity selection problem, Elements of Greedy Strategy, Minimum Spanning trees (Kruskal's algorithm, Prim's algorithm), Graphs: Shortest

paths, The Knapsack Problem, Job Scheduling Problem, Huffman code.

UNIT-3

Dynamic Programming: General method, applications-Job sequencing with deadlines, 0/1 knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

Exploring Graphs: An introduction using graphs and games, Undirected Graph, Directed Graph, Traversing Graphs, Depth First Search, Breath First Search, Topological sort, connected components.

UNIT-4

Backtracking: General method, applications-n-queen problem, sum of subsets problem, graph colouring, Hamiltonian cycles.

Branch and Bound: General method, applications - Travelling sales person problem, 0/1 knapsack problem- LC Branch and Bound solution, FIFO Branch and Bound solution.

UNIT-5

NP-Hard and NP-Complete problems: Basic concepts, non-deterministic algorithms, NP - Hard and NP Complete classes, Cook's theorem.

TEXT BOOKS:

1. "Fundamentals of Computer Algorithms", Ellis Horowitz, S. Satraj Sahani and Rajasekhran, 2nd edition, University Press.2014,
2. "Design and Analysis of Algorithms", Parag Himanshu Dave, Himanshu Bhalchandra Dave, Pearson Education, Second Edition, 2009.

REFERENCE BOOKS:

1. "Introduction to Algorithms", second edition, T.H.Cormen, C.E.Leiserson, R.L.Rivest and C.Stein, PHI Pvt. Ltd./ Pearson Education.
2. "Introduction to Design and Analysis of Algorithms A strategic approach", R.C.T.Lee, S.S.Tseng, R.C.Chang and T.Tsai, Mc Graw Hill.
3. "Data structures and Algorithm Analysis in C++", Allen Weiss, Second edition, Pearson education.
4. "Design and Analysis of algorithms", Aho, Ullman and Hopcroft, Pearson education.

5. "Algorithms" – Richard Johnson baugh and Marcus Schaefer, Pearson Education

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(CA20FPC302) DATA SCIENCE & ANALYTICS

Course Objectives:

1. The course gives you a set of practical skills for handling data that comes in a variety of formats and sizes, such as texts, spatial and time series data.
2. These skills cover the data analysis lifecycle from initial access and acquisition, modelling, transformation, integration, querying, application of statistical learning and data mining methods, and presentation of results.
3. This includes data wrangling, the process of converting raw data into a more useful form that can be subsequently analysed.

Course Outcomes:

1. Understand business intelligence and business and data analytics.
2. To understand the business data analysis through the powerful tools of data application.
3. Understand the methods of data mining.
4. Apply basic tools (plots, graphs, summary statistics) to carry out EDA.
5. Understand the key elements of a data science project
6. Identify the appropriate data science technique and/or algorithm to use for the major data science tasks.

UNIT-1

Introduction: What Is Statistical Learning?, Why Estimate f ?, How Do We Estimate f ?, The Trade-Off Between Prediction Accuracy and Model Interpretability, Supervised Versus Unsupervised Learning, Regression Versus Classification Problems, Assessing Model Accuracy, Measuring the Quality of Fit, The Bias-Variance Trade-of, The Classification Setting, Introduction to R, Basic Commands, Graphics, Indexing Data, Loading Data, Additional Graphical and Numerical Summaries.

UNIT-2

Linear Regression, Simple Linear Regression, Multiple Linear Regression, Other

Considerations in the Regression Model, Comparison of Linear Regression with K-Nearest Neighbours, Linear Regression.

UNIT-3

Classification, Logistic Regression, Linear Discriminant Analysis, A Comparison of Classification Methods, Logistic Regression, LDA, QDA, and KNN.

UNIT-4

Programming for basic computational methods such as Eigen values and Eigen vectors, sparse matrices, QR and SVD, Interpolation by divided differences.

Data Wrangling: Data Acquisition, Data Formats, Imputation, The split-apply-combine paradigm.

UNIT-5

Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Data Visualization, Measuring Data Similarity and Dissimilarity.

Data Warehouse: Basic Concepts, Data Warehouse Modelling: Data Cube and OLAP.

TEXT BOOKS:

1. Gareth James Daniela Witten Trevor Hastie, Robert Tibshirani, An Introduction to Statistical Learning with Applications in R, February 11, 2013, web link: www.statlearning.com.
2. Mark Gardener, Beginning R The statistical Programming Language, Wiley, 2015.
3. Han, Kamber, and J Pei, Data Mining Concepts and Techniques, 3rd edition, Morgan Kaufman, 2012.

REFERENCE BOOKS:

1. Sinan Ozdemir, Principles of Data Science, Packt Publishing Ltd Dec 2016.
2. Joel Grus, Data Science from Scratch, Oreilly media, 2015.

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(CA20FPC303)WEB TECHNOLOGIES

Course Objective:

1. Learn the fundamentals of HTML and JavaScript
2. Learn to communicate over a network using java
3. Learn do design server side programs and access them from client side

Course Outcomes:

1. Ability to design websites and do client side validations
2. Share information over a network
3. Ability to write server side programs

UNIT-1

Fundamentals: Introduction to the Web, Web servers and Clients, Resources, URL and its Anatomy, Message Format, Persistent and Non-persistent connections, Web Caching, Proxy, Java and the Net, Java Network Classes and Interfaces, Looking up Internet Address, Client/Server programs, Socket programming, e-mail client, POP3 programs, Remote method invocation, Example.

UNIT-2

HTML: HTML and its Flavours, HTML basics, Elements, Attributes and Tags, Basic Tags, Advanced Tags, Frames, Images, Meta tag, Planning of Web page, Model and Structure for a Website, Designing Web pages, Multimedia content.

Cascading style sheets: Advantages, Adding CSS, Browser compatibility, CSS and page layout, Selectors.

UNIT-3

JavaScript: Introduction, Variables, Literals, Operators, Control structure, Conditional statements, Arrays, Functions, Objects, Predefined objects, Object

hierarchy, Accessing objects, Events, Event handlers, Multiple windows and Frames, Form object and Element, Advanced JavaScript and HTML, Data entry and Validation, Tables and Forms, DHTML with JavaScript.

UNIT-4

Server side programming: Internet programming paradigm, Server-side programming, Languages for CGI, Applications, Server environment, Environment variables, CGI building blocks, CGI scripting using C, Shell script, Writing CGI program, CGI security, Alternatives and Enhancement to CGI, Server-side Java, Advantages over Applets, Servlet alternatives, Servlet strengths, Servlet architecture, Servlet life cycle, Generic and HTTP Servlet, First servlet, Passing parameters to servlets, Retrieving parameters, Server-side include, Cookies, Filters, Problems with servlet, Security issues, JSP and HTTP, JSP Engines, How JSP works, JSP and Servlet, Anatomy of a JSP page, JSP syntax, JSP components.

