SRI VENKATESWARA COLLEGE OF ENGINEERING

(AUTONOMOUS)

(Affiliated to J.N.T. University Anantapur, Anantapuramu)

Karakambadi Road Tirupati-517 507

SECOND BoS Minutes of Meeting

On

01-11-2021

DEPARTMENT OF MECHANICAL ENGINEERING

THIRD BOARD OF STUDIES MEETING
Minutes of the Meeting

Mode	Online
Platform	Google Meet
Meeting Link	https://meet.google.com/uqm-rzpv-jdx
Venue	Sri Venkateswara College of Engineering, Tirupati
Date	01-11-2021
Time	10:00 A.M. to 12:00 P.M.
Academic Year	2020-2021

DEPARTMENT OF M.E. – BoS MEMBERS

S. No.	Name of the Member	Designation & Address	Role
1.	Dr. M. Chandrasekhara Reddy	Professor & Head Department of Mechanical Engineering, SV College of Engineering, Karakambadi Road, Tirupati – 517507, Andhra Pradesh, India. Mobile -9912243800 Mail – hod_me@svce.edu.in	Chairman
2.	Dr.B. Durga Prasad	Professor JNTUA College of Engineering Jawaharlal Nehru Technological University, Anantapur – 515 002 **E-mail:** mukdhajntu@gmail.com Phone: **9490738404.**	Subject Expert nominated by JNTUA.
3.	Dr. N. Venkaiah	Associate Professor Department of Mechanical Engineering Indian Institute of Technology Tirupati Renigunta road, Settipalli Post, Tirupati – 517506 Mobile -9441933382 Mail - venkaiah@iittp.ac.in	Subject Expert nominated by Academic Council.
4.	Dr. P. Venkata Ramaiah	Professor Department of Mechanical Engineering S V University College of Engineering Tirupati-517502 Mobile – 8523891853 Mail: pvramaiah@gmail.com	Subject Expert nominated by Academic Council.
5.	Mr. M. Sreenivasa Rao	Manufacturing Head- ASBU Amara Raja Batteries Limited, Karakambadi Road-517520, Tirupati, Andhra Pradesh, India Mobile: 9885195541 Mail: msr@amararaja.co.in	Industry Expert nominated by Academic Council.

6.	Mr. Sree Rama Madhusudan	Product Design Engineer, Knowledge Lens Pvt Ltd Plot 74/A Keonics Electronic City, Behind Cyber Park Electronic City Phase 1, Bangalore 560100 Mobile Number #9030773546 Mail: madhusudhan.sreerama@knowledgelens.com	PG Alumni nominated by Academic Council.
7.	Dr. M. Vamsi Krishna	Mobile: 8978407734 Email: vamsikrishna.mamidi@svcolleges.edu.in	Member
8.	Dr. K. Madhivanan	Mobile: 9994490861 Email: madhivanan.k@svcolleges.edu.in	Member
9.	Dr. N. Rajesh	Mobile No: 9985289928 Email: rajesh.n@svcolleges.edu.in	Member
10.	Dr. E. Venkata Kondaiah	Mobile: 9866406540 Email: venkatakondaiah.e@svcolleges.edu.in	Member
11.	Dr.K. Jagath Narayana	Mobile: 9891598684 Mail: jagath.kamineni@svcolleges.edu.in	Member
12.	Dr. K. Renugadevi	Mobile: 9550802416 Mail: renugadevi.k@svcolleges.edu.in	Member
13.	Mr. D. Anjan Kumar Reddy	Mobile: 8555909344 Mail: anjankumarreddy.d1@svcolleges.edu.in	Member
14.	Mr. G. Guru Mahesh	Mobile: 9966214744 Mail: gurumahesh.g@svcolleges.edu.in	Member
15.	Mr. M. Gopala Krishna	Mobile: 9030341325 Mail: gopalakrishna.m@svcolleges.edu.in	Member
16.	Mr. P. Charan Theja	Mobile: 9985851430 Mail: charantheja.p1@svcolleges.edu.in	Member

Agenda:

1. Introduction of all the BOS Members
2. About the Department/College
3. Achievements
4. Information on Teaching Learning process through Online (Online classes).
5. Approval for the Course Structure (R20) to be followed for students admitted in the year 2020 pertaining to B. Tech (Mechanical).
6. Modification of course structure in I Year and II Year curriculum (2022-2023).
7. Allocation of credits for various courses modification and total credits from 160 credits to 163 credits.
8. Approval for the III B. Tech I & II SEM and IV B. Tech I & II SEM Syllabus of various Course.
9. MoUs
10. Information on Academic Performance of the students for the Previous academic year and Placements.
11. Valued Recruiters and Internships
12. Information on events organized for the Previous academic year and calendar of events for the upcoming months
13. Student Achievements

14. Course Structure -UG (B.Tech.-Mechanical Engineering)
15. Suggestions from BOS Members

Order of events:

1. The meeting started with joining of BOS members to the online meeting in Google Meet platform.
2. Welcome address by Dr. M. Chandrasekhara Reddy, Professor & HoD of M.E, SVCE
3. Presentation by Dr. M. Chandrasekhara Reddy, Professor & HoD of M.E, SVCE
4. Discussion on Achievements and progress of the department
5. Discussion on B. Tech M. E and M. Tech Course Structure & Syllabus
6. Vote of thanks by chairman

Minutes of Meeting:

Proceedings of the Third BoS meeting held on 01.11.2021.

Dr. M. Chandrasekhara Reddy, Chairman BoS M.E introduced members of BOS committeenominated by JNTUA and Academic Council.

- Dr.B. Durga Prasad, Professor, JNTUA College of Engineering, Jawaharlal Nehru Technological University, Anantapur. Subject Expertnominated by JNTUA.
- Dr. N. Venkaiah, Associate Professor, Department of Mechanical Engineering, Indian Institute of Technology Tirupati. Subject Expertnominated by Academic Council.
- Dr. P. Venkata Ramaiah, Professor, Department of Mechanical Engineering, S V University College of Engineering, Tirupati. Subject Expertnominated by Academic Council.
- Mr. M. Sreenivasa Rao, Manufacturing Head- ASBU, Amara Raja Batteries Limited, Tirupati, Industry Expertnominated by Academic Council.
- Mr. Sree Rama Madhusudan, Product Design Engineer, Knowledge Lens Pvt Ltd, Bangalore, PG Alumni nominated byAcademic Council.

The presentation includes genesis of department achievements and recognitions subsequently, college recognitions and achievements subsequently the discussion shifted to review of course structure and syllabus of UG and PG.

During the presentation the feedback and remarks given by the academic experts are given below

Further, presented the course structure for B-Tech, ME, the syllabus which was prepared according to Andhra Pradesh State Council and Higher Education (APSCHE) and JNTUA-R20 regulations.

Corrections on R -20 Course structure and Syllabus

1.TD, KOM, Numerical Methods, DOM, TE and all other problematic subjects, the credit for the subjects should be changed from 3-0-0 to 2-1-0, (three credits mean 2 (Lecture) - 1 (Tutorial) - 0,) due to the reason that these subjects are intensely problem oriented subjects, So, whenever tutorial required it can be utilised

2. Change the Name of the subject from Computer aided machine drawing and GD & T(ME20APC 404) to Machine drawing, Geometrical dimensioning and tolerances (GD and T) to be added in skill-oriented course (page no:3)

3.. "Smart Materials for Mechatronic Applications ME" (Pool 2, Page11) should be changed to "Mechatronics", Mechatronics course is not available in the B-Tech so change the title of the subject and may be add smart materials for mechatronics as one of the modules in the subject

4. Change the subject name "Reverse Engineering and Rapid Prototyping/Concurrent Engineering" to "Additive Manufacturing" (Pool 3, Page 11), under this additive manufacturing you may include reverse engineering, rapid prototyping, 3D printing etc.

6. Mention the significance of track (track 1,2,3 and so on, keep only one track to avoid practical difficulty), under the track add general subjects instead of core subject and provide the pre requisites needed

7. In minor in Mechanical, identify one basket of subjects with a specific theme and the students should not have choice as electives only compulsory subjects must be offered.

8.based on the present capability of the students offer Minor in Mechanical with 8 to 10 broad subjects and consolidate it to common pool (all eight subjects)

9.In Open elective courses – from other department students and our department students also eligible to opt on their own preference

10. For open electives, go through AICTE scheme for the subject of industrial safety it is better to take the subjects from this scheme.

11.Under one Elective, Subjects from all specialized streams should be offered and follow this to the rest of electives, reorganize the subjects in the group to provide flexibility for the student's preference.

12. Heat transfer is enough instead of Heat and mass transfer (page No 5, Subject code 601)

13.Remove "Seminar" from "project work and Seminar" (page No7)

14 Approximately 4 to 6 course outcomes are enough and course objective is not necessary, due to the reason that student will face the difficulty in tracking both course objectives and course outcomes

15.Reduce the teaching hours (4 or 5 hours per subject in a week, this literally means that four to five credits for one subject but that is not the case here) by giving some topics to the students for self-study and train the students for self-study about five to ten percent

16 In lab course outcomes include words such as perform measure, calculate etc. Avoid understanding, apply etc., which gives no clarity on all outcomes.

- Manufacturing process Lab (page No 30), remove "apply of" and use appropriate word.
- Check MOM lab CO's (page No 31).

- In Page No 32, CO’s, keep “analyse” instead “analyse to”

17. Machine tools and Measurements include metal cutting principles (Merchant circle, Lubrication aspect, tool life etc.) as one complete unit, Machine tools in the next two units and Metrology in the last two units

18. Instead of Introduction unit I title will be casting process in the subject of Manufacturing process.

19. One or two books are sufficient rest of the remaining books move to reference

20.In the Computer aided Machine drawing and GD & T (Sub code: 404), the production drawing concepts to be added (flow of study: Machine drawing, Assembly followed by production drawing) (Page No 44)

18.Remove Introduction to Mechanical system from honour degree

Corrections on MTech syllabus

19. In page no 5, Additive Manufacturing in reverse Engineering move to unit 5

20. In page No 6, Include case studies, it will be interesting for students, they will model and 3D printing exercise

Information on Academic Performance of the students for the Previous academic years

- Identifying the courses where students are suffering and identify the slow learners and provide the remedial classes to improve the pass percentage.'
- suggested to conduct remedial classes for students who failed in the courses.

Information on placements

- Industry experts suggested improve the placements, trying to send the students to internship at the end of 2nd year. Exposure of students to industries can get an opportunity to work in core-oriented companies and encourage the students for higher studies.
- Academic expert suggested for encouraging the students to write GATE exam Also he has given the information on public sector companies gives the placements based on the GATE score only.
- Suggested to maintain the lower cap, and do not allow the companies with lower package, it will degrade the quality of placements.

Information and discussion on rubrics for Identifying best academic project.

- Academic expert also suggested giving more weightage for publication and product development
- University nominee suggested to achieve all the parameters is difficult, so take one or two parameters into consideration.

Table: Decision on BoS Agenda

S.no	Item of Agenda	Decision
1	Teaching Learning process through Online (Online classes)	Approved
2	Information on Academic performance of the students for the Previous academic years and placements	Discussed and suggested for effective implementation of remedial classes and insisted to start the training and placements activities from the II Year .
3	Information on changes in course structure	Approved

	and no.of credits	
4	Information on events organized for the Previous academic years and calendar of Events for the upcoming months	Discussed and suggested to increase the number of activities
5	Information on R & D activities of the A.Y Previous academic years	Discussed and suggested to increase the number of publications
6	Discussion and approval of syllabi I and II semesters, and course structure	Approved with minor modifications
7	Discussion and approval of syllabi for Honor and minor programmes	Approved with minor modifications
8	Discussion on Subject Experts for External Examiners	Approved
9	Any other item with the permission of chair	-----

With the permission and acceptance of all BoS members it is decided to incorporate suggestions and modification made by academic experts and Industry experts.

The chairman, BOS thanked all the members for their active participation, constructive suggestions, and encouragement.

The meeting ended with the wishes by BoS members at 12:00pm

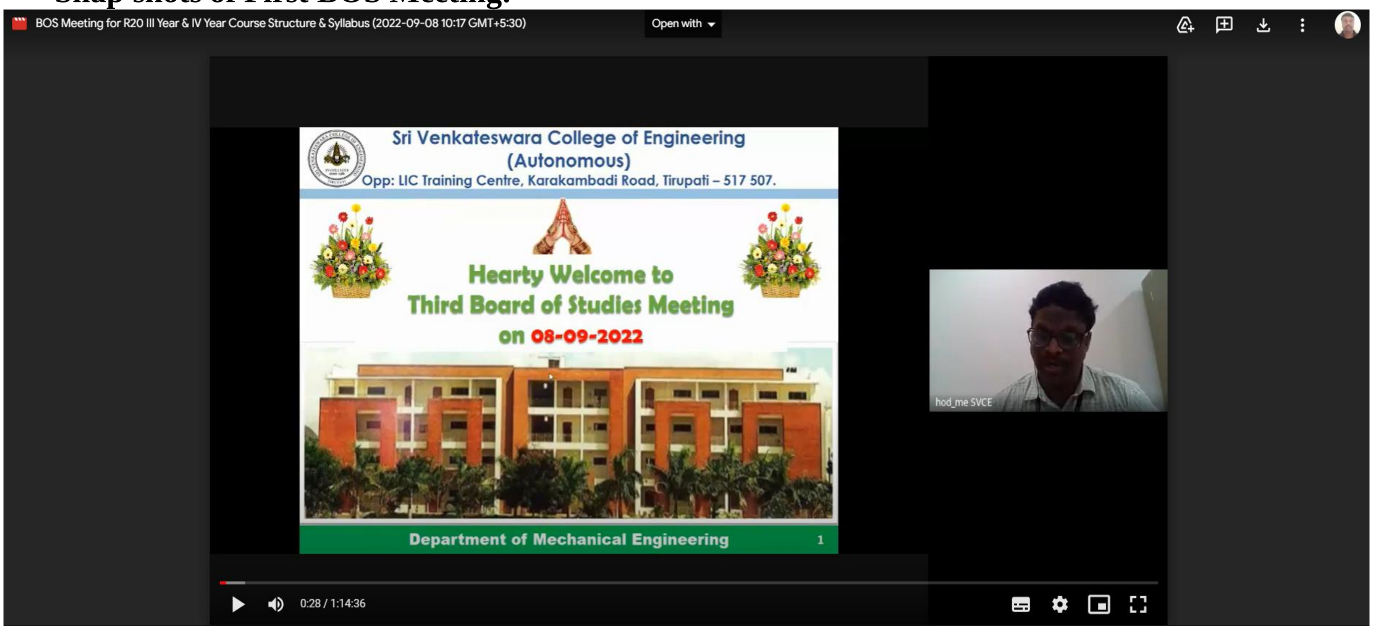
Yours sincerely,

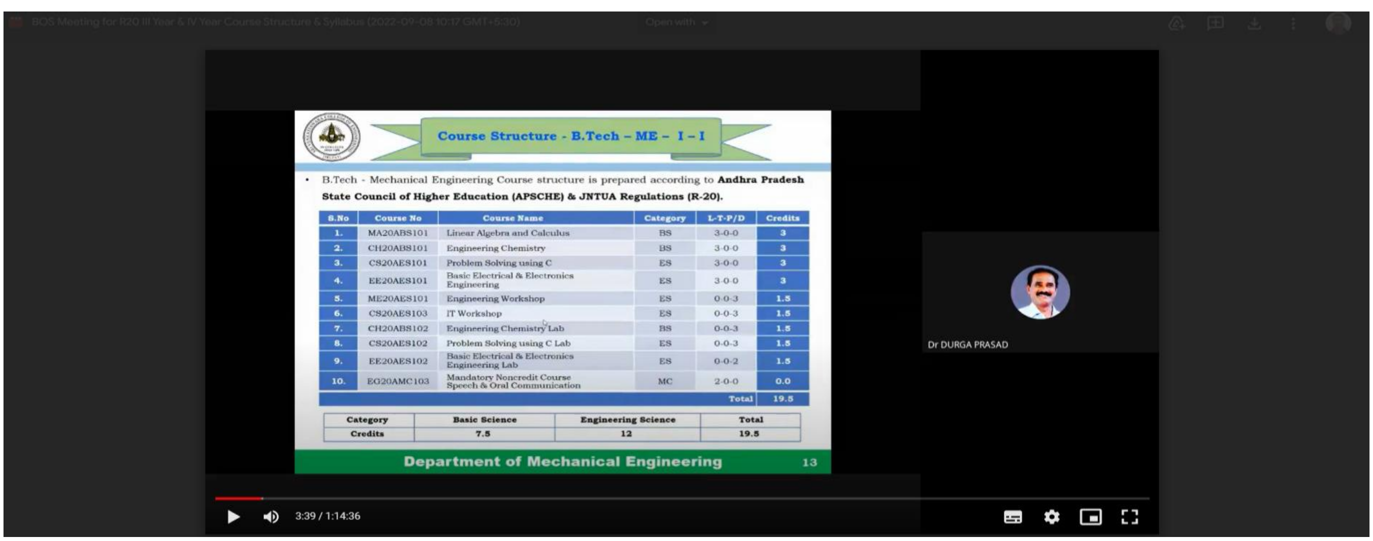
***Dr.* M. Chandra Sekhara Reddy**
Chairman, BOS (ME)

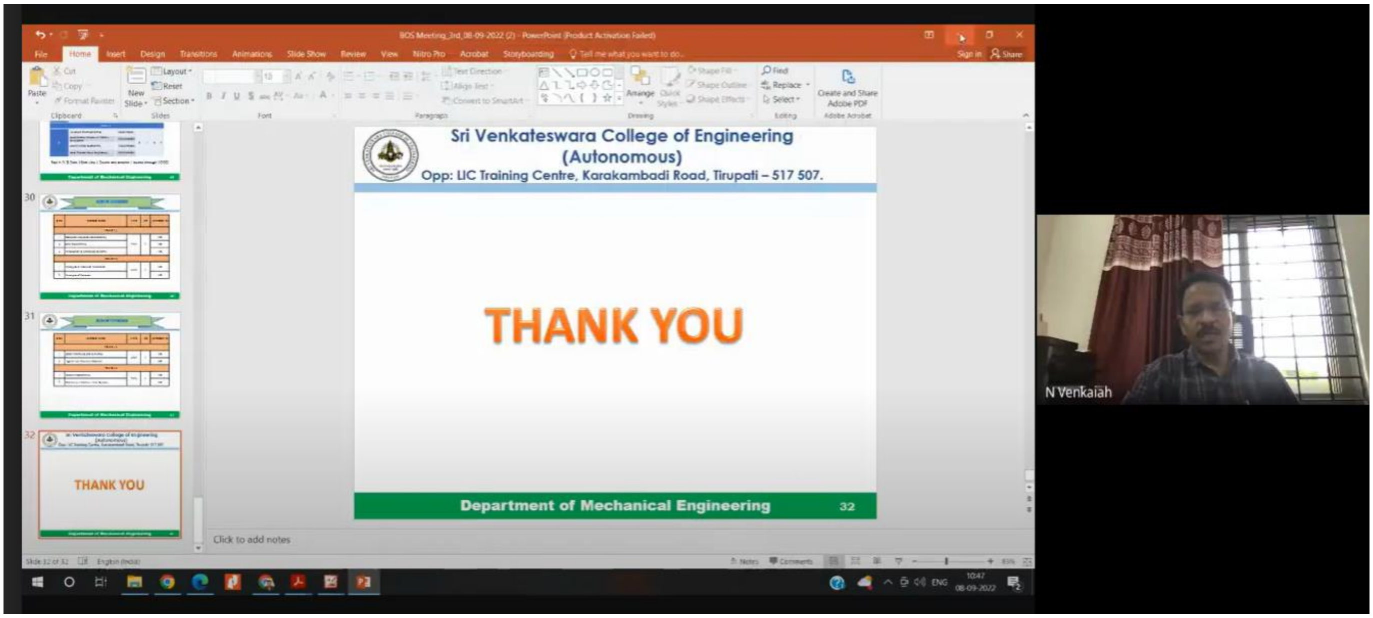
S. No.	Name of the Member	Signature
1.	Dr. M. Chandrasekhara Reddy	
2.	Dr.B. Durga Prasad	
3.	Dr. N. Venkaiah	
4.	Dr. P. Venkata Ramaiah	
5.	Mr. M. Sreenivasa Rao	
6.	Mr. Sree Rama Madhusudan	
7.	Dr. M. Vamsi Krishna	
8.	Dr. K. Madhivanan	
9.	Dr. N. Rajesh	
10.	Dr. E. Venkata Kondaiah	

11.	Dr.K. Jagath Narayana	
12.	Dr. K. Renugadevi	
13.	Mr. D. Anjan Kumar Reddy	
14.	Mr. G. Guru Mahesh	
15.	Mr. M. Gopala Krishna	
16.	Mr. P. Charan Theja	

Snap shots of First BOS Meeting:







Dr. M. Chandrasekhara Reddy
(**HOD of M. E**)
&
Chairman, BoS (M.E)

Copy to

1. **Principal, Chairman and**
2. **BoS Members To file**

SRI VENKATESWARA COLLEGE OF ENGINEERING

(AUTONOMOUS)

(Approved by AICTE | Accredited by NAAC with 'A' Grade | Accredited by NBA (CSE, ECE, EEE, CE, ME & IT) | Permanently Affiliated to JNTUA)

Karakambadi Road, Tirupati - 517 507

Program B.Tech Mechanical Engineering

B.Tech Course Structures and Syllabi under R20 Regulations

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)
Karakambadi Road, TIRUPATI – 517507

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

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Karakambadi Road, TIRUPATI – 517507

Mechanical Engineering

Semester – 1 (Theory – 4, Lab – 5, MC – 1)

S.No.	Course No	Course Name	Category	L-T-P	Credits
1.	MA20ABS101	Linear Algebra and Calculus	BS	3-0-0	3
2.	CH20ABS101	Engineering 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	Engineering Workshop	ES	0-0-3	1.5
6.	CS20AES103	IT Workshop	ES	0-0-3	1.5
7.	CH20ABS102	Engineering Chemistry Lab	BS	0-0-3	1.5
8.	CS20AES102	Problem Solving using C Lab	ES	0-0-3	1.5
9.	EE20AES102	Basic Electrical & Electronics Engineering Lab	ES	0-0-3	1.5
10.	EG20AMC101	Speech & Oral Communication	MC	2-0-0	0.0
				Total	19.5

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Mechanical Engineering

Semester – 2 (Theory – 6, Lab – 4, MC – 2)

S.No	Course No	Course Name	Category	L-T-P/D	Credits
1.	MA20ABS201	Differential Equations and Vector Calculus	BS	3-0-0	3
2.	PH20ABS101	Engineering Physics	BS	3-0-0	3
3.	EG20AHS101	Communicative English	HS	3-0-0	3
4.	ME20AES201	Material Science & Engineering	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.	PH20ABS102	Engineering Physics Lab	BS	0-0-3	1.5
9.	ME20AES202	Material Science & Engineering Lab	ES	0-0-3	1.5
10.	BA20AMC201	Mandatory Noncredit Course Universal Human Values	MC	2-0-0	0
	*BA20AHS201	Universal Human Values	HS	3-0-0	3
11.	MA20AMC101	Logical Skills for Professionals – I	MC	2-0-0	0.0
				Total	22.5

*UHV Course is considered from 2021 batch with 3 credits.

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Mechanical Engineering

Semester – 3 (Theory – 5, Lab – 3, SC – 1, MC – 2)

S. No	Course No	Course Name	Category	L-T-P/D	Credits
1.	MA20ABS301	Complex Variables, Transforms & Application of Partial Differential Equations	BS	3-0-0	3
2.	ME20AES301	Mechanics of Materials	ES	3-0-0	3
3.	ME20APC301	Engineering Thermodynamics	PC	3-0-0	3
4.	ME20APC302	Manufacturing Processes	PC	3-0-0	3
5.	ME20APC303	Kinematics of Machinery	PC	3-0-0	3
6.	ME20AES302	Mechanics of Materials Lab	ES	0-0-3	1.5
7.	ME20APC304	Manufacturing Process Lab	PC	0-0-3	1.5
8.	ME20APC305	Mechanics of Machines Lab (Virtual Lab)	PC	0-0-3	1.5
9.	EG20ASC301	Skill Oriented Course Soft Skills	SC	1-0-2	2
10.	CH20AMC201	Mandatory Noncredit Course Environmental Science	MC	2-0-0	0
11.	EG20AMC301	Enhancing English Language Skills (Lateral Entry Students only)	MC	2-0-0	0
				Total	21.5
12.	*BA20AHS201	Universal Human Values (Lateral Entry Students only)	HS	3-0-0	3

*UHV Course is considered from 2021 batch with 3 credits.