UNIT-5

Server side programming: continued: Beans, Session tracking, Users passing control and data between pages, Sharing session and Application data, Database connectivity, JDBC drivers, Basic steps, Loading a driver, Making a connection, Execute and SQL statement, SQL statements, Retrieving the result, Getting database information, Scrollable and updatable resultset, Result set metadata.

TEXT BOOKS:

1. "Web Technologies", Uttam K. Roy, , Oxford Higher Education., 1st edition, 10th impression, 2015

REFERENCE BOOKS:

1. "Java How to program", Paul deitel, Harvey deital, PHI
2. "Introduction to Java Programming", Y.Daniel Liang, 6th Edition, Pearson Education, 2007
3. "The J2EE Tutorial", Stephanie Bodoff et al, 2nd Edition, Pearson Education, 2004.
4. "Web Technologies", Roy, Oxford University Press
5. "Web Technologies" Srinivasan, Pearson Education, 2012
6. "Java EE 5 for Beginners", Ivan Bayross, Sharanam Shah, Cynthia Bayrossand Vaishali shai,SPD.
7. "Programming the Worldwide Web", Robert W.Sebesta, 7th edition, 2009, Pearson Education.

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(CA20FPC304)CLOUD COMPUTING

Course Objective:

1. To introduce the basis of Cloud Computing
2. To educate the cloud working function
3. To allow computer system resources to be used in an efficient manner
4. Makes the environment to the cloud.

Course Outcomes:

On successful completion of the course, students will be able to:

1. Understand the concepts of cloud computing and its related techniques.
2. Provide a pleasant and effective user interface.

UNIT-1

Introduction to cloud computing – The Evolution of cloud computing – Hardware Evolution- Internet Software Evolution – Server Virtualization – Web Services Deliver from the cloud– Communication-as-a-service–Infrastructure-as-a-service– Monitoring-as-a-service–Platform- as-a-Service - Software-as-a-service – Building Cloud Network.

UNIT-2

Federation in the cloud – presence in the cloud – Privacy and its Relation to cloud-Based Information Systems– Security in the cloud – Common Standards in the cloud-End-User Access to the cloud Computing.

UNIT-3

Introduction – Advancing towards a Utility Model – Evolving IT infrastructure – Evolving Software Applications – Continuum of Utilities- Standards and Working Groups- Standards Bodies and Working Groups- Service Oriented Architecture- Business Process Execution Language- Interoperability Standards for Data Center Management – Utility Computing Technology- Virtualization – Hyper Threading –

Blade Servers- Automated Provisioning- Policy Based Automation- Application Management – Evaluating Utility Management Technology – Virtual Test and development Environment – Data Center Challenges and Solutions – Automating the Data Center.

UNIT-4

Software Utility Application Architecture – Characteristics of a SaaS – Software Utility Applications – Cost Versus Value – Software Application Services Framework – Common Enablers – Conceptual view to Reality – Business profits – Implementing Database System for Multitenant Architecture.

UNIT-5

Other Design Consideration – Design of a Web Services Metering Interface – Application Monitoring Implementation – A Design for an update and Notification Policy – Transforming to Software as a Service – Application Transformation Program – Business Model Scenarios – Virtual Services for Organizations – The Future.

TEXT BOOKS:

1. Guy Bunker and Darren Thomson, Delivering utility Computing, John Wiley & Sons Ltd, 2012.

REFERENCES BOOKS:

1. John W. Rittinghouse and Ames F. Ransome, Cloud Computing Implementation , Management and security, CRC press & Francis Group, Boca Raton London New York. 2010.
2. Alfredo Mendroza, Utility Computing Technologies, Standards, and Strategies Artech House INC, 2007.

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(CA20FPC305)SOFTWARE TESTING

Elective-II

Course Objectives:

1. Fundamentals for various testing methodologies.
2. Describe the principles and procedures for designing test cases.
3. Provide supports to debugging methods.
4. Acts as the reference for software testing techniques and strategies.

Course Outcomes:

1. Understand the basic testing procedures.
2. Able to support in generating test cases and test suites.
3. Able to test the applications manually by applying different testing methods and automation tools.
4. Apply tools to resolve the problems in Real time environment.

UNIT-1

Introduction: Purpose of Testing, Dichotomies, Model for Testing, Consequences of Bugs, Taxonomy of Bugs.

Flow graphs and Path testing: Basics Concepts of Path Testing, Predicates, Path Predicates and Achievable Paths, Path Sensitizing, Path Instrumentation, Application of Path Testing.

UNIT-2

Transaction Flow Testing: Transaction Flows, Transaction Flow Testing Techniques.

Dataflow testing: Basics of Dataflow Testing, Strategies in Dataflow Testing, Application of Dataflow Testing.

UNIT-3

Domain Testing: Domains and Paths, Nice & Ugly Domains, Domain testing, Domains and Interfaces Testing, Domain and Interface Testing, Domains and

Testability.

UNIT-4

Paths, Path products and Regular expressions: Path Products & Path Expression, Reduction Procedure, Applications, Regular Expressions & Flow Anomaly Detection.

Logic Based Testing: Overview, Decision Tables, Path Expressions, KV Charts, and Specifications.

UNIT-5

State, State Graphs and Transition Testing: State Graphs, Good & Bad State Graphs, State Testing, Testability Tips.

Graph Matrices and Application: Motivational Overview, Matrix of Graph, Relations, Power of a Matrix, Node Reduction Algorithm, Building Tools.

TEXT BOOKS:

1. Software testing techniques – Boris Beizer, Dreamtech, second edition.

REFERENCE BOOKS :

1. The craft of software testing - Brian Marick, Pearson Education.
2. Software Testing- Yogesh Singh, Cambridge
3. Software Testing, 3rd edition, P.C. Jorgensen, Aurbach Publications (Dist.by SPD).
4. Software Testing, N.Chauhan, Oxford University Press.
5. Introduction to Software Testing, P.Ammann & J.Offutt, Cambridge Univ. Press.
6. Effective methods of Software Testing, Perry, John Wiley, 2nd Edition, 1999.
7. Software Testing Concepts and Tools, P.Nageswara Rao, dreamtech Press
8. Win Runner in simple steps by Hakeem Shittu, 2007 Genixpress.

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(CA20FPC306) CRYPTOGRAPHY AND NETWORK SECURITY

Elective-II

Course Objectives:

Students undergoing this course are expected to

1. Learn fundamentals of cryptography and its application to network security.
2. Understand network security threats, security services, and countermeasures.
3. Understand vulnerability analysis of network security.
4. Acquire background on hash functions; authentication; firewalls; intrusion detection techniques.

Course Outcomes:

Upon the successful completion of the course, students will be able to

1. Understand various Cryptographic Techniques
2. Apply various public key cryptography techniques
3. Implement Hashing and Digital Signature techniques
4. Understand the various Security Applications
5. Implement system level security applications

UNIT-1

Foundations of Cryptography and Security – Ciphers and Secret Messages, Security Attacks and Services, Mathematical Tools for Cryptography, Substitutions and Permutations, Modular Arithmetic, Euclid's Algorithm, Finite Fields, Polynomial Arithmetic, Discrete Logarithms, Conventional Symmetric Encryption Algorithms, Theory of Block Cipher Design, Feistel Cipher Network Structures, DES and Triple DES, Strength of DES.

UNIT-2

Modern Symmetric Encryption Algorithms, IDEA, CAST, Blowfish, Twofish, RC2, RC5,

Rijndael (AES), Key Distribution, Stream Ciphers and Pseudo Random Numbers, Pseudo Random Sequences, Linear Congenital Generators, Cryptographic Generators, Design of Stream Cipher, One Time Pad.

UNIT-3

Public Key Cryptography – Prime Numbers and Testing for Primarily, Factoring Large Numbers, RSA, Diffie-Hellman, ElGamal, Key Exchange Algorithms, Public-Key Cryptography Standards

UNIT-4

Hashes and Message Digests – Message Authentication, MD5, SHA, RIPEMD, HMAC, Digital Signatures, Certificates, User Authentication, Digital Signature Standard, Security Handshake Pitfalls, Elliptic Curve Cryptosystems.

UNIT-5

Authentication of Systems, Kerberos, Electronic Mail Security, Pretty Good Privacy, IP and Web Security, Secure Sockets and Transport Layer, Electronic Commerce Security, Electronic Payment Systems, Secure Electronic Transaction, Digital Watermarking.

TEXTBOOK

1. Behrouz A Forouzan, Cryptography and Network Security, Tata Mc Graw Hill, 2005

REFERENCE BOOKS:

1. William Stalings, Cryptography and Network Security, Principles and Practices. 3rd Ed., Pearson Education, 2005.

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(CA20FPC307)INTERNET OF THINGS Elective-II

Course Objectives:

1. Makes clear view over physical computing, ubiquitous computing, or the Internet of Things, it's a hot topic in technology.
2. It discusses design concepts that will make IOT products eye-catching and appealing.

Course Outcomes:

1. Ability to combine sensors, servos, robotics, Arduino chips, and more with various or the Internet, to create interactive, cutting-edge devices.
2. Better idea of the overview of necessary steps to take the idea of IOT concept through production

UNIT-1

Introduction - Internet of Things - **Design Principles for Connected Devices** - Web Thinking for Connected Devices - **Internet Principles** - IP - TCP - IP Protocol Suite - UDP - IP Address - MAC Address - TCP and UDP Ports - Application Layer Protocols.

UNIT-2

Prototyping - Prototypes and Production - Cloud - Open Source vs Closed Source - Tapping into the Community - **Prototyping Embedded Devices** - Electronics - Embedded Computing Basics - Arduino - Raspberry Pi - Beagle Bone Black - Electronic Imp.

UNIT-3

Prototyping thePhysicalDesign - Laser Cutting - 3D Printing - CNC Milling - Repurposing and Recycling - **Prototyping Online Components** - New API - Real Time Reactions - Other Protocols.

UNIT-4

Techniques for writing Embedded Code – Memory Management – Performance and Battery life – Libraries – Debugging – **Business Models** – Models – Funding an Internet of Things Startup.

UNIT-5

Moving to Manufacture – Designing Kits – Designing Printed Circuit Boards – Manufacturing Printed Circuit Boards – Mass Producing the case and other Fixtures – Scaling up Software – **Ethics** – Characterizing the Internet of Things – Control – Environment – Solutions.

TEXT BOOKS:

1. Adrian McEwen and HakinCassimally, "Designing The Internet of Things" Wiley Publications , 2015

REFERENCE BOOKS:

1. Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on-Approach)", 1stEdition, VPT, 2014.
2. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013 CunoPfister, "Getting Started with the Internet of Things", O'Reilly Media, 2011

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(CA20FPC308) SOFTWARE PROJECT MANAGEMENT

Elective-II

Course Objectives:

The main goal of software development projects is to create a software system with a predetermined functionality and quality in a given time frame and with given costs. For achieving this goal, models are required for determining target values and for continuously controlling these values. This course focuses on principles, techniques, methods & tools for model-based management of software projects, assurance of product quality and process adherence (quality assurance), as well as experience-based creation & improvement of models (process management). The goals of the course can be characterized as follows:

1. Understanding the specific roles within a software organization as related to project and process management
2. Describe the principles, techniques, methods & tools for model-based management of software projects, assurance of product quality and process adherence (quality assurance), as well as experience-based creation & improvement of models (process management).
3. Understanding the basic infrastructure competences (e.g., process modelling and measurement)
4. Understanding the basic steps of project planning, project management, quality assurance, and process management and their relationships

Course Outcomes:

1. Describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project.
2. Compare and differentiate organization structures and project structures
3. Implement a project to manage project schedule, expenses and resources with the application of suitable project management tools

UNIT-1

Conventional Software Management: The waterfall model, conventional software

Management performance. Evolution of Software Economics: Software Economics, pragmatic software cost estimation

UNIT-2

Improving Software Economics: Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.

The old way and the new: The principles of conventional software engineering, principles of modern software management, transitioning to an iterative process.

UNIT-3

Life cycle phases: Engineering and production stages, inception, Elaboration, construction, transition phases.

Artifacts of the process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts. Model based software architectures: A Management perspective and technical perspective.

UNIT-4

Work Flows of the process: Software process workflows, Inter Trans workflows. Checkpoints of the Process: Major Mile Stones, Minor Milestones, Periodic status assessments. Iterative Process Planning: Work breakdown structures, planning guidelines, cost and schedule estimating, Interaction planning process, Pragmatic planning.

Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, evolution of Organizations.

Process Automation: Automation Building Blocks, the Project Environment.

UNIT-5

Project Control and Process instrumentation: The server care Metrics, Management indicators, quality indicators, life cycle expectations pragmatic Software Metrics, Metrics automation. Tailoring the Process: Process discriminates, Example.

Future Software Project Management: Modern Project Profiles Next generation Software economics, modern Process transitions.

Case Study: The Command Center Processing and Display System-Replacement (CCPDS-R)

TEXT BOOKS:

1. Software Project Management, Walker Royce, Pearson Education.
2. Software Project Management, Bob Hughes & Mike Cotterell, fourth edition, Tata Mc-Graw Hill

REFERENCE BOOKS:

1. Applied Software Project Management, Andrew Stellman & Jennifer Greene, O'Reilly, 2006
2. Head First PMP, Jennifer Greene & Andrew Stellman, O'Reilly, 2007
3. Software Engineering Project Management, Richard H. Thayer & Edward Yourdon, second edition, Wiley India, 2004.
4. Agile Project Management, Jim Highsmith, Pearson education, 2004
5. The art of Project management, Scott Berkun, O'Reilly, 2005.
6. Software Project Management in Practice, Pankaj Jalote, Pearson Education, 2002

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(CA20FPC309).NET FRAMEWORK AND C#

Elective-II

Course Objectives:

This course is designed to provide the knowledge of dot net frameworks along with c#.