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Mechanical Engineering

Semester – 4 (Theory – 5, Lab – 3, SC – 1, MC – 3, AC – 1)

S. No	Course No	Course Name	Category	L-T-P/D	Credits
1.	MA20ABS401	Numerical Methods, Probability and Statistics	BS	3-0-0	3
2.	ME20APC401	Dynamics of Machinery	PC	3-0-0	3
3.	ME20APC402	Machine Tools & Measurements	PC	3-0-0	3
4.	ME20APC403	Thermal Engineering – I	PC	3-0-0	3
5.	BA20AHS301 BA20AHS302 BA20AHS303	Humanities Elective – I Managerial Economics and Financial Analysis Business Environment Organizational Behavior	HS	3-0-0	3
6.	ME20APC404	Computer Aided Machine Drawing	PC	0-0-3	1.5
7.	ME20APC405	Thermal Engineering Lab	PC	0-0-3	1.5
8.	ME20APC406	Machine Tools & Measurements Lab	PC	0-0-3	1.5
9.	CS20ASC301	Skill Oriented Course Real-Time Application of Data Structures	SC	1-0-2	2
10.	ME20AMC401	Mandatory Noncredit Course Design Thinking for Innovation	MC	2-1-0	0
11.	SH20AAC401	Extra Academic Activities (NSS/Yoga/Cultural/Games and Sports/Societal Relationship)	AC	0-0-2	0
12.	MA20AMC401	Engineering Mathematics (Lateral Entry Students Only)	MC	2-0-0	0
13.	MA20AMC301	Logical Skills for Professional – II	MC	2-0-0	0
				Total	21.5
14.	Industry / Research Internship (Mandatory) for 4 Weeks During Summer Vacation		-	-	0
15.	Honors/Minor Courses (The Hours Distribution can be 3-0-2 or 3-1-0 also)		-	4-0-0	4

SRI VENKATESWARA COLLEGE OF ENGINEERING

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Karakambadi Road, TIRUPATI – 517507

Mechanical Engineering

Semester – 5 (Theory – 5, Lab – 2, SC – 1, MC – 2)

S. No	Course No	Course Name	Category	L-T-P/D	Credits
1.	ME20APC501	CAD/CAM	PC	3-0-0	3
2.	ME20APC502	Design of Machine Members	PC	3-0-0	3
3.	ME20APC503	Fluid Mechanics & Hydraulic Machines	PC	3-0-0	3
4.	EC20AOE502 CE20AOE502 EE20AOE503 AM20AOE501	Open Elective – I Digital Electronics Principles of Waste Management Renewable Energy Resources Introduction to Operating Systems	OE	3-0-0	3
5.	ME20APE501 ME20APE502 ME20APE503 ME20APE504	Professional Elective – I Automation & Robotics Industrial Engineering Metal Forming Process Product Design and Development	PE	3-0-0	3
6.	ME20APC504	CAD/CAM Lab	PC	0-0-3	1.5
7.	ME20APC505	Fluid Mechanics & Hydraulic Machines Lab	PC	0-0-3	1.5
8.	ME20ASC501	Skill Oriented Course Additive Manufacturing (Virtual Lab)	SC	1-0-2	2
9.	CH20AMC301	Mandatory Noncredit Course Biology for Engineers	MC	2-0-0	0
10.	IT20AMC501	Problem Solving and Programming (Lateral Entry Students Only)	MC	2-0-0	0
11.	ME20ATS501	Technical Seminar Presentation – I	TS	0-0-0	0.5
12.	ME20AIP501	Evaluation of Summer Internship (4 Weeks)	IP	0-0-0	1.5
				Total	22
13.	Honors/Minor Course (The Hours Distribution can be 3-0-2 or 3-1-0 also)			4-0-0	4
14.	MOOC/NPTEL Course				2

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Mechanical Engineering

Semester – 6 (Theory – 5, Lab – 3, SC – 1, MC – 3)

S. No	Course No	Course Name	Category	L-T-P/D	Credits
1.	ME20APC601	Finite Element Methods	PC	3-0-0	3
2.	ME20APC602	Heat Transfer	PC	3-0-0	3
3.	ME20APC603	Thermal Engineering – II	PC	3-0-0	3
4.	ME20APE601 ME20APE602 ME20APE603 ME20APE604	Professional Elective – II Composite Materials Design of Transmission Elements Product Life-Cycle Management Supply Chain Management	PE	3-0-0	3
5.	CS20AOE501 CE20AOE601 EE20AOE602 EC20AOE602	Open Elective – II Computer Applications using programming Tools Disaster Management Energy Auditing & Conservation Signal Processing	OE	3-0-0	3
6.	ME20APC604	Computer Aided Engineering Lab	PC	0-0-3	1.5
7.	ME20APC605	Heat Transfer Lab	PC	0-0-3	1.5
8.	ME20APC606	Instrumentation & Composite Materials	PC	0-0-3	1.5
9.	IT20ASC301	Skill Oriented Course Application Development using Python	SC	1-0-2	2
10.	ME20ATS601	Technical Seminar Presentation – II	TS	0-0-0	0.5
11.	BA20AMC501	Mandatory Course Constitution of India	MC	2-0-0	0
12.	BA20AMC502	Mandatory Noncredit Course Intellectual Property Rights and Patents	MC	2-0-0	0
13.	AM20AMC601	AI Tools Techniques and Applications (Lateral Entry Students only)	MC	2-0-0	0
14.		Industrial/Research Mini Project (Mandatory) 4 weeks during summer vacation.			0
				Total	22
15.	Honors/Minor Course (The Hours Distribution can be 3-0-2 or 3-1-0 also)			4-0-0	4
16.	MOOC/NPTEL Course				2

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Mechanical Engineering

Semester – 7 (Theory – 6, SC – 1)

S. No	Course No	Course Name	Category	L-T-P/D	Credits
1.	 ME20APE701 ME20APE702 ME20APE703 ME20APE704	Professional Elective – III Automobile Engineering Power Plant Engineering Refrigeration & Air Conditioning Solar and Wind Energy Systems	PE	3-0-0	3
2.	 ME20APE705 ME20APE706 ME20APE707 ME20APE708	Professional Elective – IV Design for Manufacturing Design of Oil Hydraulics and Pneumatics Mechanical Behavior of Materials Mechanical Vibrations	PE	3-0-0	3
3.	 ME20APE709 ME20APE710 ME20APE711 ME20APE712	Professional Elective – V Additive Manufacturing Modern Manufacturing Methods Product Marketing Total Quality Management	PE	3-0-0	3
4.	 CE20AOE701 EE20AOE702 EC20AOE702 AM20AOE502	Open Elective – III Air Pollution and Quality Control Energy Storage Systems Principles of Communication Engineering Web Technologies	OE	3-0-0	3
5.	 AM20AOE601 CE20AOE704 EC20AOE705 EE20AOE705	Open Elective – IV Machine Learning Tools & Techniques Environmental Impact Analysis & Management Introduction to Image Processing Utilization of Energy in Electrical Utilities	OE	3-0-0	3
6.	 BA20AHS701 BA20AHS705 BA20AHS706	Humanities Elective – II Business Ethics & Corporate Governance Management Science Strategic Management	HS	3-0-0	3
7.	ME20ASC701	Skill Oriented Course Mechanism and Robotics (Virtual Lab)	SC	1-0-2	2
8.	ME20AIP701	Evaluation of Industrial / Research Mini Project (Mandatory) 04 Weeks during summer vacation.	IP	0-0-0	3
9.	ME20ATS701	Technical Seminar Presentation – III	TS	0-0-0	0.5
10.	ME20APW701	Project Work Stage – I	PW	0-0-0	2
				Total	25.5
11.	Honors/Minor Course (The Hours Distribution can be 3-0-2 or 3-1-0 also)			4-0-0	4

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Karakambadi Road, TIRUPATI – 517507

Mechanical Engineering

Semester – 8

S. No	Course No	Course Name	Category	L-T-P/D	Credits
1.	ME20APW801	Project Work Stage – II / Full Internship in Industry	PW	0-0-0	8.5
				Total	8.5

SRI VENKATESWARA COLLEGE OF ENGINEERING

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Karakambadi Road, TIRUPATI – 517507

Mechanical Engineering

HONORS COURSE

S. No.	Course Code	Course Name	L-T-P	CR
1.	ME20AHO401	Principles of Robotics	4-0-0	4
2.	ME20AHO501	CNC Programming	4-0-0	4
3.	ME20AHO601	Flexible Manufacturing Systems	4-0-0	4
4.	ME20AHO701	Design of Heat Exchangers	4-0-0	4
5.	ME20AHO502	MOOC/NPTEL Course		2
6.	ME20AHO602	MOOC/NPTEL Course		2
			Total:	20

Note 1. The subjects opted for Honors should be Advanced type which is not covered in regular curriculum
2. Students have to acquire 16 credits.
3. Concerned BoS can add or delete the subjects as per the decision of the board.
4. Pre requisites to be defined by the board for each course.
5. Compulsory MOOC/NPTEL Courses for 04 credits (02 courses@ 2 credits each)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

Karakambadi Road, TIRUPATI – 517507

Mechanical Engineering

MINOR DEGREE IN ROBOTICS

Note

1. A Student can Complete Four Subjects and 3 Credits per Subject
2. Concerned BoS can Add or Delete the Subjects as per the Decision of the Board.
3. Pre-Requisites to be Defined by the Board for Each Course.
4. Compulsory MOOC/NPTEL Courses for 04 credits (02 courses@ 2 credits each).

DEPARTMENT OF MECHANICAL ENGINEERING

S. No.	Course Code	Course Name	L-T-P	CR
1.	ME20AES301	Mechanics of Materials	3-0-0	3
2.	ME20APC402	Machine Tools & Measurements	3-0-0	3
3.	ME20APC503	Fluid Mechanics & Hydraulic Machines	3-0-0	3
4.	ME20APE601	Composite Materials	3-0-0	3
5.	ME20AMD501	MOOC/NPTEL Course		2
6.	ME20AMD601	MOOC/NPTEL Course		2
7.	ME20AMD701	Minor Discipline Project		4
			Total:	20

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech-I Sem

L	T	P	C
3	0	0	3

(MA20ABS101) LINEAR ALGEBRA AND 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)

Textbooks:

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. RajnishVerma, 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/II Sem

L	T	P	C
3	0	0	3

(CH20ABS101) ENGINEERING CHEMISTRY

(Civil & Mechanical)

Course Objectives:

- To familiarize engineering chemistry and its applications
- To impart the concept of soft and hard waters, softening methods of hard water
- To train the students on the principles and applications of electrochemistry, polymers, surface chemistry, and cement

UNIT – 1:

Water Quality and Treatment

Introduction – Soft Water and hard water, estimation of hardness of water by EDTA Method, Analysis of water- Estimation of dissolved oxygen by Winkler's method, Domestic treatment of water, Specifications for drinking water, Bureau of Indian Standards (BIS) and World health organization (WHO) standards, ,Boiler troubles – Priming, foaming, scale and sludge, Caustic embrittlement, Industrial water treatment - zeolite process, ion-exchange processes - desalination of brackish water, reverse osmosis (RO) and electro dialysis.

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 electro dialysis. (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:

Electrochemistry and Applications:

Introduction to electrochemistry: Electrodes concepts, electrochemical cell, Nernst equation, cell potential calculations. 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.

Corrosion: Introduction to corrosion, types of corrosion and mechanism, differential aeration cell corrosion, galvanic corrosion, metal oxide formation by dry and electro chemical corrosion, Pilling Bedworth ratios and uses, Factors affecting the corrosion, cathodic protection, electroplating and electro less plating (Nickel).

Learning Outcomes:

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

- Apply Nernst equation for calculating electrode and cell potentials. (L3)
- Apply Pilling Bedworth rule for corrosion and corrosion prevention. (L3)
- Demonstrate the corrosion prevention methods and factors affecting corrosion. (L2)
- Compare different batteries and their applications. (L2)

UNIT – 3:

Polymers and Fuel Chemistry:

Introduction to polymers, degree of polymerization, functionality of monomers, classification of polymerization, Mechanism of chain growth, step growth polymerization. Thermoplastics and Thermo-setting plastics: Preparation, properties and applications of poly styrene. PVC and Bakelite, Elastomers – Preparation, properties and applications of Buna S, Buna N, Thiokol

Fuels– Types of fuels; Analysis of coal, Liquid Fuels -refining of petroleum, fuels for IC engines, knocking and anti-knock agents, Octane and Cetane values, cracking of oils, calorific value, numerical problems based on calorific value, determination of calorific value of gaseous fuels by Junkers gas calorimeter, alternative fuels- methanol and ethanol, bio-fuels,

Learning Outcomes:

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

- Explain different types of polymers and their applications. (L2)

- Solve the numerical problems based on Calorific value. (L3)
- Select suitable fuels for IC engines. (L3)
- Explain calorific values, octane number, refining of petroleum and cracking of oils. (L2)

UNIT – 4:

Advanced Engineering Materials

Composites- Definition, Constituents and Engineering applications

Refractories- Classification, Properties, Factors affecting the refractory materials and Applications. Lubricants- Classification, Functions of lubricants, Mechanism, Properties of lubricating oils – Viscosity, Viscosity Index, Flash point, Fire point, Cloud point, saponification and Applications.

Building materials- Cement- types of cements, Portland cement, constituents, manufacturing of cement, Setting and Hardening of cement.

Learning Outcomes:

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

- Explain the constituents of Composites and its applications. (L2)
- Identify the factors affecting the refractory material. (L3)
- Illustrate the functions and properties of lubricants. (L2)
- Demonstrate the manufacturing of Portland cement. (L2)
- Identify the constituents of Portland cement. (L3)
- Enumerate the reactions of setting and hardening of the cement. (L3)

UNIT – 5:

Surface Chemistry and Applications:

Introduction to surface chemistry, absorption and adsorption, colloids, micelle formation, synthesis of colloids (any two methods with examples), chemical and electrochemical methods (not more than two methods) of preparation of nanometals and metal oxides, stabilization of colloids and nanomaterials by stabilizing agents, solid- gas interface, solid-liquid interface, adsorption isotherm, applications of colloids and nanomaterials – catalysis, medicine, sensors.

Learning Outcomes:

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

- Summarize the concepts of colloids, micelle and nanomaterials. (L2)

- Explain the synthesis of colloids with examples. (L2)
- Outline the preparation of nanomaterials and metal oxides. (L2)
- Identify the application of colloids and nanomaterials in medicine, sensors and catalysis. (L2)

Textbooks:

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. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.
3. H.F.W. Taylor, Cement Chemistry, 2/e, Thomas Telford Publications, 1997.
4. D.J. Shaw, Introduction to Colloids and Surface Chemistry, Butterworth-Heineman,1992.

Course Outcomes:

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

- Demonstrate the corrosion prevention methods and factors affecting corrosion. (L2)
- Explain the preparation, properties, and applications of thermoplastics & thermosetting, elastomers. (L2)
- Explain calorific values, octane number, refining of petroleum and cracking of oils. (L2)
- Explain the setting and hardening of the cement. (L2)
- Summarize the concepts of colloids, micelle and nanomaterials. (L2)

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, 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).

Textbooks:

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, Ellot 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 Kirchoff 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)

Textbooks:

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.

Reference Books:

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)
- dentify 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)

Textbooks:

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, PearsonEducation, 2007.

Reference Books:

1. Ramakanth A. Gayakwad, Op-Amps & Linear ICs, 4thEdition, Pearson, 2017.
2. R. P. Jain, Modern Digital Electronics, 3rd Edition, Tata McGraw Hill, 2003.

Course Outcomes:

- Explain the theory, construction, and operation of electronic devices. (L2)
- 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)
- Analyze small signal amplifier circuits to find the amplifier parameters(L5)
- Design small signal amplifiers using proper biasing circuits to fix up proper Q point. (L5)
- Distinguish features of different active devices including Microprocessors. (L3)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

	L	T	P	C
B.Tech I/II Sem	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

- Identify tools, work material, measuring instruments useful for domestic applications (L3).
- Apply wood working skills in real world applications. (L3)
- Build different parts with metal sheets in real world applications. (L3)
- Apply fitting operations in various applications for good strength. (L3)
- Analyze different types of basic electric circuit connections. (L4)
- Demonstrate soldering and brazing in joining circuits. (L2)
- Make moulds for sand casting using standard equipment. (L3)
- Develop different weld joints for various metals. (L3)
- Inspect various parts of machine components. (L4)
- Make plastic components using proper raw material. (L3)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

	L	T	P	C
B.Tech I/II Sem	0	0	3	1.5

(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, crimpling 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.

Reference Books:

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

(CH20ABS102) ENGINEERING CHEMISTRY LAB
(Civil & Mechanical)

Course Objectives:

To verify the fundamental concepts with experiments

Note: In the following list, out of 13 experiments, any 10 experiments must be performed in a semester

List of Engineering Chemistry Experiments:

1. Determination of Hardness of a groundwater sample.
2. Estimation of copper by EDTA method.
3. Determination of dissolved oxygen by Winkler's method.
4. pH metric titration of (i) strong acid vs. strong base, (ii) weak acid vs. strong base.
5. Potentiometry - determination of redox potentials and emfs.
6. Determination of Strength of an acid in Pb-Acid battery.
7. Preparation of Bakelite.
8. Determination of percentage of Iron in Cement sample by colorimetry.
9. Preparation of nanomaterials by precipitation.
10. Adsorption of acetic acid by charcoal.
11. Determination of Viscosity of lubricating oil by Redwood Viscometer 1&2.
12. Determination of Calorific value of gases by Junker's gas Calorimeter.
13. Determination of moisture present in the given coal sample.

Reference Books:

1. Chemistry Practical– Lab Manual, First edition, Chandra Sekhar KB, Subba Reddy GV and Jayaveera KN, SM Enterprises, Hyderabad, 2014.
2. Chemistry Laboratory Manual, Sri Krishna Hitech Publishing Company Pvt.Ltd,2nd Edition, A Ravi Krishanan, B Tirumalarao, 2020-2021.
3. Vogel's Text book of Quantitative Chemical Analysis, Sixth Edition – Mendham J et al, Pearson Education, 2012.

Course Outcomes:

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

- Determine the moisture content in the coal sample. (L3)
- Prepare advanced polymer materials. (L2)
- Determine the physical properties like adsorption and viscosity. (L3)
- Estimate Iron in cement. (L3)
- Calculate the hardness of water and dissolved oxygen. (L4)

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, Ellot 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

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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
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B.Tech I/II 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:

- https://www.bbc.co.uk/skillswise/english
- https://www.nonstopenglish.com
- 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)

I Year II Semester

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)

Textbooks:

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. RajnishVerma, 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 I/II Sem

L	T	P	C
3	0	0	3

(PH20ABS101) ENGINEERING PHYSICS

(Civil & Mechanical)

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 fibres along with engineering applications
- To open new avenues of knowledge in dielectric and magnetic materials which find potential in the emerging micro device applications.
- To familiarize the concepts of theoretical acoustics to practical use in engineering field. To explain the significance of ultrasound and its application in NDT for diversified engineering application.
- To enlighten the periodic arrangement of atoms in crystals, Bragg's law and to provide fundamentals related to structural analysis through powder diffraction method.

UNIT – 1:

Wave Optics

Interference- Principle of superposition – Interference of light – Interference of light by wavefront and amplitude splitting – 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:

Engineering Materials

Dielectric Materials - Introduction – Dielectric polarization – Dielectric polarizability, Susceptibility and Dielectric constant – Types of polarizations:

Electronic, Ionic and Orientation polarization (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 Claussius- 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:

Acoustics and Ultrasonics

Acoustics- Introduction – Requirements of acoustically good auditorium – Reverberation – Reverberation time – Sabine's formula (Derivation using growth and decay method) – Absorption coefficient and its determination – Factors affecting acoustics of buildings and their remedies.

Ultrasonics- Introduction – Properties – Generation by magnetostriction and piezoelectric methods – Detection – Acoustic grating – Non-Destructive Testing – Applications.

Learning Outcomes:

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

- Explain how sound is propagated in buildings (L2)
- Analyze acoustic properties of typically used materials in buildings (L4)
- Identify sound level disruptors and their use in architectural acoustics (L3)
- Identify the use of ultrasonics in different fields (L3)

UNIT – 5:

Crystallography and X-ray diffraction

Crystallography- Space lattice, Basis, unit cell and lattice parameters – Crystal systems –Bravais Lattices – Crystal systems – Packing fraction – Coordination number – Packing fraction of SC, BCC & FCC – Nacl structure – Miller indices – Separation between successive (hkl) planes.

X-Ray Diffraction- Diffraction of X-rays by crystal planes - Bragg's law – Crystal structure determination by Laue and Powder methods.

Learning Outcomes:

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

- Classify various crystal systems (L2)
- Identify different planes in the crystal structure (L3)
- Analyze the crystalline structure by Bragg's X-ray diffractometer (L4)
- Apply powder method to measure the crystallinity of a solid (L4)

Textbooks:

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, Mc Graw 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)
- Explain the basic concepts of acoustics and ultrasonic's. (L2)
- Apply the important properties of crystals like the presence of long-range order, periodicity and structure determination using X-ray diffraction technique. (L3).

SRI VENKATESWARA COLLEGE OF ENGINEERING
(Autonomous)

B.Tech I/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 processe 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

Textbooks:

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

(Autonomous)

B.Tech II Sem	L	T	P	C
	3	0	0	3

(ME20AES201) MATERIAL SCIENCE & ENGINEERING

Course Objectives:

- Understand the principles of physical metallurgy, i.e., crystallography of metals, constitution of alloys, phase diagrams.
- Expose commercially important metals and alloys (both ferrous and nonferrous) with engineering constraints.
- Explain the methods to change the properties of materials through heat treatment processes
- Familiarize properties and applications of ceramics, polymers and composite materials.
- Demonstrate the fundamental properties of nano-materials and their applications.

UNIT – 1:

Structure of Metals: Crystal Structures: Unit cells, Metallic crystal structures, Imperfection in solids: Point, Line, interstitial and volume defects; dislocation strengthening mechanisms and slip systems, critically resolved shear stress.

Constitution of Alloys: Necessity of alloying, substitutional and interstitial solid solutions- Phase diagrams: Interpretation of binary phase diagrams and microstructure development; eutectic, peritectic, peritectoid and monotectic reactions. Iron-Iron-carbide (Fe-Fe_3C) diagram and microstructural aspects of ferrite, cementite, austenite, ledeburite, and cast iron.

Learning Outcomes:

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

- Understand the importance of material science in engineering. (L2)
- Re-call the definitions and terminology of crystallography. (L1)
- Distinguish metals and alloys. (L4)
- Make use of the principles of construction of binary phase diagrams. (L3)
- Identify various invariant reactions in binary phase diagrams. (L3)

- Know the concept of metallography in studying the microstructures of metals and alloys. (L2)

UNIT – 2:

Steels: Plain carbon steels, use and limitations of plain carbon steels. AISI & BIS classification of steels. Classification of alloy steels. Microstructure, properties and applications of alloy steels: stainless steels and tool steels.

Cast irons: Microstructure, properties and applications of white cast iron, malleable cast iron, grey cast iron, nodular cast iron and alloy cast irons.

Learning Outcomes:

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

- Classify various types of steels, their properties and applications. (L2)
- Identify various types of cast irons, their properties and applications. (L3)
- Compare steels and cast irons and their limitations in applications. (L3)

UNIT – 3:

Heat Treatment of Steels: Annealing, tempering, normalizing and hardening, isothermal transformation diagrams for Fe-Fe_3C alloys and microstructure development. Continuous cooling curves and interpretation of final microstructures and properties- austempering, martempering, case hardening - carburizing, nitriding, cyaniding, carbo-nitriding, flame and induction hardening, and vacuum and plasma hardening, Jominy end quench testing.

Learning Outcomes:

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

- Understand the importance of iron - iron carbide phase diagram. (L2)
- Know the influence of heat treatment in modification of properties of steels. (L2)
- Develop a heat treatment cycle based on required properties. (L3)
- Comprehend the principles of surface hardening methods. (L2)

UNIT – 4:

Non-Ferrous Metals and Alloys: Microstructure, properties and applications of copper, aluminium, titanium, nickel and their alloys. Study of Al-Cu phase diagram.

Learning Outcomes:

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

- Understand the importance of non-ferrous metals and alloys in engineering applications. (L2)
- Demonstrate various properties and applications of non-ferrous alloys. (L4)
- Differentiate between ferrous and non-ferrous alloys. (L4)

UNIT – 5:

Ceramics, Polymers and Composites: Structure, properties and applications of ceramics, polymers and composites. Introduction to super alloys and nano materials.

Mechanical Testing: Hardness and hardness measurement, elastic properties, Tensile properties, Impact properties and ductile to brittle transition temperature (DBTT), Fatigue, Creep.

Learning Outcomes:

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

- Understand the properties of ceramics and their applications. (L2)
- Summarize the properties of polymers and composites and their use. (L2)
- Interpret the properties of nano-materials and their applications. (L2)
- Identify the difference between the micro and nano scale materials and their uses. (L3)
- Interpret the mechanical properties of different materials(L4)

Textbooks:

1. V.Raghavan, Material Science and Engineering, 5/e, Prentice Hall of India, 2004.
2. Balasubramaniam, Callister's Material Science and Engineering, 2/e, Wiley India, 2014.
3. S.H. Avner, Introduction to Physical Metallurgy, 2/e, Tata McGraw- Hill, 2017.

Reference Books:

1. Y. Lakhtin, Engineering Physical Metallurgy, University Press of the Pacific, 2005.
2. L.H. Van Vlack, Elements of Material Science and Engineering, 6/e, Pearson Education, 2008.

3. George E. Dieter, Mechanical Metallurgy, 3/e, McGraw-Hill, 2013.

Course Outcomes:

After completing the course, the student will be able to

- Explain the principles of binary phases. (L2)
- Select steels and cast irons for a given application. (L3)
- Apply heat treatment to different applications. (L3)
- Explain the Application of non-ferrous metals and alloys in engineering. (L2)
- Explain the properties of composites, super alloys and nano-scale materials with their applications. (L2)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech I/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) Involutes.

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)

Textbooks:

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

(Autonomous)

B.Tech I/II 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

(Autonomous)

B.Tech I/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, 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:

- Develop to handle and excel in a variety of self-instructional, learner-friendly modes of language learning. (L6)
- Develop to employ better stress and intonation patterns and utter English sounds correctly. (L6)
- Develop to avoid the impact of mother tongue in English and neutralize their accent. (L6)
- Develop to participate with skill and confidence in Group Discussions, Interviews and Public Speaking. (L6)
- Utilize the technical skills to prepare resume, report-writing, and format-making etc. (L3)

B.Tech I/II Sem

L	T	P	C
0	0	3	1.5

(PH20ABS102) ENGINEERING PHYSICS LAB
(Civil & Mechanical)

Course Objectives:

- Understand the role of Optical fiber parameters in engineering applications.
- Recognize the significance of laser by studying its characteristics and its application in finding the particle size.
- Illustrates the magnetic and dielectric materials applications.
- Identifies the various sensor applications.

Note: In the following list, out of 12 experiments, any 10 experiments must be performed in a semester

List of Engineering 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 and hence to find 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. Rigidity modulus of material of a wire-dynamic method (Torsional pendulum).
11. Sonometer: Verification of the three laws of stretched strings.
12. Determination of spring constant of springs using Coupled Oscillator.

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:

After completing the course, the student will be able to

- Utilize various optical instruments. (L3)
- Estimate wavelength of laser and particles size using laser. (L5)
- Evaluate the acceptance angle of an optical fiber and numerical aperture. (L5)
- Estimate the susceptibility and related magnetic parameters of magnetic materials. (L5)
- Organize the intensity of the magnetic field of circular coil carrying current with distance. (L3)
- Determine magnetic susceptibility of the material and its losses by B-H curve. (L5)
- Apply the concepts of ultrasonics by acoustic grating. (L3)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech II Sem

L	T	P	C
0	0	3	1.5

(ME20AES202) MATERIAL SCIENCE & ENGINEERING LAB

Course Objectives:

- To understand the microstructure and hardness of engineering materials.
- To explain grain boundaries and grain sizes of different engineering materials.

List of Experiments:

1. Metallography sample preparation.
2. Microstructure of pure metals – Iron, copper and aluminum as per ASTM standards
3. Microstructure of low carbon steel, mild steel and high carbon microstructure of cast irons.
4. Microstructure of non-ferrous alloys – aluminum, copper, titanium, nickel and their alloys.
5. Hardenability of steels by Jominy end quench Test.
6. Microstructure of heat-treated steels.
7. Hardness of various untreated and treated steels.
8. Microstructure of ceramics, polymeric materials.
9. Microstructure of super alloy and nano-materials.
10. Hardness of ceramics, super alloys, nano-materials and polymeric materials (one sample on each).

Course Outcomes:

The student can able to

- Differentiate various microstructures of ferrous and non-ferrous metals and alloys. (L4)
- Identify grains and grain boundaries. (L1)
- Explain Importance of hardening of steels. (L4)
- Evaluate hardness of treated and untreated steels. (L4)
- Differentiate hardness of super alloys, ceramics and polymeric materials. (L4)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech – II Sem

L	T	P	C
2	0	0	0

(BA20AMC201) UNIVERSAL HUMAN VALUES
(Mandatory Noncredit 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 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.

E.g., To discuss the conduct as an engineer or scientist etc.

Textbooks:

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 kantak, 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”
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6. Slow is Beautiful –Cecile Andrews.
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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

L	T	P	C
3	0	0	3

(BA20AHS201) UNIVERSAL HUMAN VALUES

Course Objectives:

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- Understanding Happiness and Prosperity correctly-A critical appraisal of the current scenario.
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- 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.

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Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education

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

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- 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.
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- Case studies of typical holistic technologies, management models and production systems
- Strategy for transition from the present state to Universal Human Order:
    - c. At the level of individual: as socially and ecologically responsible engineers, technologists and managers.
    - d. 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.

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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. FSchumacher. “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”.
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Course Outcomes:

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- Understanding the value of education to become more aware of themselves, and their surroundings (family, society, nature). (L2)
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- 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 I / II Sem	L	T	P	C
	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 4^{th}, 3^{rd} 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 post

Analogy:

- Alphabet analogy
- Number analogy

Textbooks:

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)

II Year I Semester

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(MA20ABS301) COMPLEX VARIABLES, TRANSFORMS & APPLICATION OF PARTIAL DIFFERENTIAL EQUATIONS

(Common to MECH & CIVIL)

Course Objectives: This Course Aims at Providing the Student

- To Acquire the Knowledge on the Calculus of Functions of Complex Variables. (L1)
- To Acquire the Knowledge on Laplace Transforms and its Applications in Solving Ordinary Differential Equations. (L1)
- To Extend the Given Function in Fourier Series in a Given Interval. (L2)
- Evaluate Improper Integrals of Complex Functions using Residue Theorem. (L5)
- To Analyze the Solutions of Partial Differential Equations. (L4)

UNIT – 1:

Functions of Complex Variables – Differentiation:

Introduction to Functions of Complex Variable-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 – 2:

Functions of Complex Variables – Integration:

Line Integral-Contour Integration, Cauchy's Integral Theorem, Cauchy Integral Formula, Generalized Cauchy Integral Formula (All Theorems without Proof).

Power series expansions: Taylor's Series and Laurent's Series (without proof); Zeros and Singularities of Analytic Functions.

Residues: Evaluation of Residue by Formula and by Laurent's Series, Cauchy Residue Theorem (without Proof), Evaluation of Definite Integral Involving Sine and Cosine Terms.

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 Evaluate Complex Integrals (L3)
- Understand Singularities of Complex Functions. (L2)
- Evaluate Improper Integrals of Complex Functions using RESIDUE Theorem. (L5)

UNIT – 3:

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 Finds 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 – 4:

Fourier Series:

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

- Understanding the Fourier Series Expression of the Given Function. (L2)
- Determine Fourier Coefficients (Euler's) and Identify Existence of Fourier Series of the Given Function. (L3)
- Determine the Fourier Series of Given Function in Half Range Interval.(L5)

UNIT – 5:

Partial Differential Equations & Applications:

Solution of PDE by Method of Separation of Variables –Solutions of One-Dimensional Wave Equation, One Dimensional Heat Equation and Laplace Equation in Two Dimensions under Initial and Boundary Conditions.

Learning Outcomes:

At the end of this Unit, the Student will be able to

- Understand the Method of Separation of Variables. (L2)
- Solve Applications of Partial Differential Equations by using Fourier Series. (L3)

Textbooks:

1. B. S. Grewal, "Higher Engineering Mathematics", Khanna publishers, 44th Edition.
2. 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.