Course Outcomes:

1. You will be able to using xml in c#.net specifically ado.net and sql server
2. Be able to understand use of c# basics, objects and types, inheritance
3. To develop, implement and creating applications with c#.
4. To develop, implement, and demonstrate component services, threading, remote windows services, web
5. To understand and be able to explain security in the .net framework and deployment in the .net.
6. To develop assemblies and deployment in .net, mobile application development.

UNIT-1

The .Net framework: Introduction, The Origin of .Net Technology, Common Language Runtime (CLR), Common Type System (CTS), Common Language Specification (CLS), Microsoft Intermediate Language (MSIL), Just-In -Time Compilation, Framework Base Classes.

UNIT-2

C -Sharp Language (C#): Introduction, Data Types, Identifiers, Variables, Constants, Literals, Array and Strings, Object and Classes, Inheritance and Polymorphism, Operator Overloading, Interfaces, Delegates and Events. Type conversion.

UNIT-3

C# Using Libraries: Namespace- System, Input-Output, Multi-Threading, Networking and sockets, Managing Console I/O Operations, Windows Forms, Error Handling.

UNIT-4

Advanced Features Using C#: Web Services, Window Services, Asp.net Web Form Controls, ADO.Net. Distributed Application in C#, Unsafe Mode, Graphical Device

interface with C#.

UNIT-5

.Net Assemblies and Attribute: .Net Assemblies features and structure, private and share assemblies, Built-In attribute and custom attribute. Introduction about generic.

TEXT BOOKS:

1. Herbert Schildt (2009), C# 3.0: The Complete Reference, McGraw-Hill, New Delhi
2. Wiley, "Beginning Visual C# 2008", Wrox
3. Balagurusamy, "Programming with C#", (TMH)
4. ShibiParikkar, "C# with .Net Framework", Firewall Media.

REFERENCE BOOKS:

1. Wiley, "Beginning Visual C# 2008", Wrox
2. Fergal Grimes, "Microsoft .Net for Programmers". (SPI)
3. Balagurusamy, "Programming with C#", (TMH)

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MOBILE APPLICATION DEVELOPMENT (CA20FPC310)

Elective-III

Course Objectives:

1. To understand fundamentals of android operating systems.
2. Illustrate the various components, layouts and views in creating android applications
3. To understand fundamentals of android programming.

Course Outcomes:

1. Create data sharing with different applications and sending and intercepting SMS.
2. Develop applications using services and publishing android applications.
3. To demonstrate their skills of using Android software development tools

UNIT-1

Basics of Mobile Applications Development: Tools: Eclipse ADT, Android Studio.

Understanding the Role of Android Application Components, Understanding the Utility of Android API, Overview of the Android Project Files, Understanding Activities, Role of the Android Manifest File, Creating the User Interface, Commonly Used Layouts and Controls, Event Handling, Displaying Messages Through Toast, Creating and Starting an Activity, Using the Edit Text Control, Choosing Options with Checkbox, Choosing Mutually Exclusive Items Using Radio Buttons

UNIT-2

Building Blocks for Android Application Design:

Introduction to Layouts, Linear Layout, Relative Layout, Absolute Layout, Using Image View, Frame Layout, Table Layout, Grid Layout, Adapting to Screen orientation.

Utilizing Resources and Media Resources, Creating Values Resources, Using Drawable Resources, Switching States with Toggle Buttons, Creating an Images Switcher Application, Scrolling Through Scroll View, playing Audio, Playing Video, Displaying

UNIT-3

Using Selection widgets and Debugging:

Using List View, Using the Spinner control, Using the GridView Control, Creating an Image Gallery Using the ViewPager Control, **Using the Debugging Tool:** Dalvik Debug Monitor Service(DDMS), Debugging Application, Using the Debug Perspective.

Displaying And Fetching Information Using Dialogs and Fragments: What Are Dialogs?, Selecting the Date and Time in One Application, Fragments, Creating Fragments with java Code, Creating Special Fragments

UNIT-4

Building Menus:Creating Interface Menus and Action Bars, Menus and Their Types, Creating Menus Through XML, Creating Menus Through Coding, Applying a Context Menu to a List View, Using the Action Bar, Replacing a Menu with the Action Bar, Creating a Tabbed Action Bar, Creating a Drop-Down List Action Bar

UNIT-5

Storing Data & Communicating with SMS and Emails:

Using the SQLiteOpenHelperclasss, Accessing Databases with the ADB, Creating a Data Entry Form.

Understanding Broadcast Receivers, Using the Notification System, Sending SMS Messages with Java Code, Receiving SMS Messages, Sending Email, Working With Telephony Manager.

TEXT BOOKS

1. Android Programming by B.M Harwani, Pearson Education, 2013.

REFERENCES:

1. Android application Development for Java Programmers, James C Sheusi, Cengage Learning
2. Android In Action by w.Frank Ableson, Robi Sen, Chris King, C. Enrique Ortiz., Dreamtech.
3. Professional Android 4 applications development, Reto Meier, Wiley India, 2012.
4. Beginning Android 4 applications development, Wei- Meng Lee, Wiley India,2013

5. PawPrints Learning Technologies, Beginning Android Development: Create Your Own Android Apps Today, 2014.
6. Erik Hellman, Android Programming: Pushing the Limits, John Wiley and sons Ltd, 2014.
7. Neil Smyth, Android Studio Development Essentials.
8. Joseph Annuzzi,Jr, Lauren Darcey, Introduction to Android Application Development, Addison-Wesley, Fourth Edition.

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(CA20FPC311) NATURAL LANGUAGE PROCESSING

Elective-III

Course Objectives:

This course introduces the fundamental concepts and techniques of natural language processing (NLP).

1. Students will gain an in-depth understanding of the computational properties of natural languages and the commonly used algorithms for processing linguistic information.
2. The course examines NLP models and algorithms using both the traditional symbolic and the more recent statistical approaches.

Course Outcomes:

After successful completion of this course, student will be able to

1. Understand approaches to syntax and semantics in NLP.
2. Understand approaches to discourse, generation, dialogue and summarization within NLP.
3. Understand current methods for statistical approaches to machine translation.
4. Understand machine learning techniques used in NLP, including hidden Markov models and probabilistic context-free grammars, clustering and unsupervised methods, log-linear and discriminative models, and the EM algorithm as applied within NLP

UNIT-1

Introduction and Overview: what is Natural Language Processing, hands-on demonstrations. Ambiguity and uncertainty in language. The Turing test. Regular Expressions Chomsky hierarchy, regular languages, and their limitations. Finite-state automata. Practical regular expressions for finding and counting language phenomena. A little morphology. Exploring a large corpus with regex tools. Programming in Python An introduction to programming in Python. Variables, numbers, strings, arrays, dictionaries, conditionals, iteration. The NLTK (Natural Language Toolkit) String Edit Distance and Alignment Key algorithmic tool: dynamic programming, a simple example, use in optimal alignment of sequences. String edit operations, edit distance,

and examples of use in spelling correction, and machine translation.

UNIT-2

Context Free Grammars Constituency, CFG definition, use and limitations. Chomsky Normal Form. Top-down parsing, bottom-up parsing, and the problems with each. The desirability of combining evidence from both directions Non-probabilistic Parsing Efficient CFG parsing with CYK, another dynamic programming algorithms. Earley parser. Designing a little grammar, and parsing with it on some test data. Probability Introduction to probability theory Joint and conditional probability, marginal, independence, Bayes rule, combining evidence. Examples of applications in natural language. Information Theory the "Shannon game"--motivated by language! Entropy, cross-entropy, information gain. Its application to some language phenomena.

UNIT-3

Language modelling and Naive Bayes Probabilistic language modelling and its applications. Markov models. N-grams. Estimating the probability of a word, and smoothing. Generative models of language. Part of Speech Tagging and Hidden Markov Models , Viterbi Algorithm for Finding Most Likely HMM Path , Dynamic programming with Hidden Markov Models, and its use for part-of-speech tagging, Chinese word segmentation, prosody, information extraction, etc.

UNIT-4

Probabilistic Context Free Grammars Weighted context free grammars. Weighted CYK. Pruning and beam search. Parsing with PCFGs A tree bank and what it takes to create one. The probabilistic version of CYK. Also: How do humans parse? Experiments with eyetracking. Modern parsers. Maximum Entropy Classifiers The maximum entropy principle, and its relation to maximum likelihood. Maximum entropy classifiers and their application to document classification, sentence segmentation, and other language tasks

UNIT-5

Maximum Entropy Markov Models & Conditional Random Fields Part-of-speech tagging, noun-phrase segmentation and information extraction models that combine maximum entropy and finite-state machines. State-of-the-art models for NLP. Lexical Semantics Mathematics of Multinomial and Dirichlet distributions, Dirichlet as a smoothing for multinomial. Information Extraction & Reference Resolution- Various methods,

including HMMs. Models of anaphora resolution. Machine learning methods for co-reference.

TEXT BOOKS:

1. "Speech and Language Processing": Jurafsky and Martin, Prentice Hall
2. "Statistical Natural Language Processing"- Manning and Schutze, MIT Press
3. "Natural Language Understanding". James Allen. The Benajmins/Cummings Publishing Company.

REFERENCE BOOKS:

1. Cover, T. M. and J. A. Thomas: Elements of Information Theory. Wiley.
2. Charniak, E.: Statistical Language Learning. The MIT Press.
3. Jelinek, F.: Statistical Methods for Speech Recog.

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BIG DATA ANALYTICS (CA20FPC312)

Elective-III

Course Objectives:

1. To learn to analyse the big data using intelligent techniques.
2. To understand the various search methods and visualization techniques.
3. To learn to various techniques for mining data stream.
4. To understand the applications using Map Reduce Concepts.

Course Outcomes:

On completion of this course the student will able to

1. Analyse the big data analytics techniques for useful business application.
2. Design efficient algorithms for mining the data from large volumes.
3. Analyse the HADOOP and Map Reduce technologies associated with big data analytics.
4. Explore on big data applications using Pig and Hive.

UNIT-1

Introduction to Big Data

Introduction to Big Data Platform – Challenges of Conventional System – Intelligent data analysis – Nature of Data – Analytic Processes and Tool – Analysis vs Reporting – Modern Data Analytic Tool – Statistical Concepts: Sampling Distributions – Re-Sampling – Statistical Inference – Prediction Error.

UNIT-2

Mining Data Streams

Introduction To Stream Concepts – Stream Data Model and Architecture - Stream Computing – Sampling Data in a Stream – Filtering Stream – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window – Real time Analytics Platform(RTAP) Applications – Case Studies – Real Time Sentiment Analysis, Stock Market Predictions.

UNIT-3

Hadoop

History of Hadoop- The Hadoop Distributed File System – Components of Hadoop – Analysing the Data with Hadoop – Scaling Out – Hadoop Streaming – Design of HDFS- Java interfaces to HDFS Basics- Developing a Map Reduce Application – How Map Reduce Works – Anatomy of a Map Reduce Job run – Failures – Job Scheduling – Shuffle and Sort – Task Execution – Map Reduce Types and Formats – Map Reduce Features.

UNIT-4

Hadoop Environment

Setting up a Hadoop Cluster – Cluster specification – Cluster Setup and Installation – Hadoop Configuration – Security in Hadoop – Administering Hadoop – HDFS – Monitoring – Maintenance – Hadoop Benchmarks – Hadoop in the Cloud.

UNIT-5

Frameworks

Applications on Big Data Using Pig and Hive – Data Processing operators in Pig – Hive Services – HiveQL – Querying Data in Hive – fundamentals of HBase and Zookeeper – IBM Info Sphere Big Insights and Streams. Visualization - Visual data analysis techniques, interaction techniques; Systems and applications.

TEXT BOOKS:

1. Michael Berthold, David J.Hand, Intelligent Data Analysis, Spingers, 2007.
2. Tom White, Hadoop: The Definitive Guide Third Edition, O'reilly Media, 2012.
3. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, McGrawHill Publishing, 2012.
4. AnandRajaraman and Jeffrey David UIIman, Mining of Massive Datasets Cambridge University Press, 2012.

REFERENCE BOOKS:

1. Bill Franks, Taming the big Data tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics, John Wiley & sons, 2012.
2. Glenn J. Myatt, Making Sense of Data , John Wiley & Sons, 2007 Pete Warden, Big Data Glossary, O'Reilly, 2011.

3. Jiawei Han, Micheline Kamber, Data Mining Concepts and Techniques, Second Edition.
4. Elsevier, Reprinted 2008. Da Ruan, Guoqing Chen, Etienne E. Kerre, Geert Wets, Intelligent Data Mining, Springer, 2007.
5. Paul Zikopoulos, Dirk deRoos, Krishnan Parasuraman, Thomas Deutsch, James Giles, David Corrigan, Harness the Power of Big Data the IBM Big Data Platform, Tata McGraw Hill Publications, 2012.
6. Michael Minelli (Author), Michele Chambers (Author), Ambiga Dhirraj (Author), Big Data, Big analytics.

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DISTRIBUTED SYSTEMS (CA20FPC313)

Elective-III

Course Objectives:

The student should be made to:

1. Understand the issues involved in studying process and resource management.
2. Understand in detail the system level and support required for distributed system.
3. Introduce the idea of peer-to-peer services and file system.
4. Understand foundations of Distributed Systems.