Course Outcomes:

At the end of this Course the Student will be able to

- Apply Cauchy-Riemann Equations to find the Analyticity of Complex Functions. (L3)
- Apply Cauchy's Integral Formula and Cauchy's Integral Theorem to Evaluate

Improper Integrals along Contours. (L3)

- Analyze the Concepts of Laplace Transforms to Solve Ordinary Differential Equations. (L4)
- Examine the Fourier Series for Different Functions in Half and Full Range. (L4)
- Solve One-Dimensional Wave Equation Heat Equation and Laplace Equations by Applying Fourier Series. (L3)

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(ME20AES301) MECHANICS OF MATERIALS

Prerequisites: Engineering Physics, Basic Mathematics

Course Objectives:

- To Impart Concepts of Basic Mechanics Principles and its Uses in Day Today Life Situations.
- Introduce the Concepts of Different Stresses, Strains and Their Relationships.
- Discuss the Principal Stresses and the Stress Components on Different Planes Under Different Loads.
- To Calculate Centroid and Moment of Inertia of Solids and Surfaces.
- Explain Maximum Shear Force and Bending Moment of Different Beams under Different Loading Conditions.
- Demonstrate Bending Stress and Shear Stress Distribution of Various Cross Section of Beams and to Predict the Maximum Slope Deflection of Beams.
- Impart Strain Energy due to Axial, Bending, and Torsion Loading.
- Familiarize the Euler's Concept of Buckling in Columns & Struts.

UNIT – 1:

Introduction to Engineering Mechanics:

Composition and Resolution of Forces, Parallelogram Law, Principle of Transmissibility, Types of Force Systems - Concurrent and Concurrent Coplanar Forces, Resultant of Coplanar Force Systems Couple, Moment of a Force Varignon's Theorem, Concept of Free Body Diagrams, Concept of Equilibrium of Coplanar Force Systems.

Learning Outcomes:

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

- Resolve the Forces in Mechanical Systems. (L2)
- Identify the Moments and Forces. (L3)
- Develop Free Body Diagram. (L3)

UNIT – 2:

Stresses and Strains:

Types of Stresses and Strains, Stress-Strain Relations, Stress-Strain Diagram for Ductile and Other Materials, Axial Loaded Bars of Uniform and Varying Cross Section, Compound Bars, Relation Between Three Elastic Moduli, Thermal Stresses.

Principal Stresses and Strains:

Biaxial State of Stress with and without Shear - Mohr's Circle and Analytical Methods.

Learning Outcomes:

After Completing this Unit, the student will be able to

- Determine Stresses and Deformations due to Axial Loads in Simple Members. (L3)
- Analyse Stresses Compound bars due to Temperature Raise. (L4)
- Correlate the Elastic Constants of Materials. (L3)
- Construct the Mohr's Circle for Calculating Principal Stresses. (L3)
- Analyse Principal Stresses in Biaxial State of Loading. (L4)

UNIT – 3:

Centroid, Centre of Gravity and Moment of Inertia:

Centroid and Centre of Gravity-Simple areas, Theorems of Pappus and Guldinus, Parallel Axis and Perpendicular Axis Theorems. Moment of Inertia-Area Moment of Inertia for Simple Sections, Introduction to Mass Moment of Inertia.

Analysis of Beams: Types of Beams and Loads, Shear Force and Bending Moment Diagram for Cantilever and Simply Supported beams for Different Types of Loadings, Point of Contra Flexure, Relation Between Shearing Force and Bending Moment.

Bending Stresses: Flexural Equation, Bending Stress Distribution for I and T section of Beams. Shear Stresses: Shear Stress Distribution for I and T section of Beams.

Learning Outcomes:

After Completing this Unit, the student will be able to

- Identify the Centroid and Centre of Gravity for Simple Sections. (L3)
- Draw Shear Force and Bending Moment Diagrams of Beams Subject to Bending Loading. (L3)

- Determine Bending Stresses in Beams under Different Loading. (L4)
- Evaluate the Maximum Shear Force and Bending Moment and their Location in Beams. (L4)
- Demonstrate the Shear Stress and Bending Moment Distribution in I and T of Beams. (L4)

UNIT – 4:

Deflection of Beams: Differential Equations of the Deflection Curve, Slope, and Deflection: using Double Integration Method, and Macaulay's Method for Simply Supported, Cantilever.

Torsion of Circular Shafts: Theory of Pure Torsion, Transmission of Power in Solid and Hollow Circular Shafts, Comparison of Strengths of Solid and Hollow Shafts, Shafts in Series and Parallel, Combined Bending and Torsion.

Learning Outcomes:

After Completing this Unit, the student will be able to

- Compute the slope and deflection in beam under different loading. (L3)
- Distinguish various approaches for calculating slope and deflection. (L4)
- Analyse circular shafts subjected to twisting couple. (L4)
- Determine stresses in shafts subjected to combined loads. (L4)
- Determine angle of twist in shafts. (L4)

UNIT – 5:

Buckling of Columns: Analysis of Columns to Evaluate Buckling Loads with Different Boundary Conditions, Euler's Formula and its Limitations, Rankine's Formula, Columns under Eccentric Load, Columns under Initial Curvature.

Thin Cylinders: Hoop Stresses, Longitudinal, Cylindrical and Spherical Shells Subjected to Internal Pressure, Calculation of Volumetric Strain.

Learning Outcomes:

After Completing this Unit, the student will be able to

- Determine buckling load in compressive members. (L4)
- Apply concepts of elastic stability of columns. (L3)
- Assess hoop and longitudinal stresses in thin cylinders. (L3)
- Calculate volumetric strain. (L3)

Textbooks:

1. F.P. Beer, E.R. Johnston, Jr& John.T. DeWolf, “Mechanics of Materials”, 7th Edition, Tata McGraw-Hill, 2016.
2. SS Rattan, Strength of Materials, 3rd Edition, Tata McGraw-Hill, 2016.

Reference Books:

1. Engineering Mechanics, R. S. Khurmi, S. Chand Publishing.
2. A Textbook of Engineering Mechanics, R.K. Bansal, Laxmi Publications
3. Timoshenko, “Strength of Materials Part-I& II”, 3rd edition, CBS Publishers, 2004.
4. Popov, “Mechanics of Solids”, 2nd Edition, New Pearson Education, 2015.
5. Basudeb Bhattacharya., Engineering Mechanics, 2/e, Oxford University Press (India), 2015.

Course Outcomes:

After Successful Completion of this Course, the student will be able to

- Classify the forces and stresses involved in plane and rigid bodies (L2)
- Analyze the equilibrium of forces in static particles and rigid bodies. (L4)
- Apply the concepts of stress and strain to machine and structural members. (L3)
- Determine centroid for simple sections and construct the shear force and bending moment diagrams for beams. (L4)
- Calculate slope and deflection in beams under different loading conditions and distinguish the strengths of solid and hollow shafts. (L4)
- Analyze columns for buckling loads and estimate stresses in thin cylinders due to internal pressure. (L4)

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(ME20APC301) ENGINEERING THERMODYNAMICS

Prerequisites: Engineering Physics, Engineering Mathematics

Course Objectives:

- To Familiarize the Concepts of Heat, Work, Energy and Governing Rules for Conversion of One Form to Other.
- To Impart the Knowledge on Fundamental Laws of Thermodynamics.
- To Know the Importance of Entropy, Concept of Availability, Irreversibility and Pure Substances.
- To Interpret about the Mollier Diagram usage and Properties of Pure Substances.
- To Acquire the Fundamental Concepts of Air Standard Cycles used in Steam Power Plants.

UNIT – 1:

Basic Concepts: Macroscopic and Microscopic Approaches, Thermodynamic System, State, Property, Process and Cycle, Thermodynamic Equilibrium, Quasi-static Process

Work & Heat Transfer: Work Transfer, Types of Work Transfers, Point and Path Functions, Heat Transfer, Comparison of Work and Heat transfers, Zeroth Law of Thermodynamics.

Learning Outcomes:

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

- Understand the Thermodynamic Systems, Properties and their Importance. (L2)
- Describe about the Fundamental Laws of Thermodynamics. (L2)
- Compute the Heat and Work Transfers with the Thermodynamic Systems. (L3)

UNIT – 2:

First Law of Thermodynamics: First Law applied to a Process and a Cycle, Energy - a Property, Forms and Transformation of Energy, Internal Energy and Enthalpy, Perpetual Motion Machine of First kind PMM I.

Second Law of Thermodynamics: Kelvin - Planck Statement and Clausius Statement and their Equivalence, Corollaries – Perpetual Motion Machines of Second kind PMM2 – Reversibility and Irreversibility, Cause of Irreversibility - Carnot Cycle, Heat Engine, Heat Pump and Refrigerator, Carnot Theorem, Carnot Efficiency.

Learning Outcomes:

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

- Understand the Energy Balance for Closed Systems and Open Systems. (L2)
- Apply Second Law of Thermodynamics in Design of Heat Engine, Refrigerator and Heat Pump. (L3)
- Describe the Efficiency of Thermodynamic Systems. (L2)
- Evaluate the Causes for Poor Performance of Thermodynamic Systems. (L3)

UNIT – 3:

Entropy: Clausius Inequality - Concept of Entropy- Entropy Equation for Different Processes and Systems

Availability and Irreversibility: Definition of Exergy and Anergy, Expressions for Availability and Irreversibility. Availability in Steady Flow, Non-Flow Processes and Irreversibility.

Learning Outcomes:

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

- Apply Entropy Concepts to Estimate the Performance of Systems. (L3)
- Determine the Entropy Changes in a Wide Range of Processes. (L3)
- Calculate the Availability and Irreversibility for a Flow and Non-Flow Process. (L3)

UNIT – 4:

Properties of Pure Substances: Pure Substances, P-V-T surfaces, T-S and H-S Diagram, Mollier Chart, Dryness Fraction, Property Tables, Analysis of Steam

Undergoing Various Thermodynamic Processes using Mollier Chart– Steam Calorimetry.

Thermodynamic Relations: Maxwell's Equations, TDS Equations, Joule-Kelvin Effect, Clausius-Clapeyron Equation.

Learning Outcomes:

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

- Describe about Pure Substances. (L2)
- Draw the PV and TS Diagrams and Usage of Steam Tables. (L3)
- Determine the Dryness Fraction for a Steam Undergoing Different Thermodynamic Processes. (L3)
- Identify the Importance of TDS Equations. (L2)
- Describe the Relation between Specific Heats, Internal Energy, Enthalpy and Joule-Thomson Coefficient in Standard Form. (L3)

UNIT – 5:

Air Standard Cycles: Otto Cycle, Diesel Cycle and Dual Cycle, P-V and T -S Diagrams - Description and Efficiencies, Mean Effective Pressures. Comparison of Otto, Diesel and Dual Cycles and their Applications.

Learning Outcomes:

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

- Describe the Concept of Ideal Cycles for Different Engines and their Working Principles. (L2)
- Draw P-V and T-S Diagrams for Various air Standard Cycles and Calculating Work Output, Efficiency, mean Effective Pressure of Each Cycle. (L6)
- Determine the Efficiency for Various Air Standard Cycles. (L3)

Textbooks:

1. Engineering Thermodynamics: P.K Nag, Sixth Edition,2017, TMH Publications.
2. Thermodynamics – An Engineering Approach – Younus Cengel & Boles, Nineth Edition 2019, TMH Publications.

Reference Books:

1. P. Chattopadhya, “Engineering Thermodynamics” Oxford,1st Revised ,2016.
2. Fundamentals of Thermodynamics: Sonntag, R. E., Borgnakke, C., & Wylen, Sixth Edition 2017, G. J. V publications.
3. Fundamentals of Engineering: Moran, M. J., Shapiro, H. N., Boettner, Eighth Edition 2014, D. D., & Bailey, Wiley publications.
4. Engineering Thermodynamics – J.B. Jones & R.E.Dugan, First Edition, 2009, PHI.
5. An Introduction to Thermodynamics, YVC Rao, Revised Edition, 2009, Universities Press.
6. Thermodynamics & Heat Engines, B. Yadav, Central Publishing House., Allahabad, 2002
7. Thermal Engineering – R.S. Khurmi & J.K. Gupta – S. Chand, 15th Edition,2015.

Course Outcomes

After Completing the Course, the student will be able to

- Describe the Concepts of Continuum, System, Control Volume, Thermodynamic Properties, Thermodynamic Equilibrium, Work and Heat. (L2)
- Evaluate the Laws of Thermodynamics System to Analyze Boilers, Heat Pumps, Refrigerator, Heat Engines, Compressors and Nozzles. (L3)
- Examine the Change in Entropy of the System, available Energy and Irreversibility. (L3)
- Evaluate the Performance of Pure Substance and Thermodynamic Relations. (L3)
- Analyze Air Standard Cycles Applied in Prime Movers. (L3)

NOTE: Steam Tables, Mollier Diagrams should be Supplied during Examinations.

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(ME20APC302) MANUFACTURING PROCESSES

Prerequisite Courses: Engineering Physics, Engineering Chemistry and Materials Science and Engineering.

Course Objectives:

- Working Principle of Different Metal Casting Processes and Gating System.
- Nature of Plastic Deformation, Cold and Hot Working Process, Working of a Rolling Mill and Types, Extrusion Processes.
- Principles of Forging, Tools and Dies, Working of Forging Processes.
- Classification of the Welding Processes, Working of Different Types of Welding Processes and Welding Defects
- Classification, Applications and Manufacturing Methods of Plastics, Ceramics and Powder Metallurgy.
- Learning Characteristics of Ceramics and Surface Treatment Processes.

UNIT – 1:

Casting Process: Importance and Selection of Manufacturing Processes. Casting Processes: Introduction to Casting Process, Process Steps; Pattern: Types, Materials and Allowance; Cores: Types of Cores, Core Prints, Principles and Design of Gating System; Solidification of Casting: Concept, Solidification of Pure Metal and Alloy;

Special casting processes: Shell Casting, Investment Casting, Die Casting, Centrifugal Casting, Casting Defects and Remedies.

Learning Outcomes:

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

- Selection of Suitable Manufacturing Process for a Given Product. (L3)
- Understand the Steps Involved in Metal Casting, Pattern Making. (L2)
- Apply the Knowledge of Designing Gating Systems, Risers. (L3)
- Compare the Working of Various Metal Casting Processes. (L4)
- Identify the Various Casting Defects. (L3)

UNIT – 2:

Metal Forming: Introduction, Nature of Plastic Deformation, Hot and Cold Working of Metals, Mechanics of Metal Forming;

Rolling: Principle, Types of Rolling Mill and Products, Roll Passes, Forces in Rolling and Power Requirements;

Extrusion: Basic Extrusion Process and its Characteristics, Hot Extrusion and Cold Extrusion, Wire Drawing, Tube Drawing.

Forging: Principles of Forging, Tools and Dies.

Forging Types: Smith Forging, drop Forging, Forging Hammers, Rotary Forging and Forging Defects.

Sheet Metal Forming: Mechanics of Sheet Metal Working, Blanking, Piercing, Bending, Stamping.

Learning Outcomes:

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

- Compare Cold Working and Hot Working Processes. (L4)
- Explain the Working of Rolling Mills. (L2)
- Evaluate the Forces and Power in Rolling and Extrusion Processes. (L5)
- Summarize the Working of Various Extrusion Processes. (L2)
- Identify the Principles of Forging, Tools and Dies. (L3)
- Summarize the Various Operations of Sheet Metal Forming. (L2)

UNIT – 3:

Metal Joining Processes: Classification of Welding Processes, Types of Welds and Welded Joints and V-I Characteristics, Arc Welding, Weld Bead Geometry, Submerged Arc Welding, Gas Tungsten Arc Welding, Gas Metal Arc Welding. Applications, Advantages and Disadvantages of the above Processes, Other Fabrication Processes. Heat Affected Zones in Welding; Soldering and Brazing: Types and their Applications, Welding Defects: Causes and Remedies.

Learning Outcomes:

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

- Classify the Working of Various Welding Processes. (L2)
- Compare V-I Characteristics of Different Welding Processes. (L4)
- Summarize the Applications, Advantages of Various Welding Processes.

(L2)

- Identify the Defects in Welding. (L3)

UNIT – 4:

Plastic Processing, Ceramics and Powder Metallurgy:

Plastics: Types, Properties and their Applications, Processing of Plastics, Extrusion of Plastics, Transfer Molding and Compression Molding, Injection Molding, Thermoforming, Rotational Molding and Blow Molding Ceramics: Classification of Ceramic Materials, Properties and their Application, Ceramic Powder Preparation; Processing of Ceramic Parts: Pressing, Casting, Sintering; Secondary Processing of Ceramics: Coatings, Finishing. Powder Metallurgy: Principle, Manufacture of Powders, Steps Involved.

Learning Outcomes:

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

- Learn the Methods of Manufacturing Plastics Parts. (L2)
- Explain the Steps in Making Ceramics Parts. (L2)
- Demonstrate the Application of Plastic, Ceramics and Power Metallurgy. (L2)

Unit – 5:

Introduction to Composites and Surface Treatment Process:

Composite Properties, Matrices, Fiber Reinforcement Composite Manufacturing Processes: Hand Lay-Up Process, Spray Lay-Up, Filament Winding Process, Resin Transfer Moulding, Processing of Metal Matrix Composites, Fabrication of Ceramic Matrix Composites, Carbon-Carbon Composites, Polymer Matrix

Surface Treatment Processes with their Characteristics and Applications.

(a) Overlay Coatings (b) Diffusion Coatings (c) Thermal or Mechanical Modification of Surfaces

Learning Outcomes:

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

- Students can Understand the Various Surface Treatment Processes. (L1)
- Students can Understand the Surface Coating Industry. (L1)
- Explain the Steps in Manufacturing of Composites Parts. (L2)
- Demonstrate the Application of Composites (L2)

Textbooks:

1. Rao P.N., “Manufacturing Technology – Volume I”, 5^{th} Edition, McGraw-Hill Education, 2018.
2. Kalpakjain S and Schmid S.R., “Manufacturing Engineering and Technology”, 7^{th} Edition, Pearson, 2018.

Reference Books:

1. Millek P. Groover, “Fundamentals of Modern Manufacturing”: “Materials, Processes and Systems”, 4^{th} Edition, John Wiley and Sons Inc, 2010.
2. Sharma P.C., “A Text book of Production Technology”, 8^{th} Edition, S Chand Publishing, 2014.

Course Outcomes:

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

- Demonstrate Different Metal Casting Processes and Gating Systems. (L2)
- Classify Working of Various Welding Processes. (L2)
- Evaluate the Forces and Power Requirements in Rolling Process. (L5)
- Apply the Principles of Various Forging Operations in industrial applications. (L3)
- Illustrate the Manufacturing Methods of Plastics, Ceramics and Powder Metallurgy. (L2)
- Identify Different Composites Parts and Surface heat Treatment Process. (L3)

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(ME20APC303) KINEMATICS OF MACHINERY

Prerequisites: Engineering Mathematics - I and II and Engineering Physics.

Course Objectives:

- To Make the Students Conversant with Kinematic Analysis of Mechanisms Applied to Real Life and Industrial Applications.
- To Develop the Competency to Analyze the Velocity and Acceleration in Mechanisms using Analytical and Graphical Approach.
- To Develop the Skill to Propose and Synthesize the Mechanisms using Graphical and Analytical Technique.
- To Develop the Competency to Understand & Apply the Principles of Gear Theory to Design Various Applications.
- To Develop the Competency to Design a Cam Profile for Various Follower Motions.

UNIT – 1:

Introduction:

Kinematic Link, Types of links, Kinematic Pair, Types of Constrained Motions, Types of Kinematic Pairs, Kinematic Chain, Types of Joints, Mechanism, Machine, Degree of Freedom, Mobility of Mechanism, Inversion, Grashoff's Law, Four-Bar Chain and Its Inversions, Slider Crank Chain and Its Inversions, Double Slider Crank Chain and Its Conversions.

Velocity Analysis:

Introduction, Absolute and Relative Motion, Vectors, Addition and subtraction of Vectors, Motion of a Link, Four Link Mechanism, Angular Velocity of Links, Velocity of Rubbing, Slider - Crank Mechanism, Crank and Slotted Lever Mechanism.

Learning Outcomes:

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

- Contrast the Difference Between Machine and Structure. (L2)
- Identify the Different Types of Kinematic Pairs and Kinematic Chains. (L1)
- Identify the Inversions of Four Bar Mechanism. (L1)
- Draw the Velocity Diagram for Different Configurations. (L3)

- Find the Velocity of Different Points on and Away from Different Links. (L3)

UNIT – 2:

Instantaneous Centre:

Instantaneous Centre of Velocity, Kennedy's Theorem, Angular Velocity Ratio Theorem, Analysis of Mechanism by Instantaneous Centre of Rotation (ICR) Method (Mechanisms up to 6 Links).

Acceleration Analysis:

Acceleration, Four-Link Mechanism, Angular Acceleration of Links, Acceleration of Intermediate and Offset Points, Slider-Crank Mechanism, Coriolis Acceleration Component, Crank and Slotted Lever Mechanism.

Learning Outcomes:

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

- Understand the Concept of Instantaneous Centers. (L1)
- Find the Velocity of Different Points on the Links and Angular Velocities of Different Links using Instantaneous Centers Method. (L3)
- Draw the Accelerations for Different Configurations. (L3)
- Find the Velocity and Accelerations of Different Points on and Away from Different Links. (L3)

UNIT – 3:

Steps in Synthesis: Type synthesis, Number Synthesis, Dimensional synthesis, Tasks of Kinematic synthesis - Path, function and motion generation (Body guidance), Precision Positions, Cheby-chev spacing, Mechanical and structural errors.

Graphical Synthesis: Inversion and relative pole method for three position synthesis of Four-Bar and Single Slider Crank Mechanisms.

Analytical Synthesis: Three position synthesis of Four-Bar mechanism using Freudenstein's equation, Blotch synthesis

Cams:

Cams & Followers: Introduction, Classification of Followers and Cams, Terminology of Cam Displacement Diagram for the Motion of Follower as Uniform Velocity, Simple Harmonic Motion (SHM), Uniform Acceleration and Retardation Motion (UARM), Cycloid motion, Cam Profile Construction for Knife-Edge Follower and Roller Follower, Cam Jump Phenomenon.

Learning Outcomes:

At the end of this Unit, the Student Will be Able to

- Synthesize a Four-Bar Mechanism with Analytical and Graphical Methods. (L4)
- Understand the Cam Terminology. (L1)
- Draw the Cam Profile for Different Types of Follower Motion. (L3)

UNIT – 4:

Gear: Classifications

Spur Gear: Terminology, Law of Gearing, Involute and Cycloidal Tooth Profile, Path of Contact, Arc of Contact, Sliding Velocity, Interference and Undercutting, Minimum Number of Teeth to Avoid Interference, Force Analysis (Theoretical Treatment Only);

Helical and Spiral Gears: Terminology, Geometrical Relationships, Virtual Number of Teeth for Helical Gears;

Bevel Gear & Worm and Worm Wheel: Terminology, Geometrical Relationships

Gear Trains:

Types, Analysis of Epicyclic Gear Trains, Holding Torque - Simple, Compound and Epicyclic Gear Trains, Torque on Sun and Planetary Gear Train, Compound Epicyclic Gear Train.

Learning Outcomes:

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

- Understand the Phenomenon of Interference. (L1)
- Find the Relative Merits and Demerits of Different Tooth Profiles. (L3)
- Understand Principle of Operation of Different Gears Trains for Different Purpose. (L1)
- Find Velocity Ratio and Torques for Different Gear Trains. (L3)

UNIT – 5:

Automation: Introductions, Types of Automation

Method of Work Part Transport: Continuous Transfer, Intermittent or Synchronous Transfer, Asynchronous Transfer, Different Type of Transfer Mechanisms - Linear Transfer Mechanisms and Rotary Transfer Mechanisms.

Automated Assembly-Line: Types, Assembly line Balancing Buffer Storages, Automated Assembly Line for Car Manufacturing, Artificial Intelligence in Automation.

Learning Outcomes:

At the End of this Unit, the Student will be Able to

- Understand the Types of Automations use in Industries. (L1)
- Classify Various Mechanisms Based on Work Part Transportations. (L2)
- Understand the Types of Automated Assembly – Line. (L1)

Note: Student has to Submit the Case Study Reports / Prototype Models for Each Unit in the Form of Assignments (Individual or Team work).

Textbooks:

1. S. S. Rattan, “Theory of Machines”, Third Edition, McGraw Hill Education (India) Pvt. Ltd., New Delhi. 2. Bevan T, “Theory of Machines”, Third Edition, Longman Publication.

Reference Books:

1. Paul E. Sandin, “Robot Mechanisms and Mechanical Devices Illustrated”, Tata McGraw Hill Publication.
2. Stephen J. Derby, “Design of Automatic Machinery”, 2005, Marcel Dekker, New York.
3. Neil Sclater, “Mechanisms and Mechanical Devices Sourcebook”, Fifth Edition, Tata McGraw Hill Publication.
4. Ghosh Malik, “Theory of Mechanism and Machines”, East-West Pvt. Ltd.
5. Hannah and Stephans, “Mechanics of Machines”, Edward Arnolde Publication.
6. R. L. Norton, “Kinematics and Dynamics of Machinery”, First Edition, McGraw Hill Education (India) P Ltd. New Delhi.
7. Dr. V. P. Singh, “Theory of Machine”, Dhanpatrai and Sons.
8. C. S. Sharma & Kamlesh Purohit, “Theory of Machine and Mechanism”, PHI.
9. M.P. Groover, “Automation, Production Systems and Computer-Integrated Manufacturing”, Prentice-Hall of India Pvt. Ltd, New Delhi.
10. G. Ambekar, “Mechanism and Machine Theory”, PHI.
11. J. J. Uicker, G. R. Pennock, J. E. Shigley, “Theory of Machines and Mechanisms”, Fifth Edition, International Student Edition, Oxford.

Web Reference Books:

1. https://nptel.ac.in/courses/112104121 (NPTEL1, Kinematics of Machines, Prof. Ashok K Mallik, IIT Kanpur).
2. https://nptel.ac.in/courses/112/106/112106270 (NPTEL2, Theory of Mechanism, Prof. Sujatha Srinivasan, IIT Madras).
3. https://nptel.ac.in/courses/112/105/112105268 (NPTEL3, Kinematics of Mechanisms and Machines, Prof. Anirvan Dasgupta, IIT Kharagpur).
4. https://nptel.ac.in/courses/112/105/112105236 (NPTEL4, Mechanism and Robot Kinematics, Prof.Anirvan Dasgupta, IIT Kharagpur) .
5. http://www.cdeep.iitb.ac.in/webpage_data/nptel/Mechanical/Robotics Course/Course_home_lect1.html (NPTEL5, Introduction to Robotics and Automation, IIT Bombay).

Course Outcomes:

On Completion of the Course, Learner will be able to

- Understand the Basic principles Involved in Mechanisms to Produce motion from one point to other point with help of Links, Pairs and Joints. (L2)
- Apply Kinematic Analysis to achieve Simple Mechanisms. (L3)
- Analyze Velocity and Acceleration in Mechanisms by Vector and Graphical Method. (L4)
- Synthesize a Four-Bar Mechanism with Analytical and Graphical Methods. (L3)
- Apply Fundamentals of Gear Theory as a Prerequisite for Gear Design. (L3)
- Construct Cam Profile for Given Follower Motion. (L3)

B.Tech - III Sem

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(ME20AES302) MECHANICS OF MATERIALS LAB

Prerequisites: The course builds on the concepts of engineering mechanics and Mechanics of Materials courses.

Course Objectives:

The Objective is to Learn the Fundamental Concepts of Stress, Strain, and Deformation of Solids with Applications to Bars, Beams and Columns. Detailed Study on Engineering Properties of Materials is also of Major Interest. Fundamentals of Applying Equilibrium, Compatibility and Force Deformation Relationships to Structural Elements are Emphasized. The Students are Introduced to Advanced Concepts of flexibility and stiffness method of structural analysis. The course builds on the fundamental concepts of engineering mechanics course.

List of Experiments:

1. Tension test.
2. Bending test on (Steel/Wood) Cantilever beam.
3. Bending test on simply supported beam.
4. Torsion test.
5. Rockwell Hardness Test
6. Brinell Hardness Test
7. Compression test on Open coiled springs
8. Tension test on Closely coiled springs
9. Compression test on wood/ concrete
10. Izod Impact test on metals
11. Charpy Impact test on metals
12. Shear test on metals

Textbooks:

1. F.P. Beer, E.R. Johnston, Jr& John.T. DeWolf, “Mechanics of Materials”, 7th edition, Tata McGraw-Hill, 2016.
2. SS Rattan, Strength of Materials, 3rd Edition, Tata McGraw-Hill, 2016.

Reference Books:

1. Engineering Mechanics, R. S. Khurmi, S. Chand Publishing
2. A Textbook of Engineering Mechanics, R.K. Bansal, Laxmi Publications
3. Timoshenko, “Strength of Materials Part-I& II”, 3rd edition, CBS Publishers, 2004.
4. Popov, “Mechanics of Solids”, 2nd Edition, New Pearson Education, 2015.
5. Basudeb Bhattacharya., Engineering Mechanics, 2/e, Oxford University Press (India), 2015.