Course Outcomes:

Student should be able to:

1. Design process and resource management systems.
2. Apply remote method invocation and objects.
3. Apply network virtualization.
4. Discuss trends in Distributed Systems.

UNIT-1

INTRODUCTION. Examples of Distributed Systems – Trends in Distributed Systems – Focus on resource sharing – Challenges. **Case study:** World Wide Web.

UNIT-2

COMMUNICATION IN DISTRIBUTED SYSTEM

System Model – Inter process Communication - the API for internet protocols – External data representation and Multicast communication. Network virtualization: Overlay networks. Case study: MPI Remote Method Invocation and Objects: Remote Invocation – Introduction - Request-reply protocols - Remote procedure call - Remote method invocation. Case study: Java RMI - Group communication - Publish-subscribe systems - Message queues - Shared memory approaches - Distributed objects - **Case study:** Enterprise Java Beans -from objects to components.

UNIT-3

PEER TO PEER SERVICES AND FILE SYSTEM

Peer-to-peer Systems – Introduction - Napster and its legacy - Peer-to-peer – Middleware - Routing overlays. Overlay case studies: Pastry, Tapestry- Distributed File Systems –Introduction - File service architecture – Andrew File system. File System: Features-File model -File accessing models - File sharing semantics **Naming:** Identifiers, Addresses, Name Resolution – Name Space Implementation – Name Caches – LDAP.

UNIT-4

SYNCHRONIZATION AND REPLICATION

Introduction - Clocks, events and process states - Synchronizing physical clocks- Logical time and logical clocks - Global states – Coordination and Agreement – Introduction - Distributed mutual exclusion – Elections – Transactions and Concurrency Control– Transactions -Nested transactions – Locks – Optimistic concurrency control - Timestamp ordering – Atomic Commit protocols -Distributed deadlocks – Replication – Case study – Coda.

UNIT-5

PROCESS & RESOURCE MANAGEMENT

Process Management: Process Migration: Features, Mechanism - Threads: Models, Issues, Implementation. Resource Management: Introduction- Features of Scheduling Algorithms –Task Assignment Approach – Load Balancing Approach – Load Sharing Approach.

TEXT BOOK:

1. George Coulouris, Jean Dollimore and Tim Kindberg, "Distributed Systems Concepts and Design", Fifth Edition, Pearson Education, 2012.

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(CA20FPC314) DATA WAREHOUSING & MINING

Elective-III

Course Objectives:

1. To know the basic concepts and principles of data warehousing and data mining
2. Learn pre-processing techniques and data mining functionalities
3. Learn and create multidimensional models for data warehousing
4. Study and evaluate performance of Frequent Item sets and Association Rules
5. Understand and Compare different types of classification and clustering algorithms

Course Outcomes:

1. Understand the basic concepts of data warehouse and data Mining
2. Apply pre-processing techniques for data cleansing
3. Analyse and evaluate performance of algorithms for Association Rules
4. Analyse Classification and Clustering algorithms

UNIT-1

Introduction: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or a Data Warehouse System, Major issues in Data Mining. Data Pre-processing: Need for Pre-processing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

UNIT-2

Data Warehouse and OLAP Technology for Data Mining: Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Further Development of Data Cube Technology, From Data Warehousing to Data Mining. Data Cube Computation and Data Generalization: Efficient Methods for Data Cube Computation, Further Development of Data Cube and OLAP Technology, Attribute-Oriented Induction.

UNIT-3

Mining Frequent Patterns, Associations and Correlations: Basic Concepts, Efficient and Scalable Frequent Itemset Mining Methods, Mining various kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining, Classification and Prediction: Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Rule-Based Classification, Classification by Back propagation, Support Vector Machines, Associative Classification, Lazy Learners, Other Classification Methods, Prediction, Accuracy and Error measures, Evaluating the accuracy of a Classifier or a Predictor, Ensemble Methods.

UNIT-4

Cluster Analysis Introduction :Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Clustering High-Dimensional Data, Constraint-Based Cluster Analysis, Outlier Analysis.

UNIT-5

Mining Streams, Time Series and Sequence Data: Mining Data Streams, Mining Time-Series Data, Mining Sequence Patterns in Transactional Databases, Mining Sequence Patterns in Biological Data, Graph Mining, Social Network Analysis and Multi relational Data Mining, Mining Object, Spatial, Multimedia, **Text and Web Data:** Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Data Mining, Multimedia Data Mining, Text Mining, Mining the World Wide Web.

TEXT BOOKS:

1. Data Mining: Concepts and Techniques, Jiawei Han and Micheline Kamber, Morgan Kaufmann Publishers, Elsevier, Second Edition, 2006.
2. Introduction to Data Mining – Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Pearson Education.

REFERENCES:

1. Data Mining Techniques, Arun KPujari, Second Edition, Universities Press.
2. Data Warehousing in the Real World, Sam Aanhory& Dennis Murray Pearson EdnAsia.
3. Insight into Data Mining, K.P.Soman, S.Diwakar,V.Ajay, PHI,2008.

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(CA20FPC315) DESIGN AND ANALYSIS OF ALGORITHMS LAB

Course Objectives:

1. Implement the various algorithms that are being studied in Design and Analysis of Algorithms subject in C.

Note: You may develop programs using C

1. Write a program that implements Prim's algorithm to generate minimum cost spanning tree.
2. Write a program that implements Kruskal's algorithm to generate minimum cost spanning tree.
3. Write a program to implement Huffman's algorithm for text compression.
4. Write a program to implement Dijkstra's algorithm for Single source shortest path problem.
5. Write a program to implement Floyd's algorithm for the All-pairs shortest path problem.
6. Write a program to implement greedy algorithm for job sequencing with deadlines.
7. Write programs for the implementation of BFS and DFS for a given graph.
8. Write a program to find Minimum Cost Binary Search Tree.
9. Write a program to implement Dynamic Programming algorithm for 0/1 Knapsack problem.
10. Write a program to implement the Backtracking algorithm for the m-colouring graph problem
11. Write a program to implement backtracking algorithms for N-queens problem

TEXT BOOKS

1. Data structures and Algorithms in java, 3rd edition, A. Drozdek, Cengage Learning.
2. Data structures with Java, J.R. Hubbard, 2nd edition, Schaum's Outlines, TMH.
3. Data structures and algorithms in Java, 2nd Edition, R. Lafore, Pearson Education.
4. Data Structures using Java, D.S. Malik and P.S. Nair, Cengage Learning.

5. Data structures, Algorithms and Applications in java, 2nd Edition, S.Sahani, Universities Press.
6. Data structures, Algorithms and Applications in C++, 2nd Edition, S.Sahani, Universities Press.
7. Data structures and Algorithm Analysis in C++,2nd Edition,M.A.Weiss,Pearson education.
8. Design and Analysis of Algorithms, P.H.Dave and H.B.Dave, Pearson education.
9. Data structures and java collections frame work,W.J.Collins,Mc Graw Hill.

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(CA20FPC316) DATA SCIENCE AND ANALYTICS LAB

Course Objectives:

Data Science is the study of the generalizable extraction of knowledge from data. Being a data scientist requires an integrated skill set spanning mathematics, statistics, machine learning, databases and other branches of computer science along with a good understanding of the craft of problem formulation to engineer effective solutions. This course will introduce students to this rapidly growing field and equip them with some of its basic principles and tools as well as its general mind-set. Students will learn concepts, techniques and tools they need to deal with various facets of data science practice, including data collection and integration, exploratory data analysis, predictive modelling, descriptive modelling, data product creation, evaluation, and effective communication.

Course Outcomes:

Demonstrate mastery of a body of knowledge that includes recent developments in computer science and information technology;

1. Understand and use appropriate and relevant, fundamental and applied mathematical and statistical knowledge, methodologies and modern computational tools;
2. Recognise and use research principles and methods applicable to data science.
3. Extract an interpretation of data using exploratory data analysis
4. Visualise and plot graphical representations of data.

Programmes:

1. Reload data sets into the R statistical package
2. Perform summary statistics on the data
3. Remove outliers from the data
4. Plot the data using R
5. Plot the data using lattice and ggplot
6. Data visualization using pie chart
7. Data Visualization using

8. Test a hypothesis about the data
9. Application to adjust the number of bins in the histogram Using R language
10. Bivariate Statistics for Nominal Data
11. Use the R -Studio environment to code OLS models. Review the methodology to validate the model and predict the dependent variable for a set of given independent variables Use R graphics functions to visualize the results generated with the model
12. Use R -Studio environment to code Logistic Regression models Review the methodology to validate the model and predict the dependent variable for a set of given independent variables Use R graphics functions to visualize the results generated with the model

REFERENCES

1. R Commands - Quick Reference

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(CA20FPC317) WEB TECHNOLOGIES LAB

Course Objectives:

1. To create a fully functional website with MVC architecture. To develop an online Book store using we can sell books (Ex: amazon .com).

Course Outcomes:

1. Ability to apply object oriented concepts for programming and its use.
2. Practical WEB Development using java by using JDBC and ODBC connectivity.
3. Implementation of servlets and PHP connectivity by using MYSQL applications.
4. Learning how to use PHP in different operating systems with different editors like eclipse and net beans.
5. Acquire skills to develop final project by acquired knowledge during curriculum.

Week-1:

Design the following static web pages required for an online book store web site.

1) **HOME PAGE:**

The static home page must contain three **frames**.

Top frame : Logo and the college name and links to Home page, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below).

Left frame : At least four links for navigation, which will display the catalogue of respective links.

For e.g.: When you click the link "**CSE**" the catalogue for **CSE** Books should be displayed in the Right frame.

Right frame: The *pages to the links in the left frame must be loaded here*. Initially this page contains description of the web site.

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
CSE ECE EEE CIVIL	Description ofthe Web Site			

Fig 1.1

2) LOGIN PAGE:

This page looks like below:

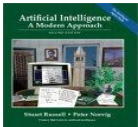
Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
CSE ECE EEE CIVIL	Lo Pa			

3) CATOLOGUE PAGE:

The catalogue page should contain the details of all the books available in the web site in a table.

The details should contain the following:

- 1 Snap shot of Cover Page.
- 2 Author Name.
- 3 Publisher.
- 4 Price.
- 5 Add to cart button.

Web Site Name				
Logo				
Home	Login	Registration	Catalogue	Cart
CSE		Book : XML Bible	\$ 40.5	
ECE		Author : Winston		
EEE		Publication : Wiely		
CIVIL		Book : AI	\$ 63	
		Author : S.Russel		
		Publication : Princeton hall		
		Book : Java 2	\$ 35.5	
		Author : Watson		
		Publication : BPB		

		publications Book : HTML in 24 hours Author : Sam Peter Publication : Sam publication	\$ 50	

Note: Week 2 contains the remaining pages and their description.

Week-2:

4) CART PAGE:

The cart page contains the details about the books which are added to the cart.

The cart page should look like this:

Logo	Web Site Name			
Home	Login	Registrati on	Catalogu e	Cart
CSE ECE EEE CIVIL	Book name	Price	Quantity	
	Amount			
	Java 2	\$35.5	2	
	\$70			
	XML bible	\$40.5	1	
	\$40.5			
	Total amount -			
	\$130.5			

5) REGISTRATION PAGE:

Create a "registration form" with the following fields

- 1) Name (Text field)
- 2) Password (password field)
- 3) E-mail id (text field)
- 4) Phone number (text field)
- 5) Sex (radio button)
- 6) Date of birth (3 select boxes)
- 7) Languages known (check boxes – English, Telugu, Hindi, Tamil)
- 8) Address (text area)

WEEK 3:

VALIDATION:

Write *JavaScript* to validate the following fields of the above registration page.

1. Name (Name should contain alphabets and the length should not be less than 6 characters).
2. Password (Password should not be less than 6 characters length).
3. E-mail id (should not contain any invalid and must follow the standard pattern name@domain.com)
4. Phone number (Phone number should contain 10 digits only).

Note : You can also validate the login page with these parameters.

Week-4:

Design a web page using **CSS (Cascading Style Sheets)** which includes the following:

- 1) Use different font, styles:

In the style definition you define how each selector should work (font, color etc.). Then, in the body of your pages, you refer to these selectors to activate the styles.

For example:

```
<HTML>
<HEAD>
<style type="text/css">
B.headline {color:red, font-size:22px, font-family:arial,
text-decoration:underline}
```

```

</style>

</HEAD>

<BODY>
<b>This is normal bold</b><br>
Selector {cursor:value}

For example:

<html>
<head>
<style type="text/css">
.xlink {cursor:crosshair}
.hlink{cursor:help}
</style>
</head>

<body>
<b>
<a href="mypage.htm" class="xlink">CROSS LINK</a>
<br>
<a href="mypage.htm" class="hlink">HELP LINK</a>
</b>
</body>
</html>

<b class="headline">This is headline style bold</b>
</BODY>

</HTML>

```

2) Set a background image for both the page and single elements on the page. You can define the background image for the page like this:


```
BODY {background-image:url(myimage.gif),}
```

3) Control the repetition of the image with the background-repeat property. As background-repeat: repeat Tiles the image until the entire page is filled, just like an ordinary background image in plain HTML.