Course Outcomes:

- Estimate the Tensile Strength of the given sample by performing Tension Test (L4)
- Calculate the Bending Strength of Simply Supported Beam and Cantilever Beam by performing Bending Test(L3)
- Evaluate the Torsional Stress for Circular Shafts by means of Torsion Test (L4)
- Evaluate the Hardness Value by means of Brinell Hardness and Rockwell Hardness Tests for Different Specimens (L4)
- Estimate the Strength of Open and Closed Coil Helical Spring by Spring Test(L4)

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(ME20APC304) MANUFACTURING PROCESS LAB

Prerequisites: Engineering Workshop, Engineering Chemistry and Materials Science and Engineering Lab

Course Objectives:

- Acquire practical knowledge on Metal Casting, Welding, Press Working and processing of Plastics

1. METAL CASTING
    - Gating Design and pouring time and solidification time calculations.
    - Sand Properties Testing – Exercise for Strength and Permeability.
    - Molding, Melting and Casting for ferrous/ nonferrous materials.
2. WELDING
    - TIG Welding.
    - MIG Welding.
    - Any other Special Welding Processes.
3. MECHANICAL PRESS WORKING
    - Press Tool: Blanking and Piercing operation with Simple, Compound and Combination dies.
    - Closed die forging, Deep Drawing and Bending operations.
4. PROCESSING OF PLASTICS:
    - Injection Moulding
    - Blow Moulding
    - FRP Composite Using Hand Layup Method

Textbooks:

1. Rao P.N., “Manufacturing Technology – Volume I”, 5th Edition, McGraw-Hill Education, 2018.
2. Kalpakjain S and Schmid S.R., “Manufacturing Engineering and Technology”, 7th Edition, Pearson, 2018.

Reference Books:

1. Millek P. Groover, “Fundamentals of Modern Manufacturing”: “Materials, Processes and Systems”, 4th Edition, John Wiley and Sons Inc, 2010.
2. Sharma P.C., “A Text book of Production Technology”, 8th Edition, S Chand Publishing, 2014.

Course Outcomes:

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

- Identify the Tools Used in Metal Casting. (L2)
- Evaluate Mechanical Components using Metal Casting Techniques. (L3)
- Analyze Different Welding Techniques for Various Mechanical Components. (L3)
- Fabricate Forging Components using Press Working Operations. (L5)
- Apply Injection, Blow Molding and Hand layup Process Techniques for Fabricating Different Composite Components. (L4)

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(ME20APC305) MECHANICS OF MACHINES LAB

(Virtual Lab)

Prerequisites: Basic Understanding of Vectors Mathematics and Engineering Mechanics

Course Objectives:

To provide students with the basic principles required for the understanding of Theory of machines like links, couplings and CAM-follower.

Software Requirement:

Adobe Flash Plugin is needed to Run Some of the Simulation Experiments on the Browser. You can download it for Free here. Kindly Wait for Flash File to Load when Opening a Simulation. Depending on Your Internet Connection Speed and the Number of users Accessing Our Site it may take a Minute.

For JavaScript based Simulations you do not need Adobe Flash however JavaScript must be Enabled in your Browser. Please use Latest Mozilla Firefox or Google Chrome Browser for best Results.

1. Position Analysis of Grashof Four Bar Mechanism
2. Velocity Analysis of Grashof Four Bar Mechanism
3. Acceleration Analysis of Grashof Four Bar Mechanism
4. Position Analysis of NonGrashof Four Bar Mechanism
5. Velocity Analysis of NonGrashof Four Bar Mechanism
6. Acceleration Analysis of NonGrashof Four Bar Mechanism
7. Position Analysis of Slider Crank Mechanism
8. Velocity Analysis of Slider Crank Mechanism
9. Acceleration Analysis of Slider Crank Mechanism
10. Position Analysis of Slider Crank Mechanism with Offset
11. Position Analysis of Scotch Yoke Mechanism
12. Velocity Analysis of Scotch Yoke Mechanism
13. Acceleration Analysis of Scotch Yoke Mechanism
14. Position Analysis of Elliptical Trammel
15. Hart Straight Line Mechanism
16. Peaucellier Straight Line Mechanism
17. Elliptical Cam Mechanism

18. Eccentric Cam Mechanism
19. Klann Mechanism
20. Jansen Linkage Model
21. Tchebichev Straight Line Mechanism
22. Whitworth Mechanism
23. Crank and Slotted Mechanism
24. Universal Joint

Textbooks:

1. S. S. Rattan, "Theory of Machines", Third Edition, McGraw Hill Education (India) Pvt. Ltd., New Delhi.

Reference Books:

1. Paul E. Sandin, "Robot Mechanisms and Mechanical Devices Illustrated", Tata McGraw Hill Publication.
2. Stephen J. Derby, "Design of Automatic Machinery", 2005, Marcel Dekker, New York.
3. Neil Sclater, "Mechanisms and Mechanical Devices Sourcebook", Fifth Edition, Tata McGraw Hill Publication.
4. Ghosh Malik, "Theory of Mechanism and Machines", East-West Pvt. Ltd.
5. Hannah and Stephans, "Mechanics of Machines", Edward Arnolde Publication.
6. R. L. Norton, "Kinematics and Dynamics of Machinery", First Edition, McGraw Hill Education (India) P Ltd. New Delhi.
7. Dr. V. P. Singh, "Theory of Machine", Dhanpatrai and Sons.
8. C. S. Sharma & Kamlesh Purohit, "Theory of Machine and Mechanism", PHI.
9. M.P. Groover, "Automation, Production Systems and Computer-Integrated Manufacturing", Prentice-Hall of India Pvt. Ltd, New Delhi.

Website:

- https://mm-nitk.vlabs.ac.in/

Course Outcomes:

After completion of Students will be able to

- Identify Different Types of Links and Pairs in Mechanisms. (L1)
- Apply Relative and Instantaneous Centre of Rotation Method for Different Mechanisms. (L3)

- Analyze various motions produced by Mechanisms. (L4)
- Analyze Various CAM Profile Motions. (L4)

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(EG20ASC301) SOFT SKILLS

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 – 1:

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 – 2:

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 – 3:

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 – 4:

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 – 5:

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.

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-bOO1_q
2. https://youtu.be/xBaLgJZ0t6A?list=PLzf4HHlsQFwJZel_j2PUy0pwjVUgj7KlJ
3. https://youtu.be/-Y-R9hDl7lU
4. https://youtu.be/gkLsn4ddmTs
5. https://youtu.be/2bf9K2rRWwo
6. https://youtu.be/FchfE3c2jzc

Course Outcomes:

By the end of the Program Students should be able to

- Memorize Various Elements of Effective Communicative Skills.
- Interpret People at the Emotional Level Through Emotional Intelligence.
- Apply Critical Thinking Skills in Problem Solving.
- Analyze the Needs of an Organization for Team Building.

- Judge the Situation and take Necessary Decisions as a Leader.
- Develop Social and Work-Life Skills as Well as Personal and Emotional Well-Being.

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B.Tech III Sem	L	T	P	C
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(CH20AMC201) ENVIRONMENTAL SCIENCE

(Mandatory Noncredit Course)

(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 – 1:

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 – 2:

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 – 3:

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 – 4:

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 – 5:

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)

Textbooks:

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.

Reference Books:

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)

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(EG20AMC301) ENHANCING ENGLISH LANGUAGE SKILLS
(Lateral Entry Students Only)

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 – 1:

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 – 2:

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 – 3:

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 – 4:

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 – 5:

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

Reference Books:

1. Krishna Mohan & NP Singh, Speaking English Effectively, 2nd Edition,2011.
2. MAshraf Rizvi, Effective Technical Communication, TataMcGraw-Hill, NewDelhi,2017.
3. Francis Soundararaj,Basics of Communication in English: Soft Skills for Listening, Speaking, Reading and Writing, New Delhi: Macmillan-2012.
4. ChaseR. 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.

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.

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(BA20AHS201) UNIVERSAL HUMAN VALUES
(Lateral Entry Students Only)

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 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:
    e. At the level of individual: as socially and ecologically responsible engineers, technologists and managers.
    f. 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.

Textbooks:

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 kantak, 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. FSchumacher. “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)

II Year II Semester

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(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 – 2:

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 $1/3^{rd}$ and $3/8^{th}$ 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 – 3:

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 – 4:

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 – 5:

Small Sample Tests:

Student T-Distribution (Single Mean, Two Means and paired T-Test), Testing of Equality of Variances (F-Test), $\chi 2$ - 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)

Textbooks:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017, 44^{th} Edition.
2. Miller and Freunds, Probability and Statistics for Engineers,7/e, Pearson, 2008
3. S.S.Sastry, "Introductory Methods of Numerical Analysis", 5^{th} 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 Pulications, 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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(ME20APC401) DYNAMICS OF MACHINERY

Prerequisites: Engineering Mechanics, Kinematics of Machinery

Course Objectives:

- Explain the Importance of Friction and Apply for Brakes and Dynamometers.
- Analyze the Turning Moment Diagrams and Discuss the Applications of Flywheel.
- Familiarizes the Concept of Gyroscope and its Applications for Aero Plane, Motor Cycle and Motor Cars.
- Uses of Governors and its Applications.
- Explain the need of Balancing of Rotating and Reciprocating Masses.

UNIT – 1:

Friction: Inclined Plane, Friction of Screws and Nuts, Pivot and Collar, Uniform pressure, Uniform Wear. Friction Circle and Friction Axis, Lubricated Surfaces, Boundary Friction, Film Lubrication.

Clutches: Friction Clutches- Single Disc or Plate Clutch, Multiple Disc Clutch, Cone Clutch, Centrifugal Clutch.

Brakes and Dynamometers: Simple Block Brakes, Band Brake, Internal Expanding Brake, Braking of Vehicle. Dynamometers – Absorption and Transmission Types. General Description and Methods of Operation.

Learning Outcomes:

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

- Know the Applications and Concepts of Friction. (L3)
- Understand the Significance of Clutches. (L2)
- Know the Applications of Breaks and Dynamometers. (L3)

UNIT – 2:

Precession: Gyroscopes, Effect of Precession Motion on the Stability of Moving Vehicles such as Motor Car, Motor Cycle, Aeroplanes and Ships.

Turning Moment Diagrams and Fly Wheels: Turning moment Diagrams for Steam Engine, IC Engine and Multi Cylinder Engine. Crank Effort - Coefficient of

Fluctuation of Energy, Coefficient of Fluctuation of Speed – Fly Wheels and their Design, Fly Wheels for Punching Machines.

Learning Outcomes:

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

- To Understand the Concept and Applications of Gyroscopic Couple. (L2)
- To Draw the Turning Moment Diagram for Energy Storage. (L2)
- To Study & Design the Applications of Flywheels. (L3)

UNIT – 3:

Governors: Watt, Porter and Proell Governors. Spring Loaded Governors – Hartnell and Hartung Governors with Auxiliary Springs. Sensitiveness, Isochronism and Hunting. Effort and Power of a Governor.

Learning Outcomes:

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

- Understand Different Types of Governors. (L2)
- Analyse the Sensitiveness and Isochronisms of Governors. (L4)
- Estimate the Effort and Power of Governors. (L3)

UNIT – 4:

Balancing: Balancing of Rotating Masses - Single and Multiple – Single and Different Planes.

Balancing of Reciprocating Masses: Primary and Secondary Balancing of Reciprocating Masses. Analytical and Graphical Methods. Unbalanced Forces and Couples -V-Engine, Multi Cylinder inline and Radial Engines for Primary and Secondary Balancing.

Learning Outcomes:

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

- Understanding the Importance of Balancing of Masses. (L2)
- Analyzing the Balancing of Rotary and Reciprocating Masses. (L3)
- Apply the Balancing Techniques. (L3)

UNIT – 5:

Vibration: Free and Forced Vibration of Single Degree of Freedom System, Role of Damping, Whirling of Shafts and Critical Speeds. Simple Problems on Free, Forced and Damped Vibrations.

Vibration Isolation & Transmissibility: Transverse Vibrations of Beams with Concentrated and Distributed Loads. Dunkerly's Method, Raleigh's Method.

Torsional Vibrations - Two and Three Rotor Systems.

Learning Outcomes:

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

- Formulate the Equations of Motion and Solve Single Degree of Freedom System with Damping. (L3)
- Estimate the Natural Frequency of Vibrating Systems. (L2)
- Understand the Concept of Vibration Isolation of Transmissibility. (L2)

Textbooks:

1. S.S. Rattan, "Theory of Machines", MGH Publishers, 3rd Edition, 2013.
2. R.L. Norton, "Kinematics and Dynamics of Machinery", Tata McGraw Hill.

Reference Books:

1. Thomas Bevan, "Theory of machines", Pearson, 3rd Edition, 2012.
2. J.E. Shiegley, "The Theory of Machine", McGraw Hill.
3. Shigley et.al. "Theory of Machines and Mechanisms" of Oxford International Student Edition.
4. R. S. Khurmi, "Theory of Machines", S. Chand Publications.

Course Outcomes:

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

- Understand the Basic Principles Involved Friction, Precession, Balancing and Vibrations. (L2)
- Determine Power Loss and Power Transmitted Due to Friction in Various Applications. (L3)
- Apply Balancing Principles for Various Rotating and Reciprocating Masses. (L3)
- Analyze the Magnitude of Vibration and Isolate Vibration of Dynamic Systems. (L4)

- Determine the dimensions of Governors for Speed Control in mechanical devices. (L3)

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(ME20APC402) MACHINE TOOLS & MEASUREMENTS

Prerequisites: Manufacturing Technology

Course Objectives:

- Explain Parameters in the Metal Cutting Operation, Relate Tool Wear and Tool Life and the Variables that Control them.
- Calculate Machining Times for Different Machining Processes.
- Teach Various Metal Cutting Processes. (Lathe, Drilling, Boring Shaping, Slotting, Milling and Grinding).
- Familiarize the Basic Concepts of Measurements
- Learning Characteristics of Surface Measurements Devices

UNIT – 1:

Material Removal Processes:

Metal Cutting: Introduction, Elements of Cutting Process – Geometry of Single Point Tools. Chip Formation and Types of Chips. Built up Edge and its Effects, Chip Breakers. Mechanics of Orthogonal Cutting –Merchant's Force Diagram, Cutting Forces – Cutting Speeds, Feed, Depth of Cut, Heat Generation, Tool Life, Coolants.

Learning Outcomes:

At the end of this Unit Student will be able to

- Describe Cutting Processes and Variables. (L2)
- Classify Various Types of Chips. (L4)

UNIT – 2:

Machining Processes:

Engine Lathe: Principle of Working, Types of Lathe, Specifications, Taper Turning – Lathe Attachments. Capstan and Turret Lathe – Single Spindle and Multi-Spindle Automatic Lathes – Tool Layouts

Drilling And Drilling Machines: Principles of Working, Specifications, Types, and Operations Performed - Tool Holding Devices - Nomenclature of Twist Drill.

Boring And Boring Machines- Principles of Working, Specifications, Types, and Operations Performed - Tool Holding Devices - Nomenclature of Boring Tools.

Learning Outcomes:

At the end of this Unit, the Student will be able to

- List the Specifications for Various Types of Lathes. (L1)
- List the Specifications & Identify Parts of Various Types of Drilling & Boring Machines. (L3)
- Determine Cutting Speeds for Different Machining Operations. (L4)

UNIT – 3:

Machining & Finishing Processes for Other Shapes:

Shaping, Slotting and Planning Machines - Principles of Working - Principal Parts, Specification, Classification, Operations Performed, Machining Time Calculations.

Milling Operations and Milling Machines - Principles of Working, Specifications, Classifications of Milling Machines, Machining Operations, Types and Geometry of Milling Cutters, Methods of Indexing, And Accessories to Milling Machines, Machining Time Calculations.

Abrasive Machining:

Grinding and Grinding Machines: Grinding Process, Types of Grinding Machines, Grinding Process Parameters, Honing, Lapping, Broaching.

Learning Outcomes:

At the end of this Unit, the Student will be able to

- Recognize the Parts of Shaping, Slotting and Planning Machine. (L3)
- Compare Tool Geometry for Milling, Shaping, Slotting and Planning Operations. (L3)
- Recognize The Parts of Milling Machine (L3)
- List the Different Operations Performed on Milling Machine and Abrasive Machines (L3)
- Determine the Machining Time Calculations (L4)

UNIT – 4:

Concepts of Measurements:

Limits, Fits and Tolerances- Types of Fits - Unilateral and Bilateral Tolerance System, Hole and Shaft Basis System. Interchangeability And Selective Assembly.

Limit Gauges: Taylor's Principle, Design of GO And NO-GO Gauges, Measurement of Angles Using Bevel Protractor and Sine Bar. Measurement Of Flatness Using Straight Edges, Surface Plates, Optical Flat and Auto Collimator.

Learning Outcomes:

At the end of this Unit, the Student Will Be Able to

- Identify Important Parameters in Metrology. (L3)
- Differentiate Interchangeability and Selective Assembly. (L4)
- Select Limits and Tolerances for Different Assemblies. (L1)

UNIT – 5:

Surface Roughness Measurement: Differences Between Surface Roughness and Surface Waviness- Numerical Assessment of Surface Finish – CLA, R.M.S Values – Ra, Rz Values, Methods of Measurement of Surface Finish-Profilograph, Talysurf, BIS Symbols for Indication of Surface Finish.

Screw Thread Measurement: Elements of Measurement – Errors in Screw Threads – Measurement of Effective Diameter, Angle of Thread and Thread Pitch-Profile Thread Gauges.

Gear Measurement: Gear Measuring Instruments, Gear Tooth Profile Measurement. Measurement Of Diameter, Pitch, Pressure Angle and Tooth Thickness. Coordinate Measuring Machines (CMM): Types and Applications Of CMM.

Learning Outcomes:

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

- Recall the terms used in surface roughness measurement, Screw and Thread Measurements. (L1)
- Explain the factors affecting the surface finish in machining. (L2)
- Demonstrate the application of different surface measuring instruments. (L2)

Textbooks:

1. P.N. Rao, “Manufacturing Technology: Metal Cutting and Machine Tools”, (Volume 2), 3rd Edition, Tata McGraw-Hill Education, 2013.
2. Mahajan, “Engineering Metrology”, 2nd Edition, Dhanpat Rai, 2013.

Reference Books:

1. R.K. Jain, “Engineering Metrology”, 20th Edition, Khanna Publishers, 2013.
2. Thomas G.Beckwith, Marangoni, Linehard, “Mechanical Measurements”, 6th Edition, PHI, 2013
3. Kalpakzian S and Schmid SR, “Manufacturing Engineering and Technology”, 7th edition, Pearson, 2018.
4. Hindustan Machine Tools, “Production Technology”, TMH, 2001.
5. AB. Chattopadhyay, “Machining and Machine Tools”, 2nd edition, Wiley, 2017.
6. R.K. Jain and S.C. Gupta, “Production Technology”, 17th Edition, Khanna Publishers, 2012.
7. S.Bhaskar, Basic Principles - Measurments and Control Systems, Anuradha Publications, 2014.
8. Anand K Bewoor & Vinay A Kulkarni, “Metrology & Measurement”, 15th Edition, McGrawHill, 2015.

Course Outcomes:

After Completing the Course, the Student will be able to

- Understand the cutting principles involved in various Machining Process. (L2)
- Illustrate the working principles of various Machine tools. (L2)
- Evaluate the machining time and tool life for the various machining processes (L4)
- Classify various measuring instruments used in metrology(L2)
- Validate various measuring instruments in Engineering Applications. (L4)

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(ME20APC403) THERMAL ENGINEERING – I

Prerequisites: Engineering Chemistry, Engineering Thermodynamics

Course Objective:

The objective of this subject is

- To Impart the Knowledge on Engine Components, Working Principles of IC Engines, Auxiliary Systems.
- To Understand the Aspects of SI and CI Engines in Addition to the Methods of Improving Performance.
- To Study the Combustion Phenomenon in I.C Engines.
- To Acquire the Knowledge of Fuel Ignition, Lubrication Systems for an IC Engine.
- To Draw and Analyse Suitable Thermodynamic Cycles for I.C Engine, Air Compressor and Gas Turbine Plant and Jet Propulsion Devices.
- To Provide the Knowledge on Performance Parameters for an IC Engine.

UNIT – 1:

I.C. Engines: Definition of Engine and Heat Engine, I.C Engine Classification – Parts of I.C. Engines, Working of I.C. Engines, Two Stroke & Four Stroke I.C. Engines, SI & CI Engines, Valve and Port Timing Diagrams.

Learning Outcomes:

After Completion of this Unit, students will be able to

- Understand the Working of SI and CI Engines (L2)
- Know the Difference between 2-Stroke and 4-Stroke Engines. (L2)
- Draw the Valve and Port Timing Diagrams of 4-Stroke and 2-Stroke Engines. (L3)

UNIT – 2:

Fuel System: S.I. Engine: Fuel Supply Systems, Carburetor Types, Air Filters, Mechanical and Electrical Fuel Pump – Filters– Gasoline Injection Systems.

Cooling & Lubrication Systems: Cooling Requirements, Air Cooling, Liquid Cooling, Thermo Siphon, Water and Forced Circulation System;

Lubrication Systems-Splash, Pressurized and Mist Lubrication.

Ignition System: Function of an Ignition System, Battery Coil Ignition System, Magneto Coil Ignition System, Electronic Ignition System using Contact Breaker, Electronic Ignition using Contact Triggers – Spark Advance and Retard Mechanism.

Learning Outcomes:

After Completion of this Unit, students will be able to

- Identify the use of Fuel Pumps and Filters used in Fuel Systems. (L2)
- Describe the need of Fuel Supply, Cooling, Lubrication and Ignition Systems for an IC Engine. (L2)
- Know the Difference between Battery Coil Ignition System and Magneto Coil Ignition System. (L2)

UNIT – 3:

Fuels and Combustion:

S.I. Engine: Normal Combustion and Abnormal Combustion – Importance of Flame Speed and Effect of Engine Variables – Abnormal Combustion, Pre-Ignition and Knocking (Explanation) – Fuel Requirements and Fuel Rating, Anti Knock Additives and Combustion Chambers.

C.I. Engines: Stages of Combustion – Delay Period and Its Importance – Effect of Engine Variables – Diesel Knock – Combustion Chambers (DI and IDI), Fuel Requirements and Fuel Rating.

Learning Outcomes:

After Completion of this Unit, students will be able to

- Contrast the Effects of Normal and Abnormal Combustion in IC Engines. (L3)
- Describe about the Flame Propagation inside the Cylinder and Stages of Combustion in S.I and C.I Engines(L2)
- Understand the Knocking Phenomenon in SI & CI Engines (L2)
- Understand the Significance of Octane Number and Cetane Number. (L2)

UNIT – 4:

Testing and Performance: Performance of Parameters- Measurement of Cylinder Pressure, Fuel Consumption, Air Intake, Exhaust Gas Composition, Brake Power – Determination of Frictional Losses and Indicated Power – Performance Test – Heat Balance Sheet and Chart.

Learning Outcomes:

After Completion of this Unit, students will be able to

- Understand Indicated Power, Brake Power, Friction Power and Performance Parameters. (L2)
- Determine the Air and Fuel Measurement Methods. (L3).
- Calculate the Brake Thermal, Indicated Thermal Efficiencies of I.C Engine. (L3)
- Evaluate the Heat Balance Test for an I.C Engine. (L3)

UNIT – 5:

Air Compressors: Reciprocating Compressors, Effect of Clearance Volume in Compressors, Volumetric Efficiency, Single Stage and Multi Stage Compressors, Effect of Inter Cooling and Pressure Drop in Multi - Stage Compressors, Problems Related to Reciprocating Compressors, Working Principles of Roots Blower, Vane Type Blower, Centrifugal Compressor - Axial Flow Compressors, Working Principle of Rotary Compressors.

Learning Outcomes:

After Completion of this Unit, students will be able to

- Describe the Working of Reciprocating and Rotary Air Compressors. (L2)
- Estimate the Effect of Clearance Volume over Performance of Compressor. (L3)
- Differentiate between Single Stage and Multistage Air Compressors with the Suitable Thermodynamic Cycles. (L4)

Textbooks:

1. Internal Combustion Engines / V. Ganesan- TMH, 2017
2. Thermal Engineering / Rajput / Lakshmi Publications, 10th Edition,2016

Reference Books:

1. I.C. Engines Fundamentals, Heywood, McGrawHIll, 1st Edition,2011.
2. IC Engines – Mathur& Sharma – DhanpathRai& Sons, 2010.
3. Engineering Fundamentals of IC Engines – Pulkrabek, Pearson, PHI, 2nd Edition, 2009.
4. Thermal Engineering, Rudramoorthy – TMH, 10th Edition,2010.

5. Thermodynamics & Heat Engines, B. Yadav, Central Publishing House., Allahabad, 2002.
6. Thermal Engineering – R.S. Khurmi & J.K. Gupta – S. Chand, 15th Edition,2015.

Course Outcomes:

After Completing this Course, the students can

- Explain the Basic priciples of I.C Engines and Combustion in S.I and C.I Engines. (L2)
- Describe the Significance of Fuel Supply, Cooling, Lubrication and Ignition Systems. (L2)
- Illustrate the Combustion Phenomenon in CI Engines and SI Engines, Types of Combustion Chambers, Knocking. (L2)
- Solve the Numerical Problems on Performance Parameters of I.C Engines. (L3)
- Solve the Numerical Problems on Air Compressors. (L3)

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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 – 1:

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 – 2:

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 Break Even Point of an Organization.
- It Explains the Merits and Demerits of Increase in the Scale of Production.

UNIT – 3:

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 Determines of Different Markets.
- Able to Get Information about Various Pricing Strategies.
- Students can Understand about Various Business Structures in India.

UNIT – 4:

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 – 5:

Capital and Capital Budgeting:

Concept of Capital - Over and Undercapitalization – Remedial Measures - Sources of Shot 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 Utilization.
- 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.

Textbooks:

1. Managerial Economics 3/e, Ahuja H.L, S.Chand, 2013.
2. Financial Management, I.M.Pandey, Vikas Publications, 2013.

Reference Books:

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 Mangement, T.S.Reddy & Y. Hariprasad Reddy, Margham.

Course Outcomes:

- Should be able to understand managerial economics and demand analysis.
- Should be able to analyze decisions relating to production and cost analysis.
- Should be able to evaluate market structures and forms of business.
- Should be able to assess financial statements and ratios.
- Should be able to apply capital budgeting methods.

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B.Tech - IV Sem

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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 – 1:

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.

Learning Outcomes:

- Students can Understand the Basic Terms and Concepts Business Environment.
- It Describes Decision Making Process of Business Activities.
- Students are able to Understand the Environmental Analysis.
- Students can Understand the Scope of Business, Characteristics of Business

UNIT – 2:

Economic Environment:

Nature of Economic Environment- Economic Factors-Growth Strategy, Basic Economic System, Economic Planning, Economic Policies- New Industrial Policy, FEMA, Onetary and Fiscal Policies- Consumer Protection Act and Competition Law. Liberalization, Privatization and Globalization of Indian Economy,- Trends and Issues.

Learning Outcomes:

- Students can understand the Various Economic Environment.
- It demonstrates the Economic policies- new industrial policy.
- Students are able to understand the Monetary and fiscal policies.

- It explains the merits and demerits Liberalization, Privatization and Globalization.

UNIT – 3:

Socio-Cultural Environment:

Nature and Impact of Culture on Business, Culture and Globalization, Social Responsibilities of Usiness, Social Audit, Business Ethics and Corporate Governance, Demographic Environment Population Size, Migration and Ethnic Aspects, Birth Rate, Death Rate and Age Structure.

Learning Outcomes:

- Students can understand about and Impact of Culture on Business.
- They are able to find Culture and Globalization, social Responsibilities of Business.
- Able to Get Information about Various Social Audit, Business Ethics and Corporate Governance.
- Students can understand about Demographic Environment.

UNIT – 4:

Political Environment:-

Functions of State- Economic Roles of Government-Government and Legal Environment- The Constitutional Environment, Rationale and Extent of State Intervention.

Learning Outcomes:

- It Explains Basic Concepts and Functions of State- Economic Roles of Government.
- Students can understand - Government and Legal Environment.
- It Describes the Constitutional Environment.
- Students can understand the Rationale and Extent of State Intervention.

UNIT – 5:

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.

Learning Outcomes:

- Students are able to understand the Innovation, Technological Leadership and Followership.
- It Describes the, Impact of Technology on Globalization.
- Students are able to understand the, Transfer of Technology, Time Lags in Technology Introduction.
- Students can understand the Management of Technology; Features and Impact of Technology.

Textbooks:

1. K.Aswathappa (2017), Essentials of Business Environment, 13^{th} Edition, Himalaya Publishers.
2. N.D.Kapoor (2019), Elements of Mercantile Law, 38^{th} Edition, Sultan Chand & Sons.