4) Define styles for links as

A:link

A:visited

A:active

A:hover

Example:

```
<style type="text/css">
  A:link {text-decoration: none}
  A:visited {text-decoration: none}
  A:active {text-decoration: none}
  A:hover {text-decoration: underline, color: red,}
</style>
```

5) **Work with layers:**

For example:

LAYER 1 ON TOP:

```
<div style="position:relative, font-size:50px, z-index:2,">LAYER 1</div>    <div
style="position:relative, top:-50, left:5, color:red, font-size:80px, z-
index:1">LAYER 2</div>
```

LAYER 2 ON TOP:

```
<div style="position:relative, font-size:50px, z-index:3,">LAYER 1</div>    <div
style="position:relative, top:-50, left:5, color:red, font-size:80px, z-
index:4">LAYER 2</div>
```

6) **Add a customized cursor:**

Selector {cursor:value}

For example:

```
<html>
<head>
```

```
<style type="text/css">
.xlink {cursor:crosshair}
.hlink{cursor:help}
</style>
</head>

<body>
<b>
<a href="mypage.htm" class="xlink">CROSS LINK</a>
<br>
<a href="mypage.htm" class="hlink">HELP LINK</a>
</b>
</body>
</html>
```

Week-5:

Write an XML file which will display the Book information which includes the following:

- 1) Title of the book
- 2) Author Name
- 3) ISBN number
- 4) Publisher name
- 5) Edition
- 6) Price

Write a Document Type Definition (DTD) to validate the above XML file.

Display the XML file as follows.

The contents should be displayed in a table. The header of the table should be in color GREY. And the Author names column should be displayed in one color and should be capitalized and in bold. Use your own colors for remaining columns.

Use XML schemas XSL and CSS for the above purpose.

Note: Give at least for 4 books. It should be valid syntactically.

Hint: You can use some xml editors like XML-spy

Week-6:

Install IIS web server and APACHE.

While installation assign port number 4040 to IIS and 8080 to APACHE. Make sure that these ports are available i.e., no other process is using this port.

1) Access the above developed static web pages for books web site, using these servers by putting the web pages developed in week-1 and week-2 in the document root.

Access the pages by using the urls : <http://localhost:4040/rama/books.html> (for tomcat)
<http://localhost:8080/books.html> (for Apache)

Week-7:

User Authentication :

Assume four users user1,user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively. Write a JSP for doing the following.

1. Create a Cookie and add these four user id's and passwords to this Cookie.
2. Read the user id and passwords entered in the Login form (week1) and authenticate with the values (user id and passwords) available in the cookies.

If he is a valid user(i.e., user-name and password match) you should welcome him by name(user-name) else you should display " You are not an authenticated user ".

Use init-parameters to do this.

Week-8:

Install a database(Mysql or Oracle).

Create a table which should contain at least the following fields: name, password, email-id, phone number(these should hold the data from the registration form).

Week-9:

Write a python script to connect to that database and extract data from the tables and display them. Experiment with various SQL queries.

Insert the details of the users who register with the website, whenever a new user clicks the submit button in the registration page (week2).

Week-10:

Write a Python script which does the following job:

Insert the details of the 3 or 4 users who register with the web site (week9) by using registration form. Authenticate the user when he submits the login form using the user name and password from the database (similar to week8 instead of cookies).

Week-11:

Create tables in the database which contain the details of items (books in our case like Book name, Price, Quantity, Amount) of each category. Modify your catalogue page (week 2) in such a way that you should connect to the database and extract data from the tables and display them in the catalogue page using Python Script.

Week-12:

HTTP is a stateless protocol. Session is required to maintain the state.

The user may add some items to cart from the catalogue page. He can check the cart page for the selected items. He may visit the catalogue again and select some more items. Here our interest is the selected items should be added to the old cart rather than a new cart. Multiple users can do the same thing at a time(i.e., from different systems in the LAN using the ip-address instead of localhost). This can be achieved through the use of sessions. Every user will have his own session which will be created after his successful login to the website. When the user logs out his session should get invalidated (by using the method `session.invalidate()`).

Modify your catalogue and cart JSP pages to achieve the above mentioned functionality using sessions.

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(CA20FMC301) UNIVERSAL HUMAN VALUES

Course Objectives:

The objective of the course is four fold:

1. Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
2. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
3. Strengthening of self-reflection.
4. Development of commitment and courage to act.

Course Outcomes:

By the end of the course,

1. Students are expected to become more aware of themselves, and their surroundings (family, society, nature)
2. They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
3. They would have better critical ability.
4. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
5. It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

UNIT-1

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

- Purpose and motivation for the course, recapitulation from Universal Human Values-I
- Self-Exploration-what is it? - Its content and process; 'Natural Acceptance' and
- Experiential Validation- as the process for self-exploration

- Continuous Happiness and Prosperity- A look at basic Human Aspirations
- Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority
- Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
- Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking

UNIT-2

Understanding Harmony in the Human Being - Harmony in Myself!

- Understanding human being as a co-existence of the sentient 'I' and the material
- 'Body'
- Understanding the needs of Self ('I') and 'Body' - happiness and physical facility
- Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
- Understanding the characteristics and activities of 'I' and harmony in 'I'
- Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail
- Programs to ensure Sanyam and Health.

Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease

UNIT-3

Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

- Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
- Understanding the meaning of Trust; Difference between intention and competence

- Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
- Understanding the harmony in the society (society being an extension of family):
- Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive
- Human Goals
- Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives

UNIT-4

Understanding Harmony in the Nature and Existence -Whole existence as Coexistence

- Understanding the harmony in the Nature
- Interconnectedness and mutual fulfilment among the four orders of nature recyclability
- and self-regulation in nature
- Understanding Existence as Co-existence of mutually interacting units in all pervasive
- Space
- Holistic perception of harmony at all levels of existence.

Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

UNIT-5

Implications of the above Holistic Understanding of Harmony on Professional Ethics

- Natural acceptance of human values
- Definitiveness of Ethical Human Conduct
- Basis for Humanistic Education, Humanistic Constitution and Humanistic
- Universal Order
- Competence in professional ethics:

- a. Ability to utilize the professional competence for augmenting universal human order
- b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems.
- c. Ability to identify and develop appropriate technologies and management patterns for above production systems.
- Case studies of typical holistic technologies, management models and production systems
- Strategy for transition from the present state to Universal Human Order:
 - a. At the level of individual: as socially and ecologically responsible engineers, Technologist's Manager's.

At the level of society: as mutually enriching institutions and organizations Sum up.

Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions

Eg. To discuss the conduct as an engineer or scientist etc.

TEXT BOOKS

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- A. N. Tripathi, "Human Values", New Age Intl. Publishers, New Delhi, 2004.
2. The Story of Stuff (Book).
3. Mohandas Karamchand Gandhi "The Story of My Experiments with Truth"
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7. Pandit Sunderlal "Bharat Mein Angreji Raj"
8. Dharampal, "Rediscovering India"

9. Mohandas K. Gandhi, "Hind Swaraj or Indian Home Rule"
10. India Wins Freedom - Maulana Abdul Kalam Azad
11. Vivekananda - Romain Rolland (English)
12. Gandhi - Romain Rolland (English)