Reference Books:

1. Indian Economy, Dutt and Sundaram, S. Chand, New Delhi.
2. Business Environment – Text and Cases, Justin Paul, TMH.
3. Indian Economy- Misra and Puri, Himalaya.
4. Business Environment, Suresh Bedi, Excel.
5. Rangarajan, C.A.; Perspective in Economics, S.Chand & Sons, New Delhi
6. Cherunilam, Francis; Business Environment - Text and Cases, Himalaya Publishing House.
7. Aswathappa, K.; Essentials of Business Environment, Himalaya Publishing House, New Delhi.

Course Outcomes:

- Should be able to Discuss the Types of Business Environment, its Scope and its Analysis along with Characteristics of Business.
- Should be able to Explain the Effects of Government Policy on the Economic Environment and Insurance Industry
- Should be able to outline how Society and Cultural Environment Impacts on Business Environment.

- Should be able to Describe how Political Environment is Utilized in Business.
- Should be able to Explain the Natural and Technological Framework that Regulates Business.

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(BA20AHS303) ORGANIZATIONAL BEHAVIOUR

Course 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 – 1:

Introduction to Organization Behaviour:

Introduction to Organization, Organization and Managers, Manager' 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.

Learning Outcomes:

- Students can understand the Basic Terms and Concepts of Organization Behaviour.
- It describes Decision Making OB Models.
- Students are able to understand the Behavioral Science.
- Students can understand the Level of OB Models.

UNIT – 2:

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).

Learning Outcomes:

- Students can understand the Individual Behaviour.
- It demonstrates the Job Satisfaction, Personality Perception.
- Students are able to understand the Motivation at Work.
- It explains the Emotions and Stress Management.

UNIT – 3:

Interpersonal Behaviour:

Interpersonal Behaviour, Johari Window, Transactional Analysis– Ego States, Types of Transactions, Life Positions, Applications of T.A., Managerial Interpersonal Styles.

Learning Outcomes:

- Students can understand about Johari Window.
- They are able to find Types of Transaction.
- Able to get Information about Application of T&A.
- Students can understand about Managerial Interpersonal Skills.

UNIT – 4:

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.

Learning Outcomes:

- It explains basic concepts Group behaviour and Dynamics.
- Students can understand Theory of Group Information.
- It describes Team vs Groups.
- Students can understand the Leadership theories.

UNIT – 5:

Organizational Behaviour:

Foundations of Organization Structure, Organization Design, Organization Culture, Organization Change, Managing Across Cultures, Human Resource Management Policies and Practices, Diversity at Work.

Learning Outcomes:

- Students are able to understand the Organisation Structure
- It describes the Organisation Design
- Students are able to understand the HRM Policies and Diversity of Work
- Students can understand the Management of technology; Features and Impact of technology

Textbooks:

1. Pardeshi, P. C., Organizational Behaviour & Principles & Practice of Management, Nirali Publication

Reference Books:

1. Robbins, S. P/ Judge, T. A/ Sanghi, S., Organizational Behavior, Pearson Publication.
2. Aswathappa, K., Organisational Behaviour– Text and Problem, Himalaya Publication.

Course Outcomes:

Students should be able to

- Discuss the Manager Roles and Skills, Behaviour at Work.
- Explain Introduction to Individual Behaviour, Values, Attitudes, Job Satisfaction, Personality.
- Outline Managerial Interpersonal Styles.
- Describe Foundations of Group Behaviour.
- Explain the Organization Design.

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(ME20APC404) COMPUTER AIDED MACHINE DRAWING

Prerequisites: Engineering Graphics Lab

Course Objectives:

- To Make the Students Understand and Interpret Drawings of Machine Components.
- To Prepare Assembly Drawings Both Manually and using Standard CAD Packages.
- To Familiarize the Students with Indian Standards on Drawing Practices and Standard Components.
- To Gain Practical Experience in Handling 2D Drafting and 3D Modelling Software Systems.
- Familiarize With Limits, Fits and Tolerances in Mating Components.

Drawing Standards & Fits and Tolerances:

1. Code of Practice for Engineering Drawing
2. Study of Welding Symbols
3. Study of Riveted Joints
4. Study of Screw Threads, Keys and Fasteners
5. Limits, Fits – Tolerancing of Individual Dimensions
6. Preparation of Production Drawings and Reading of Part and Assembly Drawings

Introduction To 2D Drafting:

Study of drafting software (CATIA) (ANY 2 of the following)

1. Basic 2D Drawing – CATIA
2. 2D Drafting of Bush Bearing
3. 2D Drafting of Plummer Block
4. 2D Drafting of Non-Return Valves

3D Geometric Modeling:

1. Exercise of PAD
2. Exercise of Shaft
3. Exercise of Rib

Assembly Drawing (Any 6 of The following):

1. Assembly of Flange Couplings
2. Assembly of Universal Couplings
3. Assembly of Oldham"s Couplings
4. Assembly of Muff Couplings
5. Assembly of Sleeve and Cotter Joint
6. Assembly of Gib & Cotter Joint
7. Assembly of Knuckle Joint
8. Assembly of Strap Joint
9. Assembly of Plummer Block
10. Assembly of Screw Jack
11. Assembly of Lathe Tail Stock
12. Assembly of Universal Joint
13. Assembly of Machine Vice
14. Assembly of Piston and connecting Rod,
15. Assembly of Steam Engine Cross-Head
16. Assembly of Stuffing Box,
17. Assembly of Multi-Plate Clutch
18. Assembly of Lathe Chuck
19. Assembly of Rotary Gear Pump
20. Assembly of Vane Pump
21. Assembly of Socket and Spigot Joint
22. Assembly of Shaft Coupling
23. Assembly of Simple Eccentric

Textbooks:

1. K.L.Narayana, P.Kannaiah and K.Venkat Reddy, Production Drawing, New Age International Publishers, 3/e, 2014
2. Software Tools/Packages- Auto CAD, Solid Works or Equivalent.

Reference Books:

1. Cecil Jensen, Jay Helsel and Donald D.Voisinet, Computer Aided Engineering
2. Drawing, Tata Mcgraw-Hill, NY, 2000.
3. James Barclay, Brain Griffiths, Engineering Drawing for Manufacture, Kogan Page Science, 2003.
4. N.D.Bhatt, Machine Drawing, Charotar, 50/e, 2014.

Course Outcomes:

After Completion of this Lab Student will be able to

- Demonstrate the Conventional Representations of Materials and Machine Components. (L2)
- Understand Various Types of Fasteners Used for Permanent and Temporary Joints like Screw, Bolt and Rivet etc. (L2)
- Develop Solid Models of Machine Parts and Assemble them by using CAD Software. (L3)
- Translate 3D Assemblies into 2D Drawings by using CAD Software. (L2)
- Create Manufacturing Drawing with Dimensional and Geometric Tolerances. (L4)

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B.Tech - IV Sem

L	T	P	C
0	0	3	1.5

(ME20APC405) THERMAL ENGINEERING LAB

Prerequisites: Engineering Thermodynamics

Course Objective:

The objective of this subject is

- To Provide Exhaustive Knowledge and Enough Confident about All Type of I.C Engines Parts.
- To Understand the Functioning and Performance of Various Engines.
- To Find Heat Losses in Various Engines
- Analyzing the Performance Characteristics of Various Engines
- Applying for Proper Valve and Port Timing in IC Engines
- To Understand the Functioning and Working of Boilers.

List of Experiments:

1. Valve Timing Diagram of 4 - Stroke Diesel Engine.
2. Port Timing Diagram of 2 - Stroke Petrol Engine.
3. Performance Test on a 4 - Stroke Single Cylinder Diesel Engine.
4. Performance Test on 2 - Stroke Petrol Engine.
5. Heat Balance Sheet on 4 - Stroke Single Cylinder Diesel Engine.
6. Morse Test on Multi Cylinder Petrol Engine.
7. Air/Fuel Ratio and Volumetric Efficiency of an I.C. Engines.
8. Performance Test on Variable Compression Ratio of Petrol Engine.
9. Performance Test on Two Stage Reciprocating Air – Compressor.
10. Dismantling / Assembly of Engines to Identify the Parts and their Position in an Engine.
11. Study of Babcock & Wilcox and Lancashire Boilers
12. Performance Test on Vapour Compression Refrigeration System.
13. Performance Test on Vapour Absorption Refrigeration System.

Note: Student has to Perform Minimum 10 Experiments from the above List of Experiments

Textbooks:

1. Internal Combustion Engines / V. Ganesan- TMH, 2017

2. Thermal Engineering / Rajput / Lakshmi Publications, 10th Edition,2016

Reference Books:

1. I.C. Engines Fundamentals, Heywood, McGrawHIll, 1st Edition,2011.
2. IC Engines – Mathur& Sharma – DhanpathRai& Sons, ,2010.
3. Engineering Fundamentals of IC Engines – Pulkrabek, Pearson, PHI, 2nd Edition,2009.
4. Thermal Engineering, Rudramoorthy – TMH, 10th Edition,2010.
5. Thermodynamics & Heat Engines, B. Yadav, Central Publishing House. Allahabad, 2002.
6. Thermal Engineering – R.S. Khurmi & J.K. Gupta – S. Chand, 15th Edition, 2015.

Course Outcomes:

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

- Draw the Diagram of Port/Valve Timing and Functioning of an I.C Engines. (L2)
- Evaluate the Performance Characteristics of I.C Engine at Different Loads and Draw the Heat Balance Sheet. (L3)
- Evaluate the Performance Test on Reciprocating Air Compressor. (L3)
- Illustrate the Working principle of Refrigeration System. (L4)
- Identify the Various Components of Babcock, Wilcox and Lancashire Boilers. (L2)

B.Tech - IV Sem

L	T	P	C
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(ME20APC406) MACHINE TOOLS & MEASUREMENTS LAB

Prerequisites: Theoretical exposure to Machine tools and Metrology

Course Description:

This Course will Provide Students with a Hands-on Experience on Various Machine Tools and Measuring Instruments. This Course will also Provide an Opportunity to the Students to Experience the Various Steps Involved in the Industrial Product Manufacturing.

Course Objectives:

- Familiarize the Construction and Working of Various Machine Tools.
- Teach Selection of Parameters for Different Machining Processes.
- Familiarize the Construction and Working of Un Conventional Machining Process.

List of Experiments:

Any 6 experiments from each section

Section A:

1. Perform step turning, taper turning, knurling, thread cutting on lathe machine and to measure its surface roughness and the pitch of the thread for thread cutting operation (Any 2).
2. Machining of holes in drilling machine and to perform internal thread cutting.
3. Job on milling (Groove cutting/Gear cutting).
4. Job on shaper.
5. Job on slotter.
6. Grinding of tool angles using tool and cutter grinder

Section B:

1. Measurement of lengths, heights, diameters by vernier calipers, micrometers.
2. Measurement of Diameter of bores by internal micrometers and dial bore indicators.
3. Use of gear teeth vernier calipers for checking the chordal addendum and chordal height of the spur gear.
4. Angle and taper measurements by bevel protractor and sine bars.

5. Thread measurement by 2-wire and 3-wire methods.
6. Surface roughness measurement by Talysurf.
7. Use of mechanical comparator.
8. Study of Tool makers microscope and its application

Course Outcomes:

After completing the course, the student will be able to

1. Illustrate a experimental model with Step turning, taper turning and thread cutting on lathe machine (L4)
2. Demonstrate working principles of drilling and tapping process using drilling machine and Practice a experimental model using the principles of operations in practical on shaper, slotter, planer and milling (L3)
3. Adapt the working principles of grinding of tool angles, cylindrical grinding and surface grinding process (L3)
4. Demonstrate work in quality control departments of industries and to ensure quality of products (L3)
5. Apply the principles in instruments and measuring techniques (L3)

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(CS20ASC301) REAL-TIME APPLICATION OF DATA STRUCTURES

(Skill Oriented Course)

(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.

List of Experiments:

1. Write a program to implement the following operations on Binary Search Tree:
    a) Insert b) Delete c) Search d) Display
2. Write a program to perform a Binary Search for a given set of integer values.
3. Write a program to implement Splay trees.
4. Write a program to implement Merge sort for the given list of integer values.
5. Write a program to implement Quick sort for the given list of integer values.
6. Write a program to find the solution for the knapsack problem using the greedy method.
7. Write a program to find minimum cost spanning tree using Prim's algorithm
8. Write a program to find minimum cost spanning tree using Kruskal's algorithm
9. Write a program to find a single source shortest path for a given graph.
10. Write a program to find the solution for job sequencing with deadlines problems.
11. Write a program to find the solution for a 0-1 knapsack problem using dynamic programming.
12. Write a program to solve Sum of subsets problem for a given set of distinct numbers using Backtracking.
13. Implement N Queen's problem using Back Tracking.

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)

Textbooks:

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 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)

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(ME20AMC401) DESIGN THINKING FOR INNOVATION

(Mandatory Noncredit Course)

Prerequisites: Basic concepts of Mechanical Engineering

Course Objectives:

The Objective of this Course is to Familiarize Students with Design Thinking Process as a Tool for Breakthrough Innovation.

It Aims to Equip Students with Design Thinking Skills and Ignite the Minds to Create Innovative Ideas, Develop Solutions for Real – Time Problems.

UNIT – 1:

Introduction to Elements and Principles of Design, Basics of Design-Dot, Line, Shape, Form as Fundamental Design Components. Principles of Design. Introduction to Design Thinking, History of Design Thinking, New Materials in Industry.

Learning Outcome

After Completion of this UNIT, the Student will be able to

- Explain the Steps in the Principles of Design. (L2)
- Explain the Principle of Design Thinking. (L2)

UNIT – 2:

Design Thinking Process:

Design Thinking Process (Empathize, Analyze, Idea & Prototype), Implementing the Process in Driving Inventions, Design Thinking in Social Innovations. TOOLS of Design Thinking - Person, Costumer, Journey Map, Brain Storming, Product Development

Activity: Every Student Presents their Idea in Three Minutes, Every Student can Present Design Process in the Form of Flow Diagram or Flow Chart etc. Every Student Should Explain about Product Development.

Learning Outcome:

After Completion of this UNIT, the student will be able to

- Explain the Steps in the Design Process. (L2)
- Apply the Design Principle to Various Applications. (L3)

UNIT – 3:

Innovation:

Art of innovation, Difference between Innovation and Creativity, Role of Creativity and Innovation in Organizations. Creativity to Innovation. Teams for Innovation, Measuring the Impact and Value of Creativity.

Activity: Debate on Innovation and Creativity, Flow and Planning from Idea to Innovation, Debate on Value-Based Innovation.

Learning Outcome:

After Completion of this Unit, the student will be able to

- Explain the Types of Innovations and Creativity. (L2)

UNIT – 4:

Product Design:

Problem Formation, Introduction to Product Design, Product Strategies, Product Value, Product Planning, Product Specifications. Innovation towards Product Design Case Studies.

Activity: Importance of Modelling, How to Set Specifications, Explaining their Own Product Design.

Learning Outcome

After Completion of this Unit, the student will be able to

- Explain the Product Design and its Values. (L2)
- Develop Strategies for New Product Development. (L3)

UNIT – 5:

Design Thinking in Business Processes:

Design Thinking Applied in Business & Strategic Innovation, Design Thinking Principles that Redefine Business – Business Challenges: Growth, Predictability, and Change, Maintaining Relevance, Extreme Competition, and Standardization. Design

Thinking to Meet Corporate Needs. Design Thinking for STARTUPS. Defining and Testing Business Models and Business Cases. Developing & Testing Prototypes.

Activity: How to Market our Own Product, About Maintenance, Reliability and Plan for Startup.

Learning Outcome

After Completion of this Unit, the student will be able to

- Explain the Design Thinking Applied in Business & Strategic Innovation. (L2)
- Develop Design Model for Militance and Growth for Different Cases of Business. (L3)

Textbooks:

1. Change by Design, Tim Brown, Harper Bollins (2009).
2. Design Thinking for Strategic Innovation, Idris Mootee, 2013, John Wiley & Sons.

Reference Books:

1. Design Thinking in the Classroom by David Lee, Ulysses Press.
2. Design the Future, by Shrrutin N Shetty, Norton Press.
3. Universal Principles of Design- William Lidwell, Kritinaholden, Jill Butter.
4. The Era of Open Innovation – Chesbrough.H.

Online Learning Resources:

1. https://nptel.ac.in/courses/110/106/110106124/
2. https://nptel.ac.in/courses/109/104/109104109/
3. https://swayam.gov.in/nd1_noc19_mg60/preview

Course Outcomes:

Define the Concepts Related to Design Thinking.

- Explain the Fundamentals of Design Thinking and Innovation.
- Apply the Design Thinking Techniques for Solving Problems in Various Sectors.
- Analyze Work in a Multidisciplinary Environment.
- Evaluate the Value of Creativity.
- Formulate Specific Problem Statements of Real Time Issues.

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(MA20AMC401) ENGINEERING MATHEMATICS

(Lateral Entry Students Only)

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 andMaclaurin 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 del, del applies to scalar point functions-Gradient, del 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)

Textbooks:

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. RajnishVerma, 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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(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, Calendar, Clocks and Number Series Analogy Concepts.

UNIT – 1:

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 – 2:

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 – 3:

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 – 4:

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 – 5:

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.

Textbooks:

3. Quantitative Aptitude, 2012, Dr. R.S. Aggarwal, S. Chand and Company Ltd, New Delhi.
4. A Modern Approach to Verbal and Non-Verbal Reasoning, 2012, Dr. R.S. Aggarwal, S. Chand and Company Ltd, New Delhi.

Reference Books:

5. Quantitative Aptitude for Competitive Examinations, 14/e, 2010, Abhijit Guha, Tata McGraw Hill Publishers, New Delhi.
6. Course in Mental Ability & Quantitative Aptitude, 3/e, 2012, Edgar Thorpe, Tata McGraw Hill Publishers, New Delhi.
7. Fast Track Objective Arithmetic, 2012, Rajesh Verma, Arihant Publications, Meerut.
8. 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 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 Calender, Clocks and Number Series Analogy Concepts.

III Year I Semester

B.Tech- V Sem

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(ME20APC501) CAD / CAM

Prerequisites: Computer Aided Machine Drawing, Machine Tools, and Metrology

Course Objectives:

- Understand the basics of CAD/CAM, geometric representation and transformations.
- Explain geometric modeling methods in CAD.
- Familiarize numerical control (NC), computer numerical control (CNC) and direct numerical control (DNC) machines.
- Impart knowledge on manual part programming and computer aided part programming.
- Explain the principles CAQC, CIM, AR,VR and AI in CIM

UNIT – 1:

Introduction to CAD/CAM: Introduction, Hardware and software, I/O devices, benefits. Graphics standards-Neutral file formats – IGES, STEP.

2D and 3D geometric transformations: Translation, Scaling, Rotation, Mirroring, Homogenous Transformations, Concatenation of transformations, Viewing transformations.

Learning Outcomes:

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

- List various input and output devices (L1)
- Apply geometric transformations in 2D and 3D (L3)
- Apply window to viewport transformation (L3)

UNIT – 2:

Parametric representation: Representation of curves, Hermite curves, Bezier and B-spline curves in two dimensions. Geometric modelling of surfaces: Surface patch, Coons patch, Bezier and B-spline surfaces, Sweep surfaces, Surface of revolution.

Geometric Modelling of Solids: Wireframe, Surface modelling, Solid entities, Boolean operations, CSG approach and B-rep of solid modelling, Geometric modelling of surfaces.

Learning Outcomes:

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

- Apply the concepts of parametric representation to curves and surfaces. (L3)
- Create surfaces such as coons, bezier and b-spline (L6)
- Differentiate wireframe, surface and solid modeling. (L4)
- Apply the solid modeling concepts. (L3)

UNIT – 3:

Computer Aided Manufacturing (CAM): Structure of numerical control (NC) machine tools, Designation of axes, Drives and actuation systems, Feedback devices, Computer numerical control (CNC) and Direct numerical control (DNC), Adaptive control system, CNC tooling, Automatic tool changers and work holding devices, Functions of CNC and DNC systems.

Learning Outcomes:

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

- Identify the differences between NC, CNC and DNC. (L3)
- Use devices and activation systems. (L3)
- Apply adaptive control system. (L3)
- Apply different tooling and tool chargers, working holding devices. (L3)

UNIT – 4:

Part Programming: Part programming instruction formats, Information codes, Preparatory functions, Miscellaneous functions (G-codes, M-codes). Tool codes and tool length offset, Interpolations and Canned cycles.

APT Programming: APT language structure, APT geometry, Definition of point, Line, Circle, Plane. APT Motion Commands: set-up commands, Point to point motion command.

Learning Outcomes:

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

- Apply the fundamentals of part programming in CNC. (L3)
- Use G codes, M codes in CNC part programs. (L3)
- Apply the concept of canned or fixed cycles for the hole making operations. (L3)
- Identify geometric features in APT language. (L3)
- Apply motion commands in APT to generate surfaces. (L3)

UNIT-5

Computer Aided Quality Control: Terminology in Quality control, Inspection and testing, Contact inspection methods - Optical and Non optical, Integration of CAQC with CAD and CIM

Computer integrated manufacturing (CIM): Elements of CIM, Virtual Reality (VR), Augmented Reality (AR), Artificial Intelligence (AI) and expert systems in CIM.

Learning Outcomes:

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

- Understanding the need of Computers in Quality Control. (L3)
- Categorize the cim environment and its elements. (L4)
- Explain the role vr, ar and ai in manufacturing engineering. (L3)

Textbooks:

1. P. N. Rao, CAD/CAM: “Principles and applications”, 3rd edition, Tata McGraw-Hill, Delhi, 2017.
2. Ibrahim Zeid, R.Siva Subramanian, “CAD/CAM: Theory and Practice”, 2nd edition, Tata McGraw-Hill, Delhi, 2009.

Reference Books:

1. Mikell P. Groover, Emory W. Zimmers , “CAD/CAM”, 5th edition, Pearson Prentice Hall of India, Delhi, 2008
2. P. Radhakrishnan, S. Subramanyan & V. Raju, “CAD/CAM/CIM”, 3rd edition, New Age International Publishers, 2008
3. Tien Chien Chang, “Computer Aided Manufacturing”, 3rd edition, Pearson, 2008.

4. SJ Martin, “Numerical control of machine tools”, London, Hidden & Stoughton, 1982.
5. Solid cam, “Software packages”, solid works or equivalent.

Course Outcomes:

After Successful Completion of this Course, the student will be able to

- Apply the basics of geometric representation and transformations in CAD/CAM. (L3)
- Choose geometric modeling methods for building CAD models. (L3)
- Compare NC, CNC and DNC. (L4)
- Develop manual and computer aided part programming for turning and milling operations. (L3)
- Summarize the principles of CAQC, Robotics AR, VR and AI in CIM. (L2)

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(ME20APC502) DESIGN OF MACHINE MEMBERS

Prerequisites: Kinematic of Machines and Dynamic of machinery

Course Objectives:

- Provide an introduction to design of machine elements.
- Familiarize with fundamental approaches to failure prevention for static and dynamic loading.
- Explain design procedures to different types of joints and shafts.
- Teach principles of keys, couplings and springs and design procedures.
- Explain design procedures of IC Engine parts.

UNIT – 1:

Mechanical Engineering Design: Design process, design considerations, codes and standards of designation of materials, selection of materials.

Design for Static Loads: Modes of failure, design of components subjected to axial, bending, torsional and impact loads. Theories of failure for static loads.

Design for Dynamic Loads: Endurance limit, fatigue strength under axial, bending and torsion, stress concentration, notch sensitivity. Types of fluctuating loads, fatigue design for infinite life. Soderberg, Goodman and modified Goodman criterion for fatigue failure. Fatigue design under combined stresses.

Learning Outcomes:

After completion of this unit, students will be able to

- Identify materials suitable for machine elements. (L1)
- Apply codes and standards in design. (L3)
- Contrast the difference between static and dynamic loads. (L2)
- Apply failures theories in designing components subjected to static and dynamic loads. (L3)

UNIT – 2:

Design of Bolted Joints: Threaded fasteners, preload of bolts, various stresses induced in the bolts and eccentrically loaded bolted joints.

Welded Joints: Strength of lap and butt welds, Joints subjected to bending and torsion. Eccentrically loaded welded joints.

Learning Outcomes:

After completion of this unit, students will be able to

- Identify different types of joints. (L1)
- Analyse stresses induced in joints subjected to different loads. (L4)
- Design different joints subjected to combined loading. (L3)

UNIT – 3:

Power Transmission Shafts: Design of shafts subjected to bending, torsion and axial loading. Shafts subjected to fluctuating loads using shock factors.

Riveted Joints: Design of lap, butt and eccentrically loaded joints, failure and efficiency of Riveted joints.

Learning Outcomes:

After completion of this unit, students will be able to

- Design shafts subjected to fluctuating loads. (L3)
- Design different joints subjected to combined loading. (L4)

UNIT – 4:

Keys: Function, types, design of sunk, saddle, Kennedy and Woodruff keys, Design of keys.

Couplings: Design of flange and bushed pin couplings, universal coupling.

Springs: Design of helical compression, torsion and leaf springs.

Learning Outcomes:

After completion of this unit, students will be able

- Explain the functions of different keys. (L2)
- Select coupling for a given application and outline the design procedure. (L3)
- Explain construction and design procedure for helical and leaf springs. (L2)

UNIT – 5:

Design of IC Engine parts: Pistons– Design of piston. Cylinder, Connecting Rod. Crank shafts- Centre and over hung cranks.

Learning Outcomes:

After completion of this unit, students will be able

- To understand various concepts of design of IC Engine parts and know failure criteria.(L2)

Textbooks:

1. J.E. Shigley, "Mechanical Engineering Design", 2nd edition, Tata McGraw Hill, 1986.
2. V.B.Bhandari, "Design of Machine Elements", 3rd edition, Tata McGraw Hill, 2010.

Reference Books:

1. R.L. Norton, "Machine Design an Integrated approach", 2nd edition, Pearson Education, 2004.
2. R.K. Jain, "Machine Design: Khanna Publications, 1978.
3. M.F.Spotts and T.E.Shoup, "Design of Machine Elements", 3rd edition, Prentice Hall (Pearson Education), 2013.

- Note: PSG Design data book is permitted

Course Outcomes:

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

- Estimate safety factors of machine members subjected to static and dynamic loads. (L5)
- Design fasteners subjected to variety of loads. (L3)
- Select of standard machine elements such as keys, shafts, couplings and springs. (L1)
- Design of IC Engine parts. (L3)

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(ME20APC503) FLUID MECHANICS & HYDRAULIC MACHINES

Prerequisites: Engineering Mechanics, Engineering Physics

Course Objectives:

- To Introduce concepts of fluid statics and kinematics
- To impart the knowledge on minor losses in pipes
- To impart knowledge on power developed by hydraulic energy and hydroelectric installations.
- To impart the knowledge on design of turbines
- To impart the knowledge on design of centrifugal pumps.

UNIT -1:

Fluid Statics:

Dimensions and units: physical properties of fluids – specific gravity, porosity surface tension – vapor pressure and their influence on fluid motion – atmospheric gauge and vacuum pressure – measurement of pressure – Piezometer, U-tube differential manometers

Fluid Kinematics

stream line, path line and streak lines and steam tube, classification of flows-steady & unsteady, uniform, non-uniform, laminar, turbulent, rotational, and irrotational flows-equation of continuity for one dimensional flow.

Fluid dynamics: surface and body forces – Euler's and Bernoulli's equations for flowing stream line, momentum equation and its application on force on pipe bend.

Learning Outcomes:

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

- To introduce the concepts stream line, path line, streak line etc., (L3)
- To familiarize the concepts of rotational and irrotational flows (L3)

UNIT -2:

Conduit Flow

Reynold’s experiment – Darcy Weisbach equation – Minor losses in pipes – pipes in series and pipes in parallel – total energy line-hydraulic gradient line. Measurement of flow: pitot tube, venturi meter, and orifice meter, Flow nozzle, Turbine current meter.

Learning Outcomes:

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

- To introduce the concepts of pipes in series and parallel (L3)
- To familiarize the discharge measurements by using pitot tube, venturi meter etc., (L3)

UNIT -3:

Turbo Machinery: hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work done efficiency, flow over radial vanes.

Hydroelectric Power Stations: Elements of hydroelectric power station-types, concept of pumped storage plants-storage requirements.

Learning Outcomes:

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

- To impart the knowledge on effect of impact of jets on different types of vanes. (L3)
- To familiarize with the elements of hydroelectric installations. (L3)

UNIT -4:

Hydraulic Turbines: Classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies hydraulic design-draft tube- theory- functions and efficiency.

Performance of Hydraulic Turbines: Unit and specific quantities, characteristics governing of turbines, selection of type of turbine, cavitation, surge tank, hammer.

Learning Outcomes:

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

- To impart the knowledge on working principles of hydraulic turbines along with their efficiencies. (L3)

- To evaluate the performance of different types of turbines. (L3)

UNIT -5:

Centrifugal Pumps: Classification, working, work done – manomertic head – loss efficiencies – specific speed – pumps in series and parallel – performance characteristic curves, NPSH.

Learning Outcomes:

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

- To impart the knowledge on working principles of different pumps. (L3)
- To evaluate the performance of different types of pumps. (L3)

Textbooks:

1. "Hydraulics, fluid mechanics and Hydraulic machinery MODI and SETH". Standard book house
2. Dr. R.K.Bansal, "Fluid Mechanics" Lakshmi Publications Pvt. Ltd.
3. D. Rama Durgaiah, "Fluid Mechanics and Machinery" New Age International.

Reference Books:

1. D.S. Kumar, "Fluid Mechanics and Fluid Power Engineering", Kotaria &Sons.
2. Banga & Sharma, "Hydraulic Machines", Khanna Publishers.
3. James W.Dally, "Instrumentation for Engineering Measurements", Wiley Riley, John Wiley & Sons Inc. 2004.

Course Outcomes:

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

- Understand characteristics of laminar and turbulent flows. (L2)
- Understand the energy losses in different types of pipes. (L2)
- Identify the performance of different types of turbines. (L1)
- Identify the performance of centrifugal pumps. (L1)

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(EC20AOE502) DIGITAL ELECTRONICS

(Open Elective – I)

Course Objectives:

- To introduce basic postulates of Boolean algebra and the methods for simplifying Boolean expressions
- To learn about Gate Minimization techniques.
- To illustrate the concepts and study the procedures for the analysis and design of Combinational circuits.
- To study the procedures for the analysis and design of Sequential circuits.
- To introduce the concepts of programmable logic devices.

UNIT – 1:

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 – 2:

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 – 3:

Combinational Logic Circuits:

Combinational circuits, Analysis & Design procedure, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude comparator, Decoder, Encoders, Multiplexers.

UNIT – 4:

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 – 5:

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).

Textbooks:

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:

- Apply basic postulates of Boolean Algebra in the design of design systems.
- Design digital logic circuits using K-Map minimization technique.
- Develop an Arithmetic Logic Unit using different Combinational circuits.
- Design Sequential circuits.
- Compare various Programmable logic devices.

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 – 1:

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 – 2:

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 – 3:

Biomedical waste: e-waste and Plastic waste, Biomedical waste and Biomedical waste management rules, 2016.

Composting: Definition- Vermicomposting 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 – 4:

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 – 5:

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

Textbooks:

1. Arcadio Sincero and Gregoria Sincero "Environmental Engineering", Second Edition, Prentice -Hall India
2. George Tchobanoglous "Intigrated 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.

- Qian X, Koerner RM and Gray DH, 'Geotechnical Aspects of Landfill Design and Construction' Prentice Hall, 2002.

Course Outcomes:

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.

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(EE20AOE503) RENEWABLE ENERGY RESOURCES

(Open Elective – I)

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 titled 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.

Textbooks:

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

- Explain the basic concepts of solar radiation and solar collectors
- Develop the Bio - Energy Concepts
- Explain the geothermal Energy ,Tidal and Wave Energy
- Apply the principles of electrical technology to develop MHD power generator & Utilize different wind parameters for design of rotor
- Make use of power curve for energy estimation and fuel cell Technology

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(AM20AOE501) 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 – 1:

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 – 2:

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 – 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, 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 – 4:

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 – 5:

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)

Textbooks:

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

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)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech- V Sem

L	T	P	C
3	0	0	3

(ME20APE501) AUTOMATION & ROBOTICS

(Professional Elective – I)

Prerequisites:

Course Objectives:

- The objectives of this course are to
- Describe the basic concepts of automation in manufacturing systems.
- Acquire the fundamental concepts of automated flow lines and their analysis.
- Classify automated material handling, automated storage and retrieval systems.
- Illustrate adaptive control systems and automated inspection methods.
- Define the fundamental concepts of industrial robotics.
- Apply basic mathematics to calculate the robot kinematic and dynamic mechanics
- Understand the robot programming methods and software packages.

UNIT – 1:

Introduction

Introduction: Automation in production system, need, types, Principles and Strategies of automation, levels of automation, basic elements of an automated system, hardware components for automation and process control, mechanical feeders, hoppers, orienteers, high speed automatic insertion devices.

Automated flow lines& transfer mechanisms, fundamentals of transfer Lines, flow lines with or without buffer storage.

Learning Outcomes:

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

- Applying the diagnostic techniques, for analyzing the troubles in a vehicle through the microprocessor.
- Perform vehicle diagnosis and apply the fault-finding techniques practically

UNIT – 2:

Assembly Line Balancing and Automated Manufacturing System

Assembly Line Balancing: Assembly process and systems assembly line, line balancing algorithms, ways of improving line balance, flexible assembly lines.

Material handling and Identification Technologies: Overview of automatic material handling systems, principles and design consideration, material transport systems, storage systems, overview of automatic identification methods.

Automated Manufacturing Systems: Components, classification and overview of manufacturing systems, manufacturing cells, GT and cellular manufacturing, FMS and its planning and implementation.

Learning Outcomes:

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

- Understand the sensors, and location of sensors in a vehicle and connections with the processor
- Understand the basic concepts of on board and off board diagnosis (L2)

UNIT – 3:

Introduction to Robotics

Introduction: Brief history of robots,classification of robot, functional line diagram, degrees of freedom. Elements of robot - types and its functions, factors to be considered in the design of grippers.

Robot Actuators And Feedback Components: Actuators, Pneumatic, Hydraulic actuators, Electric &Stepper motors, comparison. Position sensors - potentiometers, resolvers, encoders - velocity sensors, Tactile sensors, Proximity sensors.

Learning Outcomes:

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

- Explain the fundamentals of robotics and its components
- Explain sensors and instrumentation in robotics
- Diagnostic system enables real-time communication through modules, the engine condition information can be checked at any time.

UNIT – 4:

Kinematics and Dynamics of a Manipulator

Manipulator Kinematics: Homogenous transformations as applicable to translation, rotations- D-H notation, Forward and inverse kinematics.

Manipulator Dynamics: Differential transformations, Jacobians, Lagrange - Euler and Newton - Euler formations.

Learning Outcomes:

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

- GENERAL BRAKE SYSTEMS DIAGNOSIS
- Understanding the life of a tire enhanced and control of steering

UNIT – 5:

Robot Programming and Applications

Robot Programming: Methods of programming - requirements and features of programming languages, software packages, problems with programming languages. Motion path control- slew motion, joint integrated motion, straight line motion; avoidance of obstacles.

Robot Application in Manufacturing: Material Transfer - Material handling, loading and unloading; Process - spot and continuous arc welding & spray painting; Assembly and Inspection.

Learning Outcomes:

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

- Understand the working and trouble shooting in lighting, Body-Electrical Systems, Heating Ventilation and Air Conditioning

Textbooks:

1. Richard.C.Dorf and Robert.H.Bishop , “Modern Control System” 12th edition Pearson Prentice Hall,2013.
2. Benjamin.C.Kuo, “Automatic control systems”, Prentice Hall of India, 7th Edition, 1995.
3. Tom denton “Advanced automotive fault diagnosis”, Elsevier butterworth-heinemann linacre house, jordan hill, oxford ox2 8dp, uk - isbn-10: 0-75-066991-8.

4. Tom Denton “Automotive Electronics Handbook”, - - McGraw-Hill Publishing Co.; 2nd Revised edition 1999, ISBN10:0070344531

Reference Books:

1. J.Nagrath and M.Gopal, “Control System Engineering”, New Age International Publishers, 5th Edition, 2007.
2. Routledge “Automobile Electrical and Electronic Systems”, 4th edition 2012, ISBN10: 0080969429.

Course Outcomes:

At the end of the course student will be able to

- Classify the types of hardware components of automation and control system.
- Design a simple material handling system for low-cost manufacturing.
- Design a simple gripper for robot.
- Compare the types of actuators used in robot manipulator.
- Understand the requirements and features of robot programming.
- Demonstrate the various applications of robots in manufacturing.

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L	T	P	C
3	0	0	3

(ME20APE502) INDUSTRIAL ENGINEERING

(Professional Elective – I)

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, Hertzberg"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 – Departmentation and Decentralization and their Merits, Demerits and Suitability

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)
- Differentiate the concepts of Departmentation and Decentralization etc. (L2)

UNIT – 2:

Plant Location: Definition, Factors affecting the Plant Location, Comparison of Rural and Urban sites, Selection of Plant Location – Types of Production; Plant Layout: Definition, Objectives, Types of Plant Layout - Materials Handling: Functions-Objectives – Types, Selection Criteria of Material Handling Equipment.

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)
- Apply the various material handling systems and types in industry. (L3)

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. Acceptance Sampling Plan - Single Sampling and Double Sampling Plans- OC Curves. 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)
- Differentiate single and double sampling plans. (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)
- Understand the Inspection and Quality control concepts. (L2)
- Apply SQC techniques of Variables and attribute charts for effective inspection. (L4)

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3	0	0	3

(ME20APE503) METAL FORMING PROCESS

(Professional Elective – I)

Pre-requisite: Mechanics of Solids and Manufacturing Technology

Course Objectives:

- To understand the basic concepts of stress and strain.
- To comprehend Hot working and Cold working concepts.
- To apply the knowledge in Rolling, Extrusion, Forging and Sheet metal Working.
- Perform Processing of Plastics by different methods.

UNIT – 1:

Stress & Strain:

Stress, strain, Two-dimensional stress analysis and three-dimensional stress analysis, relation between engineering stress and true stress, relation between engineering strain and true strain, yield criteria, yield locus, theory of plasticity, Hot working, cold working, strain hardening, recovery, recrystallization and grain growth, Comparison of properties of Cold and Hot worked parts

Learning Outcomes:

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

- Solve problems in Stress and Strain. (L3)
- Explain the concept of Hot working and Cold Working. (L2)
- Compare cold working and hot working processes. (L4)

UNIT – 2:

Rolling:

Bulk deformation processes – Economics of bulk forming, principles and theory of rolling, types of Rolling mills and products. Forces in rolling and power requirements, applications and, limitations, defects in rolled products – machinery and Equipment.

Forging Processes:

Principles of forging –Types Forging – Smith forging, Drop Forging – Roll forging – Forging hammers: Rotary forging – forging defects, Forces in forging of strip, disc and power requirements, applications, Equipment and their selection.

Learning Outcomes:

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

- Explain the bulk deformation Process in Rolling and Forging. (L2)
- Explain the working principle of different types of Rolling and Forging (L2)
- Explain the working of rolling mills. (L2)
- Evaluate the forces and power in rolling and forging processes. (L5)
- Identify the principles of forging, tools and dies. (L3)

UNIT – 3:

Extrusion Processes:

Basic extrusion process and its characteristics. Mechanics of hot and cold extrusion - Forward extrusion and backward extrusion – Impact extrusion Hydrostatic extrusion, forces in extrusion of cylindrical and non-cylindrical components – characteristics and defects in extruded parts.

Wire Drawing: Process Mechanics and its characteristics, determination of degree of drawing, drawing force, power, and number of stages-defects in products.

Learning Outcomes:

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

- Solve problems in Extrusion Ratio and Wire Drawing force. (L3)
- Explain the concepts of Wire Drawing process. (L2)
- Summarize the working of various extrusion processes. (L2)
- Evaluate the forces and power in extrusion processes. (L5)

UNIT – 4:

Sheet Metal Working:

Economical Considerations - Stamping, forming and other cold working processes: Blanking and piercing – Bending and forming – Drawing and its types – Cup drawing and Tube drawing – coining – Hot and cold spinning. Force and power requirement in sheet metal operations, defects in sheet metal products – Equipment, tooling and their characteristics.

Learning Outcomes:

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

- Apply the concepts of sheet forming in real time applications. (L2)
- Explain the working principle of different types of forming operations (L2)
- Summarize the various operations of Sheet metal forming. (L2)

UNIT – 5:

Processing of Plastics:

injection and blow moulding, calendaring, thermo forming, compression moulding, transfer moulding, High energy rate forming methods Rapid manufacturing: - Introduction – concepts of rapid manufacturing, information flow for rapid prototyping, classification of rapid prototyping process, sterer holography fused deposition modelling, selective laser sintering, Applications of rapid prototyping process.

Learning Outcomes:

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

- Student will able to prepare different parts by using moulding machines. (L3)
- Explain the concepts of Rapid manufacturing(L2)
- Learn the methods of manufacturing plastics parts. (L2)
- Demonstrate the application of plastic. (L2)

Textbooks:

1. Manufacturing Technology, Schmid and kalpakjin, Pearson Education.
2. Manufacturing Technology, Foundry forming and welding, Vol I, P.N.Rao, TMH.

Reference Books:

1. Production Technology, R.K. Jain, Khanna Publishers,17th edition, 2012.
2. Process and materials of manufacturing –Lindberg, PE.
3. Principles of Metal Castings, Rosenthal.
4. Welding Process, Parmar.
5. Manufacturing Technology, R.K. Rajput, Laxmi Pub.
6. Rapid Prototyping Principles and Applications, RafiqNoorani, Wiely Pub.

Course Outcomes:

At the end of this course students will be able to ...

- Determine major process/processes of manufacturing used for given application.
- Explain when and why metal forming is chosen compared to other compatible methods.
- Analyze effect of parameters influencing metal forming and compare hot working and cold working with applications.
- Explain capabilities and applications of bulk metal forming processes and sheet metal work.
- Outline tooling and equipments required for important metal forming processes.
- Examine effects of friction & lubrication and causes of common defects in metal forming.

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B.Tech- V Sem	L	T	P	C
	3	0	0	3

(ME20APE504) PRODUCT DESIGN AND DEVELOPMENT

(Professional Elective – I)

Prerequisites:

Course Objectives:

The objectives of the course are to

- Explain the concepts of product design and development.
- Familiarize with the concepts of product design.
- Impart knowledge with various methods of designing for manufacturing and assembly.
- Explore about the quality added factors to the products to improve the life of the product.
- Gaining knowledge on reverse engineering concepts.

UNIT – 1:

Introduction: Classification - Specifications of Products - Product life cycle – Product mix. Introduction to product design - Modern product development process - Innovative thinking - Morphology of design.

Learning Outcomes:

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

- Identify the basic needs of product design and life cycle. (L2)

UNIT – 2:

Conceptual Design: Generation, selection & embodiment of concept - Product architecture. Industrial design: process, need - Robust Design: Taguchi Designs & DOE - Design Optimization.

Learning Outcomes:

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

- Sammarize concept of product design using different design methods. (L2)

UNIT – 3:

Design for Manufacturing & Assembly: Methods of designing for Manufacturing & Assembly - Designs for Maintainability - Designs for Environment - Product costing. Legal factors and social issues - Engineering ethics and issues of society related to design of products.

Learning Outcomes:

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

- Describe the various methods for manufacturing and assembly. (L3)

UNIT – 4:

Ergonomics / Aesthetics: Gross human autonomy – Anthropometry - Man-Machine interaction. Concepts of size and texture, colour - Comfort criteria. Psychological & Physiological considerations - Creativity Techniques: Creative thinking, conceptualization, brain storming, primary design, drawing, simulation, detail design.

Learning Outcomes:

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

- Explain with concepts to improve the quality of the product. (L2)

UNIT – 5:

Value Engineering/Value Analysis: Definition - Methodology - Case studies - Economic analysis - Qualitative & Quantitative.

Concurrent Engineering, Rapid prototyping, Tools for product design – Drafting / Modeling software. CAM Interface - Patents & IP Acts - Overview, Disclosure preparation.

Learning Outcomes:

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

- Analyze with value analysis to increase the marketing strategy of the products. (L4)

Textbooks:

1. Karl T Ulrich, Steven D Eppinger, “Product Design & Development.” Tata Mc Grawhill New Delhi 2003.
2. David G Ullman, “The Mechanical Design Process.” Mc Grawhill Inc Singapore 1992 N J M Roozenberg, J Ekels, N F M Roozenberg “Product Design Fundamentals and Methods.” John Willey & Sons 1995.

Reference Books:

1. Kevin Otto & Kristin Wood Product Design: “Techniques in Reverse Engineering and new Product Development.” 1 / e 2004, Pearson Education New Delhi.
2. L D Miles “Value Engineering.”
3. Hollins B & Pugh S “Successful Product Design.” Butter worths London.
4. Baldwin E N & Neibel B W “Designing for Production.” Edwin Homewood Illinois.
5. Jones J C “Design Methods.” Seeds of Human Futures. John Willey New York.
6. Bralla J G “Handbook of Product Design for Manufacture, Mc Grawhill New York.

Course Outcomes:

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

- Summarize the concepts of product design and development. (L2)
- Illustrate the conceptual design and layout the industrial process. (L3)
- Design the manufacturing process for a product. (L6)
- Analyze the product design based on the cost. (L6)
- Evaluate the existing product using reverse engineering and assemble the parts with concurrent engineering. (L6)

B.Tech - V Sem

L	T	P	C
0	0	3	1.5

(ME20APC504) CAD/CAM LAB

Prerequisites: Computer Aided Machine Drawing Lab and Machine Tools Lab

List of Experiments:

3D MODELING

1. 3D Geometric Modelling using Pad
2. Modeling of Machine Component in 3D
3. Modeling of Angular block in 3D
4. Write Program for Translation, Scaling and Rotation
5. Write Program for Generating Bezier Curve
6. Introduction to CNC Machines and G-Code, M-Codes
7. Introduction to NC part programming – for Different operations like Turning, Threading, Milling, Drilling etc., (G-Codes & M-Codes)
8. CNC Part Program for Plane Milling.
9. CNC Part Program for Drilling Operation.
10. CNC Part Program for Step Turning Operation.

Textbooks:

1. P. N. Rao, CAD/CAM: “Principles and applications”, 3rd edition, Tata McGraw-Hill, Delhi, 2017
2. Ibrahim Zeid, R.Siva Subramanian, “CAD/CAM: Theory and Practice”, 2nd edition, Tata McGraw-Hill, Delhi, 2009

Reference Books:

1. Mikell P. Groover, Emory W. Zimmers , “CAD/CAM”, 5th edition, Pearson Prentice Hall of India, Delhi, 2008
2. P. Radhakrishnan, S. Subramanyan & V. Raju, “CAD/CAM/CIM”, 3rd edition, New Age International Publishers, 2008
3. Tien Chien Chang, “Computer Aided Manufacturing”, 3rd edition, Pearson, 2008
4. SJ Martin, “Numerical control of machine tools”, London, Hidden & Stoughton, 1982.

5. Solid cam, “Software packages”, solid works or equivalent.

Course Outcomes:

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

- Generate Solid CAD models of Machine Parts. (L3)
- Develop CNC programs for various machining operations. (L3)
- Make use of modern software tools to accurately model parts for specific manufacturing operations.(L3)

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L	T	P	C
0	0	3	1.5

(ME20APC505) FLUID MECHANICS & HYDRAULIC MACHINES LAB

Prerequisites: Engineering Mechanics, Engineering Physics

Course Objectives:

- The object of the course to make the students understand the fluid flow concepts and get familiarity with flow measuring devices.

List of Exercises:

- Calibration of Venturi meter
- Calibration of Orifice meter
- Determination of Coefficient of discharge for a small orifice by a constant head method.
- Determination of Coefficient of discharge for an external mouth piece by variable head method.
- Calibration of contracted Rectangular Notch and /or Triangular Notch.
- Determination of Coefficient of loss of head in a sudden contraction and friction factor.
- Verification of Bernoulli's equation.
- Impact of jet on vanes.
- Study of Hydraulic jump.
- Performance test on Pelton wheel turbine.
- Performance test on Francis turbine.
- Efficiency test on centrifugal pump.

Textbooks:

1. "Hydraulics, fluid mechanics and Hydraulic machinery MODI and SETH". Standard book house
2. Dr.R.K.Bansal, "Fluid Mechanics" Lakshmi Publications Pvt.Ltd.
3. D.Rama Durgaiah, "Fluid Mechanics and Machinery" New Age International.

Reference Books:

1. D.S. Kumar, “Fluid Mechanics and Fluid Power Engineering”, Kotaria &Sons
2. Banga & Sharma, “Hydraulic Machines”, Khanna Publishers.
3. James W.Dally, “Instrumentation for Engineering Measurements”, Wiley Riley, John Wiley & Sons Inc. 2004

Course Outcomes:

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

- Analyze the various flow properties using various flow measuring devices.
- Understand the performance of various turbines and pumps.

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L	T	P	C
1	0	2	2

(ME20ASC501) ADDITIVE MANUFACTURING (VIRTUAL LAB)

(Skill Oriented Course – III)

Prerequisites: Fundamentals of Additive Manufacturing

Course Objectives:

1. Identify and describe the function of different parts of the 3D printer.
2. Use the simulator & assemble the different parts of the 3D printer.
3. Realize the operation of the 3D printer for different parameters given by the student and can check the effect of the different parameter on the performance of the printer.
4. Build a given 3D printer by using the different parts available with the students. This will help them to learn the assembly without actually destructing the parts.
5. Answer the questions related to part functioning and the assembly of the 3D printer

List of Experiments:

1. FDM Anatomy of 3D Printer Machine
2. Cartesian 3D Printer Machine
3. Polar 3D Printing machine
4. Delta 3D Printing machine
5. Simulation of Stereo lithography Process
6. Simulation of Fused Deposition Modelling (FDM) Process
7. Simulation of Selective Laser Sintering (Non-Metal) Process
8. Simulation of Selective Laser Sintering (Metal) Process
9. Simulation of Laminated object manufacturing Process
10. Simulation of Powder Binding / Jetting Process
11. Simulation of Post-processing in Additive manufacturing
12. Simulation of Pre-processing in Additive manufacturing.

Textbooks:

1. Ian Gibson, David W. Rosen, Brent Stucker, “Additive Manufacturing Technologies Rapid Prototyping to Direct Digital Manufacturing”.
2. Kamara S, Faggiani KS. Fundamentals of Additive Manufacturing for the Practitioner. John Wiley & Sons; 2021 Apr 29.

Reference Books:

1. Venuvinod PK, Ma W. Rapid prototyping: laser-based and other technologies. Springer Science & Business Media; 2004.
2. Chua CK, Leong KF. 3D Printing and additive manufacturing: Principles and applications (with companion media pack)-of rapid prototyping. World Scientific Publishing Company; 2014 Aug 6.

Online Resources:

- Online simulation platform on "3D Printing Virtual Simulation Lab" by https://3dp-dei.vlabs.ac.in/

Course Outcomes:

- Distinguish the different parts of the 3D printer.
- Perform the assembly of different parts of the 3D printer.
- Analyze the different parameters effect on the performance of the 3D printer.
- Build the 3D printer by using the different parts available and apply this concept to build different type of 3D printers.
- Analyze the functioning of different parts which contributes to improve the performance of the 3D printer.

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L	T	P	C
2	0	0	0

(CH20AMC301) BIOLOGY FOR ENGINEERS

(Mandatory Noncredit Course)

Prerequisites:

Course Objectives:

- To provide basic understanding about life and life Process. Animal an plant systems.
- To understand what bimolecules, are, their structures are functions. Application of certain bimolecules 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 – 1:

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 – 2:

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 – 3:

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 – 4:

Introduction to Molecular Biology and Recombinant DNA Technology: Prokaryotic gene and Eukaryotic gene structure. DNA replication, Transcription and Translation. DNA 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 – 5:

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)

Textbooks:

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 Phil Tunner, A. Mctennan, A. Bates & M. White, Instant Notes – Molecular Biology –2014

Course Outcomes:

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

- Analyze about cells and their structure and function. Different types of cells and basics for classification of living Organisms.
- Analyze about biomolecules, their structure and function and their role in the living organisms. How biomolecules are useful in Industry.
- Analyze about human physiology.
- Analyze about genetic material, DNA, genes and RNA how they replicate, pass and preserve vital information in living Organisms.
- Apply biological Principles in different technologies for the production of medicines and Pharmaceutical molecules through transgenic microbes, plants and animals.

B.Tech - V Sem

L	T	P	C
2	0	0	0

(IT20AMC501) PROBLEM SOLVING AND PROGRAMMING

(Lateral Entry Students Only)

Pre-requisite:

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

- 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, 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, Preprocessors.

Learning Outcomes:

The students will be able to

- Use pointers to write c Programs (L3).
- Understand the concepts of pre processors (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 of records, 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).

Textbooks:

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, Ellot 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).

III Year II Semester

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech - VI Sem

L	T	P	C
3	0	0	3

(ME20APC601) FINITE ELEMENT METHODS

Prerequisites:

Course Objectives:

- To enable the students, understand the mathematical and physical principles underlying the Finite Element Method (FEM) as applied to solid mechanics, heat transfer and fluid flow problems.
- To teach the students the characteristics of various elements and selection of suitable elements for the problems being solved.
- To make the students derive finite element equations for simple and complex elements.

UNIT – 1:

Introduction to Finite Element Method

General description of Finite Element Method – Historical development – Comparison with classical methods – Other numerical methods such as FDM, BEM, etc. - General procedure of FEM – Application software’s in FEM.

Approximate Solutions to Engineering Problems

Weighted residual methods – collocation method, sub domain method, method of least squares and Galerkin method - Variational formulation Ritz method - numerical problems.

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)

UNIT – 2:

Finite Element Formulations to 1-D problems

II order problems - Bar Problem – Formulation for the whole domain – Formulation for the subdomain (finite element) using interpolation polynomial - Nodal approximation using shape function – computing element matrices - Assembly of element matrices – Application of B.Cs – solution –post processing.

Analysis of trusses: Stiffness Matrix for 1D truss element, Stress Calculations and Problems with maximum of three elements.

Learning Outcomes:

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

- Formulate and solve axially loaded bar problems. (L4)
- Formulate and solve truss problems. (L4)

UNIT – 3:

Beam problems

(IV order problems) – B.Cs & loading conditions on to nodes – element matrices - solution and post processing of results – I Dimension problems such as Heat transfer problems, Vibration problems in bar and beams etc.

Two Dimensional problems

Discretization: Geometrical approximations – Simplification through symmetry – Element shapes and behaviour – Choice of element types – Simplex - Complex and Multiplex elements – Selection of interpolation polynomials (shape functions) - Convergence requirements – Element shape and distortion – Location of nodes – Node and Element numbering.

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. (L4)

UNIT – 4:

Field problems – scalar and vector variables

Scalar variable problems such as heat transfer, torsion of non-circular shafts etc – Vector variable problems such as plane stress, plane strain and axi-symmetric problems

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. (L4)
- Understand the basic concept and formulation of plane stress and plane strain problems. (L3)

UNIT – 5:

Natural Coordinate Systems

Derivation of shape functions for various elements – Isoperimetric elements – 1D, 2D and 3 D elements - Numerical Integration and its advantages.

Learning Outcomes:

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

- To write shape functions for various elements. (L2)
- Apply the Numerical Integration for 2D, 3D elements.(L3)

Textbooks:

1. Chandraputla, Ashok & Belegundu, Introduction to Finite Element in Engineering, Prentice Hall.
2. S.S.Rao, The Finite Element Methods in Engineering, Elsevier Butterworth - Heinemann 2nd Edition, 2011.

Reference Books:

1. J N Reddy, An introduction to the Finite Element Method, McGraw – Hill, New York, 1993.
2. S.Md.Jalaludeen, Finite Element Analysis in Engineering, 2nd Edition, Anuradha Publications, 2016.
3. R D Cook, D S Malkus and M E Plesha, Concepts and Applications of Finite Element Analysis, 3rd Edition, John Wiley, New York, 1989.
4. K J Bathe, Finite Element Procedures in Engineering Analysis, Prentice-Hall, Englewood Cliffs,1982.
5. G.Lakshmi Narasaiah, Finite Element Analysis, 1st Edition, B.S. Publications, 2008.

6. O C Zienkiewicz and R L Taylor, the Finite Element Method, 3rd Edition. McGraw-Hill, 1989.

Online Learning Resources:

- https://nptel.ac.in/courses/112/104/112104193/
- https://nptel.ac.in/courses/112/104/112104205/
- https://nptel.ac.in/courses/105/105/105105041/
- https://nptel.ac.in/courses/112/106/112106130/
- https://nptel.ac.in/courses/112/103/112103295/

Course Outcomes:

Upon successful completion of the course the students will be able to

- Distinguish different numerical methods involved in Finite Element Analysis (L 3)
- Apply equations in finite element methods for 1D, 2D and 3D problems. (L3)
- Apply shape functions in finite element formulations and use linear, quadratic, and cubic shape functions for interpolation (L3)
- Formulate and solve basic problems in heat transfer, solid mechanics and fluid mechanics. (L3)
- Analyse beams and shafts using finite element analysis. (L4)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech- VI Sem

L	T	P	C
3	0	0	3

(ME20APC602) HEAT TRANSFER

Pre-requisite: Thermodynamics and Thermal Engineering

Course Objectives:

- To impart the basic laws of conduction, convection and radiation heat transfer and their applications
- To familiarize the convective heat transfer concepts
- To explain basics of radiation heat transfer
- To make conversant with the heat transfer analysis related to thermal
- Systems like heat exchangers, evaporator, and condenser

UNIT – 1:

Introduction: Basics of Heat Transfer, Modes and Mechanism of heat transfer, Conduction, convection and radiation, General differential equation of heat conduction - Cartesian, Cylindrical and Spherical Coordinates; Boundary and Initial Conditions, One dimensional steady state heat conduction - Conduction through plane wall, cylinders and spherical systems; Composite systems, Critical thickness of insulation

Learning Outcomes:

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

- Identify the phenomenon related to different modes of heat transfer (L1)
- Compare different types of conduction heat transfer (L2)
- Apply concept of thermal resistance and its importance in practical problems (L3)

UNIT – 2:

Heat Transfer in Extended Surface (Fins) – efficiency, effectiveness and temperature distribution on Long Fin, Fin with Insulated Tip and Short Fin, Application to Errors in Temperature Measurement.

Unsteady State Heat Transfer Conduction- Transient heat conduction- lumped system analysis and use of Heisler charts.

Learning Outcomes:

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

- Concept of extended surfaces and its applications. (L3)
- Transient heat conduction and how it varies with respect to time. (L4)

UNIT – 3:

Convection: Basic concepts of convection–heat transfer coefficients - types of convection –forced convection and free convection.

Free Convection -development of hydrodynamic and thermal boundary layer along a vertical plate – use of empirical relations for convective heat transfer on plates and cylinders in horizontal and vertical orientation

Forced convection in external flow–concepts of hydrodynamic and thermal boundary layer- use of empirical correlations for flow over plates and cylinders. Fluid friction – heat transfer analogy, approximate solution to laminar boundary layer equation for external flow. Internal flow – Use of empirical relations for convective heat transfer in horizontal pipe flow

Learning Outcomes:

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

- Apply the convective heat transfer principles (L3)
- Use analogy between fluid friction and heat transfer (L3)
- To estimate the convention heat to differentiate between forced and free convection engineering problems. (L2)

UNIT – 4:

Boiling and Condensation: Different regimes of boiling- nucleate, transition and film boiling – condensation – film wise and dropwise condensation

Heat Exchangers: Types of heat exchangers- parallel flow- counter flow- cross flow heat exchangers- overall heat transfer coefficient- LMTD and NTU methods- fouling in heat exchangers.

Learning Outcomes:

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

- Calculate heat transfer in condensation and boiling systems, laminar film condensation. (L5)

- The concepts of critical heat flux and different models of critical heat flux (L4)
- Grasp the fundamentals of heat exchangers and its analysis. (L5)

UNIT – 5:

Radiation: Fundamentals of Radiation, Emission Characteristics and Laws of Black Body Radiation, Irradiation, Total and Monochromatic radiation, Laws of Planck, Wien's displacement, Kirchoff, Lambert's cosine, Stefan and Boltzmann, Radiative Heat Exchange - Heat Exchange between Two Black Bodies, Concepts of Shape Factor, Emissivity, Heat Exchange between Gray Bodies, Radiation Shields.

Learning Outcomes:

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

- Apply the principles of radiation heat transfer (L3)
- Calculate the radiation heat transfer between two bodies (L2)
- Design a radiation shield for given conditions (L3)
- Examine the effect of greenhouse gases on atmosphere (L4)

Textbooks:

1. P.K. Nag, Heat Transfer, 3/e, Tata McGraw-Hill, 2011.
2. J.P.Holman, Heat Transfer, 9/e, Tata McGraw-Hill,2008.
3. S. C. Arora & S. Domkundwar , A Course in Heat and Mass Transfer, Dhanpat Rai & CO.(P) LTD-Delhi , 2007.
4. Fundamentals of Heat and Mass Transfer by R C Sachdeva, New Age Publications, 2007.

Reference Books:

1. F. P. Incropera and D.P. Dewitt, Fundamentals of Heat and Mass Transfer, 6/e, John Wiley, 2007.
2. Cengel. A.Yunus, Heat Transfer- A Practical Approach, 4/e, Tata McGraw-Hill, 2007.
3. S.P. Sukhatme, A Textbook of Heat Transfer, Universities Press, 2005
4. Lienhard and Lienhard, A Heat and Mass Transfer, Cambridge Press, 2011.
5. C.P. Kothandaraman and S. Subramanyan, Heat and Mass Transfer data book, New Age Publications, 2014.
6. Heat and Mass Transfer by Er. R.K. Rajput, S-Chand Publications, 2007.

Course Outcomes:

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

- Apply the concepts of different modes of heat transfer. (L3)
- Apply knowledge of conduction heat transfer in the design of insulation of furnaces and pipes. (L3)
- Analyse free and forced convection phenomena in external and internal flows. (L4)
- Design of thermal shields using the concepts of black body and non-black body radiation. (L5)
- Use analytical and numerical solution techniques in solving heat transfer problems, including heat generation and extended surfaces. (L3)

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B.Tech - VI Sem

L	T	P	C
3	0	0	3

(ME20APC603) THERMAL ENGINEERING – II

Pre-requisite: Thermal engineering -I and Thermodynamics

Course Objectives:

- To understand the basic concepts of thermodynamics.
- To comprehend laws of thermodynamics and apply it to the related processes.
- To apply the thermodynamic concepts for Nozzles, Boilers, Turbines, and Refrigeration & Air Conditioning Systems
- Perform thermal analysis on behaviour and performance of systems.

UNIT – 1:

Basic Concepts and Boilers:

Basic Concepts: Rankine cycle - Schematic layout, Thermodynamic Analysis, Concept of Mean Temperature of Heat addition, Methods to improve cycle performance – Regeneration & reheating Cycles.

Boilers: Classification – Working principles with sketches including H.P. Boilers – Mountings and Accessories – Working principles- Boiler horse power, Equivalent Evaporation, Efficiency and Heat balance

Learning Outcomes:

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

- Explain the functioning and features of different types of Boilers and auxiliaries (L2)
- Explain Principle and concepts of Power generation cycles (L2)
- Apply concept of power generation and its importance in practical problems (L3)

UNIT – 2:

Steam Nozzles & Steam Condensors:

Steam Nozzles: Stagnation Properties- Function of nozzle – Applications and Types- Flow through nozzles, Thermodynamic analysis – Assumptions -Velocity of nozzle at exit-Ideal and actual expansion in nozzle- Velocity coefficient- Condition for maximum discharge- Critical pressure ratio - Criteria to decide nozzle shape

Steam Condensers: Requirements of steam condensing plant, Classification of condensers, working principle of different types, vacuum efficiency and condenser efficiency, air leakage, sources and its affects, air pump, cooling water requirement

Learning Outcomes:

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

- Solve problems in Steam Nozzle. (L3)
- Explain the functioning and working principle of different types of Condensers (L2)

UNIT – 3:

Steam Turbines:

Impulse turbine: Mechanical details, Velocity diagram, effect of friction, power developed, axial thrust, blade or diagram efficiency, condition for maximum efficiency. De-Laval Turbine - its features. Methods to reduce rotor speed-Velocity compounding and pressure compounding, Velocity and Pressure variation along the flow.

Reaction Turbine: Mechanical details, principle of operation, thermodynamic analysis of a stage, degree of reaction, velocity diagram, Parson's reaction turbine, condition for maximum efficiency.

Learning Outcomes:

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

- Explain the flow in steam turbines, draw velocity diagrams for steam turbines and solve problems(L3)
- Explain the concept of Pressure variation along the flow of Steam turbines(L2)

UNIT – 4:

Gas Turbines and Jet Propulsion:

Gas Turbines: Simple gas turbine plant - Ideal cycle, essential components - Parameters of performance - Actual cycle - Regeneration, Intercooling and Reheating - Closed and Semi - closed cycles - turbines of Gas Turbine plant

Jet Propulsion: Principle of Operation - Classification of jet propulsive engines - Working Principles with schematic diagrams and representation on T-S diagram - Turbo jet engines

Learning Outcomes:

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

- Explain the concept of Gas Turbines plant, Working features and performance. (L3)
- The concepts and working principle of Jet Propulsion(L2)

UNIT – 5:

Refrigeration and Air Conditoning:

Refrigeration: Reversed Carnot cycle – Performance Evaluation – Vapour Compression Cycle, Vapour absorption cycle – mechanical details, working principles, use of P-H charts for calculations.

Air- Conditioning: Introduction, classification and working principles of air-conditioning systems, requirements, schematic layout of a typical plant.

Learning Outcomes:

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

- Solve problems using refrigerant table / charts and psychrometric charts (L3)
- Explain the principles of air conditioning systems (L2)

Textbooks:

1. R. K. Rajput, Thermal Engineering, 18th edition, Lakshmi Publications, New Delhi, India.
2. V. Ganesan, Gas Turbines, 3rd edition, Tata McGraw-Hill education (P) Ltd, New Delhi, India.
3. CP Arora, Refrigeration and Air Conditioning, TMH.

Reference Books:

1. Gas Turbines and Propulsive Systems / P. Khajuria & S.P. Dubey / Dhanapatrai Pub.
2. Thermal Engineering / Ballaney / Khanna Pub.
3. Thermal Engineering / R.S. Khurmi & J.S. Gupta / S. Chand Pub.
4. Thermodynamics and Heat Engines / R. Yadav / Central Book Depot.

5. Refrigeration and Air conditioning / R.S. Khurmi

Course Outcomes:

At the end of the course students will be able to

- Demonstrate the Rankine cycle and apply thermodynamic concepts on boilers. (L2)
- Figure out the types and applications of steam nozzles and condensers and
- Solve the problems on Nozzles.(L3)
- Classify the steam turbines and describe it's working. (L2)
- Explain the working of gas turbines and analyse the performance.(L2)
- Demonstrate the principles of operation of refrigeration and Air-conditioning systems (L2)

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B.Tech - VI Sem

L	T	P	C
3	0	0	3

(ME20APE601) COMPOSITE MATERIALS

(Professional Elective – II)

Prerequisites: Material Science

Course Objectives:

- Introduce composite materials and their applications.
- Build proper background for stress analysis in the design of composite structures.
- Familiarize various properties of composite materials.
- Focus on biodegradable composites.

UNIT – 1:

Introduction to composites

Fundamentals of composites, Definition, classification: based on Matrix, based on structure, Advantages and applications of composites, Reinforcement, whiskers, glass fiber, carbon fiber, Aramid fiber, ceramic fiber, Properties and applications.

Learning Outcomes:

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

- Understand in detail about Composite Materials. (L2)
- Explain its Properties, Advantages and Applications. (L3)

UNIT – 2:

Polymer Matrix Composites

Polymers, Polymer matrix materials, PMC processes, hand layup processes, spray up processes, resin transfer moulding, Pultrusion, Filament winding, Auto clave based methods, Injection moulding, sheet moulding compound, properties and applications of PMCs.

Learning Outcomes:

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

- Understand in detail about PMCs. (L2)
- Explain its Properties, Advantages and Applications. (L3)

UNIT – 3:

Metal Matrix Composites

Metals, types of metal matrix composites, Metallic Matrices, Processing of MMC, Liquid state processes, solid state processes, In-situ processes, Properties and applications of MMCs.

Learning Outcomes:

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

- Understand in detail about MMCs. (L2)
- Explain its Properties, Advantages and Applications. (L3)

UNIT – 4:

Ceramic Matrix Composites

Ceramic matrix materials, properties, processing of CMCs, Sintering, Hot pressing, Infiltration, Lanxide process, Insitu chemical reaction techniques, solgel polymer pyrolsis, SHS, Cold isostatic pressing (CIPing), Hot isostatic pressing (HIPing), Properties and Applications of CCMs.

Learning Outcomes:

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

- Understand in detail about CMCs. (L2)
- Explain its Properties, Advantages and Applications. (L3)

UNIT – 5:

Advances in Composites

Advantages of carbon matrix, limitations of carbon matrix carbon fibre, chemical vapour deposition of carbon on carbon fibre perform, Properties and applications of Carbon-carbon composites, Composites for aerospace applications, Biodegradability, introduction of bio composites, classification, processing of bio composites, applications of bio composites, Mechanical, Biomedical, automobile Engineering.

Learning Outcomes:

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

- Understand in detail about Carbon Matrix. (L2)
- Explain the applications of carbon fiber composites & bio composites. (L3)

Textbooks:

1. Chawla K.K, Composite materials, 2/e, Springer – Verlag, 1998.
2. Mathews F.L. and Rawlings R.D., Chapman and Hall, Composite Materials: Engineering and Science, 1/e, England, 1994.

Reference Books:

1. H K Shivanand, B V Babu Kiran, Composite Materials, ASIAN BOOKS, 2011.
2. A.B. Strong , Fundamentals of Composite Manufacturing, SME, 1989.
3. S.C. Sharma, Composite materials, Narosa Publications, 2000.
4. Maureen Mitton, Hand Book of Bioplastics & Biocomposites for Engineering applications, John Wiley publications.

Course Outcomes:

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

- Explain the practical applications of composites. (L3)
- Identify the various types of Polymer Matrix Composites. (L2)
- Understand the Processing & Applications of MMCs. (L2)
- Classify the various types of Ceramic Matrix Materials. (L2)
- Explain the applications of carbon fiber composites & bio composites. (L3)

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B.Tech - VI Sem

L	T	P	C
3	0	0	3

(ME20APE602) DESIGN OF TRANSMISSION ELEMENTS

(Professional Elective – II)

Prerequisites: Kinematic of Machinery and Design of Machine Elements

Course Objectives:

- Explain the various elements involved in a transmission system.
- Focus on the various forces acting on the elements of a transmission system.
- Design the system based on the input and the output parameters.
- Produce working drawings of the system involving pulleys and gears.
- Demonstrate the energy considerations in the design of motion control elements.

UNIT – 1:

Design of Sliding Contact Bearings: Lubrication modes, bearing modulus, McKee's equations, design of journal bearing. Bearing Failures.

Design of Rolling Contact Bearings: Static and dynamic load capacity, Steinbeck's Equation, equivalent bearing load, load-life relationships, load factor, selection of bearings from manufacturer's catalogue.

Learning Outcomes:

After completion of this unit, students will be able to

- Contrast the difference between sliding and rolling contact bearings. (L2)
- Explain the mechanics of lubrication in sliding contact bearings. (L2)
- Identify failures in bearings. (L3)
- Evaluate static and dynamic load capacity of rolling contact bearings. (L5)
- Explain the procedure to select bearings from manufacturer's catalogue. (L3)

UNIT – 2:

Spur Gear: Gear geometry – Kinematics – Forces on gear tooth – Stresses in Gear tooth –Selection of gear material based on bending stress and contact stress – Design of Spur gear –Power transmitting capacity.

Learning Outcomes:

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

- Explain Kinematics of different types of gears. (L2)
- Predict various forces and stresses acting on the gear tooth. (L3)
- Select materials for a gear based on bending and contact stresses (L3)
- Analyze the power transmitting capacity of a gear. (L4)
- Design a spur gear (L5)

UNIT – 3:

Helical, Bevel and Worm Gears: Introduction to helical, bevel and worm gear Design of helical gear – Kinematics – Force analysis –Design of bevel gear – Worm gearing – Kinematics – Forces - Friction and Efficiencies

Learning Outcomes:

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

- Identify the differences between the helical gear and a bevel gear. (L2)
- Solve problems on the design of helical and bevel gear. (L3)
- Explain the kinematics of helical, straight bevel gears and worm gears. (L3)
- Predict the various forces acting on the worm gear tooth. (L3)
- Select of helical, bevel and worm gears in power transmission (L3)

UNIT – 4:

Design of Gear Boxes: Design of Speed reducers – Design of multi speed gear boxes for machine Tools – Structural and ray diagrams.

Learning Outcomes:

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

- Select the speed reducers in power transmission (L3)
- Design speed reducers (L4)
- Design of multi speed gear boxes for various applications (L5)
- Draw ray diagrams of gear boxes (L4)

UNIT – 5:

Design of Power Transmission Systems: Design of Flat belt drives, V-belt drives & rope drives. Selection of wire ropes, design procedure for chain drives.

Learning Outcomes:

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

- Choose various types of flexible power transmission systems. (L3)

Textbooks:

1. Joseph Edward Shigley and Charles, R. Mischke, “Mechanical Engineering Design”, McGraw –Hill International Editions, 2000.
2. Robert L. Norton, “Machine Design”- an integrated approach, (5th Edition) Pearson publisher, 2000

Reference Book:

1. “Design Data”, PSG College of Technology, DPV Printers, Coimbatore, 2005.
2. Malisa, “Hand Book of Gear Design”, Tata Mc Graw Hill, International Edition, 2000.
3. V.B. Bhandari, “Design of Machine Elements”, Tata Mc Graw Hill, 2001.

- NOTE: PSG hand book is allowed into Examination Hall.

Course Outcomes:

At the end of this Unit the student will be able to

- Design of sliding and rolling contact bearings. (L5)
- Determine performance requirements in the selection of commercially available transmission drives. (L4)
- Design brakes and clutches (L4)
- Design various types of gear boxes. (L5)
- Design pulleys, chain drives, rope drives and belt drives. (L5)

B.Tech - VI Sem

L	T	P	C
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(ME20APE603) PRODUCT LIFE – CYCLE MANAGEMENT

(Professional Elective – II)

Prerequisites:

Course Objectives:

The objectives of the course are to

- Explain the concepts of product life cycle management
- Gaining knowledge on implementing the concepts of Product life cycle environment.

UNIT – 1:

Introduction: Product life cycle – Introduction, growth, maturity & decline, Product Life cycle Management- Definition & Overview, Background for PLM-corporate challenges, Need of PLM, Components/Elements of PLM, Emergence of PLM, Significance of PLM - life cycle problems to be resolved, product development problems to be resolved, Customer Involvement

Learning Outcomes:

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

- Explain the various strategies of PLM and Product Data Management. (L2)

UNIT – 2:

Constructing Product Life Cycle Management & Driving Environment: PLM Life cycle model- plan, design, build, support & dispose. Threads of PLM computer aided design (CAD), engineering data management (EDM), Product data management (PDM), computer integrated manufacturing (CIM). Weaving the threads into PLM, comparison of PLM to Engineering resource planning (ERP). PLM characteristics - singularity, cohesion, traceability, reflectiveness, Information Mirroring Model. External drivers- scale, complexity, cycle times, globalization & regulation. Internal drivers - productivity, innovation, collaboration & quality. Board room drivers – income, revenues & costs.

Learning Outcomes:

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

- Describe decomposition of product design and model simulation. (L2)

UNIT – 3:

Digital Life Cycle: Collaborative Product Development, Mapping Requirements to specifications. Part Numbering, Engineering Vaulting, Product reuse, Engineering Change Management, Bill of Material and Process Consistency. Digital Mock up and Prototype development. Virtual testing and collateral. Introduction to Digital Manufacturing.

Learning Outcomes:

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

- Apply the concept of New Product Development and its structuring

UNIT – 4:

Product Life Cycle Management System: Product life cycle management system- system architecture, Information models and product structure, Information model, the product information data model, the product model, functioning of the system. Reasons for the deployment of PLM systems

Learning Outcomes:

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

- Analyze the technological forecasting and the new functions in the innovation system. (L4)

UNIT – 5:

Product Life Cycle Environment: Product Data issues – Access, applications, Archiving, Availability, Change, Confidentiality. Product Workflow, The Link between Product Data and Product Workflow, Key Management Issues around Product Data and Product Workflow, Company's PLM vision, The PLM Strategy, Principles for PLM strategy, preparing for the PLM strategy, Developing a PLM strategy, Strategy identification and selection, Change Management for PLM.

Learning Outcomes:

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

- Evaluate the various principles of PLM strategies and creating PLM environment. (L5)

Textbooks:

1. Grieves Michael, Product Lifecycle Management- Driving the Next Generation of Lean Thinking, McGraw-Hill, 2006. ISBN 0071452303.
2. Stark, John. Product Lifecycle Management: 21st Century Paradigm for Product Realization, Springer-Verlag, 2004. ISBN 1852338105.

Reference Books:

- Fabio Giudice, Guido La Rosa, Product Design for the environment-A life cycle approach, Taylor & Francis 2006
- Antti Saaksvuori, Anselmi Immonen, Product Life Cycle Management - Springer, 1st Edition (Nov.5, 2003)

Course Outcomes:

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

- Explain the various strategies of PLM and Product Data Management. (L2)
- Describe decomposition of product design and model simulation. (L2)
- Apply the concept of New Product Development and its structuring. (L3)
- Analyze the technological forecasting and the new functions in the innovation system. (L4)
- Evaluate the various principles of PLM strategies and creating PLM environment. (L5)

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(ME20APE604) SUPPLY CHAIN MANAGEMENT

(Professional Elective – II)

Prerequisites: Operations Research

Course Objectives:

- Explain the basics of supply chain management.
- Familiarize inventory management techniques and models to ensure EOQ batch size under risk management.
- Demonstrate various distribution strategies for shipment of products.
- Focus on evaluating of strategic alliance partners and understanding of RDBMS.

UNIT – 1:

Understanding the Supply Chain: What is SCM? Why SCM? The Complexity, Key issues in SCM Logistics network - Introduction, Data Collection, Transportation, Ware house Management, Strategic location of ware houses, Demand forecasting, Role of aggregate planning, MRP, ERP, Managing variability, Key features of Network configuration.

Learning Outcomes:

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

- Understand the concepts of Supply chain management. (L2)
- Define and establish the strategic importance of logistics to achieve business success by creating value through supply chains. (L1)

UNIT – 2:

Inventory Management: Concepts of Materials Management, Economic lot size model, Effect of Demand uncertainly, Fixed order costs, Variable lead frames, Inventory under certainly & uncertainty, Risk Management

Learning Outcomes:

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

- Describe the functions and costs of an inventory system. (L3)
- Determine the order quantity. (L3)
- Design a continuous or periodic review inventory-control system. (L4)

UNIT – 3:

Distribution Strategies: Introduction, Centralized vs Decentralized control, Direct shipment, Cross Docking, Push based vs Pull based supply chain.

Learning Outcomes:

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

- Understand the concepts of centralized & Decentralized distribution control systems. (L2)
- Describe channel flows and participants. (L1)

UNIT – 4:

Strategic Alliances: Third party Logistics (3PL), Retailer – supplier relationship issues, requirements, success & failures, Distributor integration Types & issues.

Learning Outcomes:

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

- Effectively manage due diligence and supply chain / third-party risk. (L3)
- Integrate third-party/supplier risk with other key processes such as procurement & Distribution integration systems. (L4)

UNIT – 5:

MIS & SCM: Relational Data Base Management (RDBMS), System Architecture, Communications, and Implementation of ERP, Decision support systems for SCM: Analytical tools, Presentation tools, Smooth production flow Current issues & directing challenges for future, e-Commerce strategies and world class supply chain management.

Learning Outcomes:

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

- Learn to use and apply computer-based supply chain optimization tools including the use of selected state of the art supply chain software suites currently used in business. (L3)
- Develop and utilize critical management skills such as negotiating, working effectively within a diverse business environment, ethical decision making and use of information technology. (L4)

Textbooks:

1. Sunil Chopra, Peter Meindl, Supply Chain Management: Strategy, Planning, and Operation, 4/e, Pearson, 2010.
2. David N. Burt, Donald W. Dobler , World Class Supply Management: The Key to Supply Chain Management, 2/e, McGraw-Hill/Irwin, 2003

Reference Books:

1. John Joseph Coyle, Edward J. Bardi, C. John Langley, The Management of Business Logistics: A Supply Chain Perspective, South-Western/Thomson Learning, 2003.
2. Upendra Kachru ,Logistics and Supply Chain Management, Excel Books, 2009.

Course Outcomes:

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

- Apply the concepts of supply chain management for demand forecasting. (L3)
- Make use of SCM and inventory management for procurement. (L3)
- Analyse the shipment activities and related issues (L4)
- Build third party alliances. (L5)
- Adapt the RDBMS data for communications and analyzing future challenges and understand e-commerce strategies. (L6)

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(CS20AOE501) COMPUTER APPLICATIONS USING PROGRAMMING TOOLS

(Open Elective – II)

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 – 1:

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 – 2:

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 – 3:

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 – 4:

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: Libraryfunctions & 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 – 5:

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)

Textbooks:

1. Yeswanth Kanethkar, Let us 'C'
2. Balaguruswamy E., "Computer Programming in 'C'"
3. Mark Allen Waise , "Data Structures"

Reference Books:

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.

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'.

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(CE20AOE601) DISASTER MANAGEMENT
(Open Elective – II)

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 – 1:

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 – 2:

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 – 3:

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 – 4:

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 – 5:

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.

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.

Course Outcomes:

On completion of the course the students will 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

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(EE20AOE602) ENERGY AUDITING & CONSERVATION

(Open Elective – II)

Course Objectives:

- To learn about energy consumption and situation in India
- To learn about Energy Auditing.
- To learn about Energy Measuring Instruments.
- To understand the Energy Conservation.
- To understand the Energy saving Practices.

UNI – 1:

Introduction to Energy Auditing

Energy Situation – World and India, Energy Consumption, Conservation, Codes, Standards and Legislation. Energy Audit- Definitions, Concept, Types of Audit, Energy Index, Cost Index, Pie Charts, Sankey Diagrams, Load Profiles. Measurements in Energy Audits, Presentation of Energy Audit Results.

UNIT – 2:

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. Motor Energy Audit. Power Factor – Methods of Improvement, Power factor With Non Linear Loads

UNIT – 3:

Lighting and Energy Instruments for Audit

Good Lighting System Design and Practice, Lighting Control, Lighting Energy Audit - Energy Instruments- Watt Meter, Data Loggers, Thermocouples, Pyrometers, Lux Meters, Tong Testers, Application of PLCs

UNIT – 4:

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.

UNIT – 5:

Energy Conservation in Major Utilities and Practices

Pumps, Fans, Blowers, Compressed Air Systems, Refrigeration and Air Conditioning Systems – Cooling Towers – D.G. Sets. Useful energy saving practices

Textbooks:

1. Energy management by W.R. Murphy & G. Mckay Butter worth, Heinemann publications, 2007.
2. De, B. K., "Energy Management audit & Conservation", 2nd Edition, Vrinda Publication, 2010.
3. Principles of Energy conversion, A. W. Culp Jr., McGraw Hill. 1996

Reference Books:

1. Energy management by Paul o" Callaghan, Mc-graw Hill Book company-1st edition, 1998.
2. Energy efficient electric motors by John .C. Andreas, Marcel Dekker Inc Ltd2nd edition, 1995.
3. Industrial Energy Management Systems, Arry C. White, Philip S. Schmidt, David R. Brown, Hemisphere Publishing Corporation, New York, 1994.

Course Outcomes:

After completion of the course the student should be able to:

- Conduct energy auditing and evaluate energy audit results.
- Analyze performance of Energy Efficient Motors and power factor improvement.
- Illustrate the different types of energy instruments and lighting systems.
- Examine energy conservation methods in thermal systems.
- Apply energy conservation in major utilities and practices.

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(EC20AOE602) SIGNAL PROCESSING

(Open Elective – II)

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:

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 – 2:

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 – 3:

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 – 4:

Discrete Time Fourier Transform:

Definition, Computation and properties of Fourier Transform for different types of signals.

UNIT – 5:

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.

Textbooks:

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.

Reference Books:

1. Simon Haykin and Van Veen, "Signals & Systems", Wiley, 2nd Edition.
2. B.P. Lathi, "Signals, Systems & Communications", 2009,BS Publications.

Course Outcomes:

- Understand the mathematical description and representation of continuous-time and discrete-time signals and systems. Also understand the concepts of various transform techniques.
- 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.
- Analyze the frequency spectra of various continuous-time signals using different transform methods.
- Analyze the systems based on their properties and determine the response of them.
- Analyze the frequency spectra of various discrete-time signals using different transform methods.

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(ME20APC604) COMPUTER AIDED ENGINEERING LAB

Prerequisites:

Course Objectives

- To use the commercial Finite Element packages to build Finite Element models and solve a selected range of engineering problems.
- To validate a Finite Element model using a range of techniques.
- To communicate effectively in writing to report (both textually and graphically) the method used, the implementation and the numerical results obtained.
- To discuss the accuracy of the Finite Element solutions.

Finite Element Analysis using Simulation package for different structures. The discretization can be done with 1-D, 2-D & 3-D elements to perform the following analysis for post processing:

1. Static Analysis
   a. Stress analysis of 2D truss.
   b. Stress analysis of a plate with a circular hole and L-Bracket – 2D and 3D
   c. Stress analysis of beams (cantilever, simply supported & fixed ends)
   d. Stress analysis of an axi-symmetric component
   e. Torsion based Problem
2. Thermal Analysis
   a. Conductive heat transfer analysis of a 2D and 3D components
   b. Conduction and Convective heat transfer analysis of a 2D component
   c. Heat transfer rate of a composite wall
   d. Coupled field analysis of a component
3. Modal Analysis
   a. mode frequency analysis of a 2D component
   b. mode frequency analysis of beams (cantilever, simply supported)

Reference Book:

1. Practical Finite Element Analysis by Nitin S Gokhale and Sanjay Deshpande.
2. Finite Element Analysis in Practice-Instructor Manual by Joe Stefanelli.
3. MATLAB codes for Finite Element Method" by Ferreira, Springer Pub.
4. The finite element method: basic concepts and applications with MATLAB, MAPLE, and COMSOL: Heinrich, Juan C., Pepper, Darrell W, CRC Press, 3rd edition 2017.

Online Learning Resources/Virtual Labs:

- https://www.youtube.com/watch?v=1gamqpyZjTg
- https://www.youtube.com/watch?v=4c-sPXolD0w
- https://www.youtube.com/watch?v=XSYRnEfPMqA
- https://au.mathworks.com/discovery/finite-element-analysis.html
- https://w3.pppl.gov/m3d/reference/fsem_intro.pdf
- https://www.youtube.com/watch?v=WXKUCky9CtA&list=PL3YYYtsmbXgdRoY27y3ZEjF5qE7YYeX_I
- https://www.youtube.com/watch?v=n3FDQqrRJqA
- https://www.youtube.com/watch?v=oHYVzAih_VM

Course Outcomes:

- Explain the need for Finite Element Method in Manufacturing Design.
- Interpret the real life problems and propose sustainable design solutions for specific needs through applications of Engineering principles.
- Utilize FEA software to solve simple structural, heat transfer and fluid flow problems.
- Analyze a physical problem, develop experimental procedures for accurately investigating the problem, and effectively perform.

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(ME20APC605) HEAT TRANSFER LAB

Prerequisites:

Course Objectives:

- Understand different modes of heat transfer
- Gain knowledge about natural and force convection phenomenon
- Estimate experimental uncertainty in measurements

List of Experiments:

1. Determine the overall heat transfer coefficient across the width of composite wall.
2. Determine the thermal conductivity of a metal rod
3. Determine the thermal conductivity of insulating powder material through concentric sphere apparatus
4. Determine the thermal conductivity of insulating material through lagged pipe apparatus
5. Determine the efficiency of a pin fin in natural and forced convection.
6. Determine the heat transfer coefficient for a vertical cylinder in natural convection
7. Determine the heat transfer coefficient in forced convection of air in a horizontal tube.
8. Determine the heat transfer coefficients on film and drop wise condensation apparatus.
9. Determine the effectiveness of a parallel and counter flow heat exchanger.
10. Study the pool boiling phenomenon and different regimes of pool boiling.
11. Experiment on pool boiling
12. Determine the emissivity of the test plate surface.
13. Experiment on Stefan-Boltzmann apparatus
14. Determine the heat transfer rate coefficient in fluidized bed apparatus

Textbooks:

1. P.K. Nag, Heat Transfer, 3/e, Tata McGraw-Hill, 2011.
2. J.P.Holman, Heat Transfer, 9/e, Tata McGraw-Hill,2008.
3. S. C. Arora & S. Domkundwar , A Course in Heat and Mass Transfer, Dhanpat Rai & CO.(P) LTD-Delhi , 2007.

Reference Books:

1. Abdul Matheen, Heat Transfer Laboratory Manual, Laxmi Publications; Second edition (1 January 2007).

Course Outcomes:

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

- Explain different modes of heat transfer
- Identify parameters for measurement for calculating heat transfer
- Determine effectiveness of heat exchanger
- Design new equipment related to heat transfer
- Apply principles of heat transfer in wide application in industries

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(ME20APC606) INSTRUMENTATION & COMPOSITE MATERIALS

Prerequisites: FMHM, Measurements and Metrology, Manufacturing Technology Lab

Course Objectives:

1. Understand basic principles of instrumentation and control systems
2. Understand calibration of measuring instruments for temperature, pressure and speed
3. To describe key processing techniques for producing metal, ceramic-, and polymer-matrix composites.
4. To demonstrate the relationship among synthesis, processing, and properties in composite materials.

List of Experiments:

Instrumentation Lab:

1. Calibration of Pressure Gauges
2. Calibration of transducer or thermocouple for temperature measurement.
3. Calibration of LVDT transducer for displacement measurement.
4. Calibration of capacitive transducer for angular measurement.
5. Calibration of photo and magnetic speed pickups for the measurement of speed.

Composites Lab:

1. To prepare FRP composite using hand layup method
2. To prepare hybrid nano composite material by using hand layup method.
3. To prepare composite helical spring using filament winding process
4. To prepare hallow circular pipe using GFRP.
5. Characterization FRP composites by different orientations

Textbooks:

1. Sawheny, A.K. “Electrical and Electronics Measurements & Instrumentation”, Dhanpat Rai & Co., 1993.
2. Gibson R F, Principles of Composite Material Mechanics, McGraw-Hill, 1994, CRC press, 4th Edition, 2015

Reference Books:

1. Thomas G. Beckwith, Lewis buck N. Ray D. Maragoni, ‘Mechanical Measurements, Narosa Publishing House new Delhi, 1989.
2. Madhujit Mukhopadhyay, “Mechanics of Composite Materials and Structures”, University Press, 2004.

Course Outcomes:

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

- Able to explain how common fibers are produced and how the properties of the fibers are related to the internal structure.
- Able to select matrices for composite materials in different applications.
- Able to describe key processing methods for fabricating composites.

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(IT20ASC301) APPLICATION DEVELOPMENT USING PYTHON

(Skill Oriented Course)

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.

ACTIVITIES:

Module - 1:

History of Python,Installing Python,Executing Python Programs,Commenting in Python,Internal working of Python.

Task: Write a sample Python program.

Module - 2:

Basics of Python Programming-character set,token,data types, I/O functions, Assigning value to a variable ,multiple assignments, formatting numbers and strings, inbuilt functions.

Task:

1)Write a program to demonstrate different number datatypes in python

2)Write a program to perform arithmetic operations on numbers

Module - 3:

Operators and expressions, precedence and associatively.

Task: Write a program to add two numbers.

Module - 4:

Decision making statements

Task:

1. Write a program to find largest number among three.
2. Write a program to find the given number is even or odd.

3. Write a python program to print a number is positive/negative using if-else.
4. Write a program to find sum of individual digits.
5. Write a program to check the given string is palindrome or not.
6. Write a program to find GCD of two numbers.

Module - 5:

Loop control statements.

Task:

1)Use a for loop to print a triangle like the one below.Allow the user to specify how high the triangle should be

```
*
**
***
****
```

2)Write a program takes in the the number of terms and finds the sum of series: 1 + x^2/2 + x^3/3 + … x^n/n.

3) Write a program to construct the following pattern using nested for loop

```
*
**
***
****
*****
*****
****
***
**
*
```

Module - 6:

Basics of functions, use of functions, parameters and arguments, local and global scope of a variable, the return statement, recursive functions, lambda funstion

Task:

1. Write a program to find factorial of a number using recursion.
2. Write a program to define a module to find fibonaaci numbers and import the module to another program.

Module - 7:

Strings basics, strings functions, string operators, string operations

Task:

1. Write a program to create, concatenate and print a string and accessing sub-string from a given string.
2. Write a program to count the frequency of words appearing in a string using a dictionary.
3. Write a program to count the number of words in a text file.

Module - 8:

List basics-creation, list functions, list operators.

Task:

1. Create a list and perform the following methods
   1)insert() 2) remove() 3) append() 4) len() 5) pop() 6)clear()meters, or kilometers
2. 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.

Module - 9:

Introduction to tuples-creation,functions

Task:

1. Create a tuple and perform the following methods

1) Add items 2) len() 3) check for item in tuple4)Access iems

Module - 10:

Need of file handling,text input and output,file handling functions.

Task:

1. Write a program to read a file and capitalize the first letter of every word in the file.

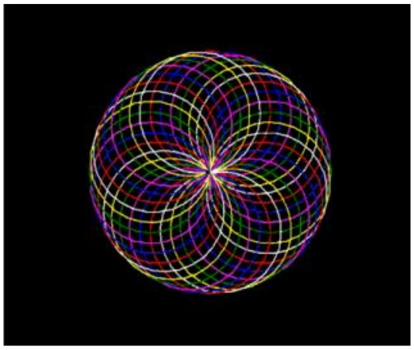
Module - 11:

Understanding Python modules,Turtle module.

Task:

1. Write a program using NumPy, implement different matrix operations in python.
2. 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.

3. Write program to draw the following image



Module - 12:

Introduction classes and objects, defining classes, passing object as a parameter to a method.

Task:

Write a program to find the area of a rectangle using classes.

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
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

Online Learning Resources/Virtual Labs:

- www.turorialspot.com
- www.sanoundary.com

Course Outcomes:

By the end of this lab, the student is able to

- Write, Test and Debug Python Programs. (L1)
- Use Conditionals and Loops for Python Programs. (L3)
- Construct custom modules and functions to handle different operations. (L3)
- Implement Object oriented concepts through real time scenarios and handle errors. (L3)
- Design different shapes and objects using turtle graphics. (L4)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech- III Sem

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(BA20AMC501) CONSTITUTION OF INDIA
(Mandatory Course)

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.
- Tounderstandthecentral-staterelationinfinancialandadministrativecontrol

UNIT – 1:

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 – 2:

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 – 3:

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 – 4:

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 – 5:

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

Textbooks:

- J.A. Siwach,“Dynamics of Indian Government &Politics”.
- H.M.Sreevai,“ConstitutionalLawofIndia”,4theditionin3volumes(UniversalLawPublication)
- 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

Reference Book:

- J.A. Siwach,“Dynamics of Indian Government &Politics”.
- H.M.Sreevai,“ConstitutionalLawofIndia”,4theditionin3volumes(UniversalLawPublication)
- 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

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.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech - VI Sem

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(BA20AMC502) INTELLECTUAL PROPERTY RIGHTS AND PATENTS

(Mandatory Non- Credit Course)

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 – 1:

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 – 2:

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 – 3:

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 – 4:

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 – 5:

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. DeborahE.Bouchoux:"IntellectualProperty".Cengagelearning,NewDelhi
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 McGraw–Hill, New Delhi
2. Richard Stim: "Intellectual Property", Cengage Learning, New Delhi.
3. R.RadhaKrishnan, S.Balasubramanian: "Intellectual Property Rights", Excel Books. New Delhi.
4. M.Ashok Kumar and Mohd. Iqbal Ali: "Intellectual Property Right" Serials Pub.

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.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech - VI Sem	L T P C
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(AM20AMC601) AI TOOLS TECHNIQUES & APPLICATIONS

(Lateral Entry Students only)

UNIT – 1:

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

- Classify various AI Applications. (L2)
- List the AI Languages. (L1)
- Explain various types of Agents. (L2)

UNIT – 2:

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

- Apply informed search techniques to problems. (L3)
- Interpret the features using feature engineering. (L2)
- Analyse the data using different visualization techniques. (L4)

UNIT – 3:

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

- Analyse different classification models and make recommendations towards learning. (L4)
- Solve real world data using classification techniques. (L3)
- Understand different regression models and about its problems. (L2)

UNIT – 4:

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

- Understand the concept of clustering over classification. (L2)
- Distinguish between expert systems and traditional systems. (L2)
- Identify different applications of expert systems. (L3)

UNIT – 5:

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

- Understand the architecture of an artificial neuron. (L2)
- Illustrate different artificial neural network architecture. (L2)
- Analyse the effect of different activation functions of a CNN unit. (L4)

Textbooks:

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.

Reference Books:

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

Course Outcomes:

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

- Demonstrate various AI applications, languages and Intelligent Agents.
- Solve problems using search strategies and understand the basic process of Machine Learning.
- Apply classification and regression algorithms on real world data.
- Develop an expert system.
- Comprehend the structure of an artificial neural network and identify the building blocks of a convolutional neural network.

IV Year I Semester

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech - VII Sem

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3	0	0	3

(ME20APE701) AUTOMOBILE ENGINEERING

(Professional Elective – III)

Pre-requisite:

Course objectives:

- Impart the knowledge of vehicle structure and its components.
- Demonstrate various components of petrol engines and diesel engines.
- Trains various electrical system, circuits, and testing of automobiles.
- Explain the concepts of steering, suspension and braking system in automobile.

UNIT – 1:

Introduction to vehicle structure and engine components: Vehicle construction - Chassis and body - Specifications - Engine - Types - Construction - Location of engine - Cylinder arrangement - Construction details - Cylinder block - Cylinder head - Cylinder liners - Piston – piston rings - Piston pin - Connecting rod - Crankshaft - Valves. Lubrication system - Types - Oil pumps - Filters - Cooling system - Types - Water pumps - Radiators - Thermostats - Anti-freezing compounds.

Learning Outcomes:

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

- Identify different parts of the automobile.(l3)
- Explain various parts of the engine.(l2)
- Describe the lubrication and cooling system in icengines.(l2)

UNIT – 2:

Ignition, fuel supply and emission control system: Ignition system - Coil and Magneto - Spark plug - Distributor – Electronic ignition system - Fuel system - Carburetor - Fuel pumps - Fuel injection systems - Mono point and Multi point – UNIT Injector – Nozzle types - Electronic Fuel Injection system (EFI) – GDI, MPFI, DTSI-Automobile Emissions - Source of formation – Effects on human health and environment - Control techniques - Exhaust Gas Recirculation (EGR).

Learning Outcomes:

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

- Explain the working principles of ignition, fuel supply and emission control systems.(l2)
- Compare the types of ignition systems and fuel systems.(l2)
- Interpret the about effects of automobile emissions on human health and environment.(l6)

UNIT – 3:

Transmission system: Clutches - Function - Types - Single plate, Multiple plate and Diaphragm Clutch – Fluid coupling - Gearbox - Manual - Sliding - Constant - Synchromesh - Overdrive – Automatic transmission - Torque converter - Epicylic and Hydromatic transmission – Continuously variable transmission - Universal joint - Propeller shaft - Hotchkiss drive – Final drive - Rear axle assembly - Types - Differential - Need - Construction – Non-slip differential – Differential locks – Front wheel and rear wheel drive-Four wheel drive.

Learning Outcomes:

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

- Describe different transmission systems.(l2)
- Illustrate working principle of different gearbox transmission systems.(l2)
- Demonstrate various types of clutches and differentials.(l2)
- Explain the rear axle assembly.(l2)

UNIT – 4:

Steering, suspension and braking system: Principle of steering - Steering Geometry and wheel alignment - Steering linkages – Steering gearboxes - Power steering - front axle - Suspension system - Independent and Solid axle – coil, leaf spring and air suspensions - torsion bar - shock absorbers – Wheels and Tyre - Construction - Type and specification - Tyre wear and causes - Brakes - Needs – Classification –Drum and Disc Mechanical - Hydraulic and pneumatic - Vacuum assist – Retarders – Anti-lock Braking System(ABS)

Learning Outcomes:

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

- Describe the steering and the suspension systems.(L2)
- Classify the brakes in automobile.(L1)

- Explain power steering system in automobiles. (L2)
- Illustrate working principle of anti-lock braking system. (L2)

UNIT – 5:

Automobile Electrical Systems, Instrumentation and Advances in Automobile Engineering: Battery-General electrical circuits- Automotive Electronics - Electronic Control Unit (ECU) - Variable Valve Timing (VVT) - Active Suspension System (ASS) - Electronic Brake Distribution (EBD) – Electronic Stability Program(ESP) Traction Control System (TCS) - Global Positioning System (GPS) - X-by-wire - Electric - Hybrid vehicle.

Learning Outcomes:

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

- Explain the working principles of various automobile electrical systems. (l2)
- Identify the various electrical components in automobile.(l3)
- Explain about Ecu, Vvt, Ass, Esp, Ebd, Tcs and Gps in automobile.(l2)
- Examine the recent developments of automobile engineering.(l4)

Textbooks:

1. Kirpal Singh, "Automobile Engineering",Vol 1 & 2.
2. S.K. Gupta, "A text book of Automobile Engineering", S. Chand Publications.

References:

1. K.K. Ramalingam, "Automobile Engineering" , 2nd edition, 2014.
2. K. Newton and W. Steeds, "The motor vehicle", 13th edition, Butterworth-Heinemann Publishing Ltd. (year).
3. Kirpal Singh, "Automobile Engineering", Vol.1&2, Standard Publications year.

Course Outcomes:

After successful completion of this course, the student will be able to

- Identify different parts of automobile. (L3)
- Explain the working of various parts like engine, transmission, clutch, brakes.(L2)
- Describe the working of steering and the suspension systems. (L2)
- Summarize the environmental implications of automobile emissions. (L2)
- Outline the future developments in the automobile industry.(L2)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech- VII Sem

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(ME20APE702) POWER PLANT ENGINEERING

(Professional Elective – III)

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, Diesel, MHD, Nuclear and Gas Turbine Power Plants - Combined Power Cycles - Comparison and Selection.

Power Plant Economics and Environmental Considerations: Capital Cost, Investment of Fixed Charges, Operating Costs, General Arrangement of Power Distribution, Load Curves, Load Duration Curve. Definitions of Connected Load, Maximum Demand, Demand Factor, Average Load, Load Factor, Diversity Factor - Tariff - Related Exercises. Effluents from Power Plants and Impact on Environment - Pollutants and Pollution Standards - Methods of Pollution Control. Inspection And Safety Regulations.

Learning Outcomes:

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

- Outline sources of energy, compare and selection of types 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 - Analysis of Power Plant Cycles - Modern Trends in Cycle Improvement - Waste Heat Recovery, Fluidized Bed Boilers., Fuel and Handling Equipment's, 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, Travelling Grate Stokers, Spreader Stokers, Retort 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. Analysis of Pollution from Thermal Power Plants - Pollution Controls.CO2 Recorders

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 and associated systems. (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 - HAWT & VAWT-Tidal Energy. MHD power Generation.

Nuclear Power Station: Nuclear Fuel - Nuclear Fission, Chain Reaction, Breeding and Fertile Materials - Nuclear Reactor -Reactor Operation.

Types of Reactors: Pressurized Water Reactor, Boiling Water Reactor, Sodium-Graphite Reactor, Fast breeder Reactor, Homogeneous Reactor, Gas Cooled Reactor, 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 conventional and non-conventional sources in India (L2)
- Explain working 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:

2. P.K. Nag, “Power Plant Engineering”, 3rd edition, TMH, 2013.
3. 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.
4. Ramalingam, “Power plant Engineering”, Scietech Publishers, 2013
5. P.C. Sharma, “Power Plant Engineering”, S.K. Kataria Publications, 2012.
6. 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 diesel and 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)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech - VII Sem

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(ME20APE703) REFRIGERATION & AIR CONDITIONING

(Professional Elective – III)

Pre-requisite: Thermal Engineering and Heat Transfer

Course Objectives:

- Provides insights in how thermodynamic principles are applied within the refrigeration and air conditioning industry.
- Introduce the students how real systems used in commercial, industrial refrigeration and air conditioning industries are built-up.
- Expose the students on various refrigeration methods like VCR, VAR and latest developments.
- Know the various air conditioning methods like summer, winter and year round air conditioning and to make the student to understand the practical applications of refrigeration and air conditioning systems.

UNIT – 1:

Introduction To Refrigeration: Necessity and Applications, Carnot Refrigerator, First and Second Law Applied to Refrigerating Machines, Unit of Refrigeration, COP, EER, Different Refrigeration Methods.

Air Refrigeration: Bell-Coleman Cycle, Ideal and Actual Cycles, Open and Dense Air Systems - Numerical Problems - Refrigeration Needs of Air Crafts.

Learning Outcomes:

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

- Explain the terminologies associated with refrigeration. (l2)
- Describe the first and second law applied to refrigerating machines.(l2)
- Demonstrate the bell-coleman cycle in air refrigeration. (l2)
- Identify the various refrigeration cycles

UNIT – 2:

Vapour Compression Refrigeration (VCR) System - Basic Cycle - Working Principle and Essential Components of the Plant - COP - Representation of Cycle On T-S and P-h Charts - Expander Vs. Throttling, Effect of Sub Cooling and Super Heating -

Cycle Analysis - Actual Cycle- Influence of Various Parameters on System Performance - Construction and Use of P-h Charts - Numerical Problems. Refrigerants - Desirable Properties - Classification of Refrigerants Used - Nomenclature- Secondary Refrigerants- Lubricants - Ozone Depletion - Global Warming- Newer Refrigerants.

Learning Outcomes:

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

- Appraise the importance of vapour compression refrigeration system. (L5)
- Draw the t-s and p-h charts for representation of cycle.(L1)
- Classify various refrigerants used in vapour compression refrigeration
- Systems (L1)
- Model the numerical problems on refrigeration cycles. (L3)
- Demonstrate the influence of various parameters on system performance. (L2)

UNIT – 3:

Vapor Absorption Refrigeration (VAR) System- Description and Working of NH3 - Water System and Li Br -Water (Two Shell & Four Shell) System -Calculation of Max COP, Principle of Operation of Three Fluid Absorption System

STEAM JET REFRIGERATION SYSTEM: Working Principle and Basic Components- Estimation of Motive Steam Required Principle and Operation of: (I) Thermo-Electric Refrigerator (ii) Vortex Tube or Hilsch Tube (iii) Acoustic refrigeration system.

Learning Outcomes:

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

- Appraise the importance of vapour absorption refrigeration system. (L5)
- Identify the latest developments of electrolux, thermo electric vortex tube
- Methods. (L3)
- Illustrate the working of various components of steam jet refrigeration system.(L2)
- Estimate the motive steam required for steam jet refrigeration system.(L6)
- Describe the working principle of themo- electric refrigerator and Vortex tube
- refrigerator.(L2)

UNIT – 4:

Introduction to Air Conditioning: Psychrometric Properties & Processes - Characterization of Sensible and Latent Heat Loads - Need For Ventilation, Consideration of Infiltrated Air - Heat Load Concepts. Air Cooler (Evaporative Cooling) ,Window, Split, Summer , Winter, Year Round, Central Air Conditioning Systems..

Learning Outcomes:

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

- Illustrate the psychometric properties & processes. (L2)
- Select the air conditioning systems for different realistic situations. (L6)
- Define the terms sensible heat load and latent heat load. (L1)
- Draw the psychometric charts for various air conditioning environments.(L1)

UNIT – 5:

Air Conditioning Equipment - Humidifiers - Dehumidifiers - Air Filters, Fans and Blowers.

Human Comfort: Requirements of Temperature, Humidity And Concept of Effective Temperature, Comfort Chart. Heat Pump - Heat Sources - Different Heat Pump Circuits

Learning Outcomes:

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

- Appraise the importance of humidifiers and dehumidifiers. (L5)
- Select the requirements of temperature and humidity for human comfort. (L6)
- Demonstrate the heat pump working and its components. (L2)
- List the various air conditioning equipments. (L1)

Textbooks:

1. Refrigeration and Air Conditioning ,CPArora,TMH, 15th edition, 2013.
2. A Course in Refrigeration and Air conditioning,S.CArora&Domkundwar, Dhanpatrai

Reference Books:

1. Refrigeration and Air Conditioning / Manohar Prasad / New Age, 2nd edition, 2013
2. Principles of Refrigeration - Dossat / Pearson Education, 4th edition, 2007
3. Refrigeration and Air Conditioning-P.L.Ballaney, 2nd edition, 2012.
4. Basic Refrigeration and Air-Conditioning - P.N.Ananthanarayanan / TMH, 4th edition, 2013.

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)

NOTE: Tables/Codes: Thermal Engineering Data Book containing refrigerant and Psychometric property Tables and charts are permitted in Exam

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(ME20APE704) SOLAR AND WIND ENERGY SYSTEMS

(Professional Elective – III)

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 hetro 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 Photovoltatics – 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)

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(ME20APE705) DESIGN FOR MANUFACTURING

(Professional Elective – IV)

Prerequisites: Manufacturing Processes, Engineering Materials

Course Objectives:

- The objective of course is identify the manufacturing constraints that influence the design of parts and part systems.
- Students will be introduced to the Design for Manufacturability (DFM) methodology, and will be motivated to understand infeasible or impractical designs.

UNIT – 1:

Introduction: Design philosophy steps in Design process - General Design rules for manufacturability - basic principles of design Ling for economical production - creativity in design. Materials: Selection of Materials for design Developments in Material technology - criteria for material selection - Material selection interrelationship with process selection process selection charts.

UNIT – 2:

Machining Process: Overview of various machining processes - general design rules for machining - Dimensional tolerance and surface roughness - Design for machining - Ease - Redesigning of components for machining ease with suitable examples. General design recommendations for machined parts. Metal Casting: Appraisal of various casting processes, selection of casting process, - general design considerations for casting - casting tolerances - use of solidification simulation in casting design - product design rules for sand casting.

UNIT – 3:

Metal Joining: Appraisal of various welding processes, Factors in design of weldments - general design guidelines - pre and post treatment of welds - effects of thermal stresses in weld joints - design of brazed joints. Forging - Design factors for Forging - Closed dies forging design - parting lines of dies drop forging die design - general design recommendations.

Extrusion & Sheet Metal Work: Design guidelines for extruded sections - design principles for Punching, Blanking, Bending, Deep Drawing - Keeler Goodman Forming Line Diagram - Component Design for Blanking. Plastics: Viscoelastic and Creep behavior in plastics – Design guidelines for Plastic components – Design considerations for Injection Moulding.

UNIT – 4:

Assemble Advantages: Development of the assemble process, choice of assemble method assemble advantages social effects of automation. Automatic Assembly Transfer Systems: Continuous transfer, intermittent transfer, indexing mechanisms, and operator - paced free – transfer machine.

UNIT – 5:

Design of Manual Assembly: Design for assembly fits in the design process, general design guidelines for manual assembly, development of the systematic DFA methodology, assembly efficiency, classification system for manual handling, classification system for manual insertion and fastening, effect of part symmetry on handling time, effect of part thickness and size on handling time, effect of weight on handling time, parts requiring two hands for manipulation, effects of combinations of factors, effect of symmetry effect of chamfer design on insertion operations, estimation of insertion time.

Textbooks:

3. Assembly Automation and Product Design/ Geoffrey Boothroyd/ Marcel Dekker Inc., NY, 1992.
4. Engineering Design - Material & Processing Approach/ George E. Deiter/McGraw Hill Intl. 2nd Ed. 2000.
5. Hand Book of Product Design/ Geoffrey Boothroyd/ Marcel and Dekken, N.Y. 1990.

Reference Books:

1. Computer Aided Assembly London/ A Delbainbre/.
2. Product Design for Manufacturing and Assembly/ Geoffrey Boothroyd, Peter Dewhurst & Winston Ansthony Knight/CRC Press/2010

Course Outcomes:

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

- Understand the quality aspects of design for manufacture and assembly
- Apply Boothroyd method of DFM for product design and assembly
- Apply the concept of DFM for casting, welding, forming and assembly
- Identify the design factors and processes as per customer specifications
- Apply the DFM method for a given product.

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(ME20APE706) DESIGN OF OIL HYDRAULICS AND PNEUMATICS

(Professional Elective – IV)

Pre-Requisite:

Course Objectives:

- Familiarize on Fluid Power Engineering and Power Transmission System.
- Introduce the students, the basic concepts of hydraulic and pneumatic systems.
- Expose the students with various hydraulic and pneumatic actuators.
- Familiarize on fluid power systems and its applications to real time.
- Know the problem, which occur in fluid power systems and take necessary troubleshooting/ maintenance activities.
- Get practiced in designing hydraulic and pneumatic systems.
- Understand the design procedure available for Hydraulic and Pneumatic circuits.

UNIT – 1:

Introduction

Introduction to fluid power - Types, advantages and application of fluid power systems. Properties of hydraulic fluids – General types of fluids – Fluid power symbols as per ISO/ANSI. Basic Components of Oil Hydraulic and Pneumatic Systems. Comparison of Mechanical, Electrical, Hydraulic & Pneumatic systems for force and motion analysis in automation.

Learning Outcomes:

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

- Identify the basic components of oil hydraulics and pneumatic systems (L2)

UNIT – 2:

Oil Hydraulic Pumps, Actuators: Types of hydraulic pumps - construction and working principle - design considerations, selection, specifications and characteristics of pumps. Types of actuators-construction and working principle - design considerations, selection, specifications and characteristics of actuators.

Control and Regulation Elements: Direction control valves, Pressure control valves, Flow control valves, Non-return valves, Reservoirs, Accumulators, Heating & cooling devices, Hoses. Selection of valves for hydraulic circuits.

Learning Outcomes:

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

- Familiar with parts of hydraulic actuator and parts pnemautics. (L3)

UNIT – 3:

Design of Hydraulic Circuits: Speed control circuits - Regenerative circuits-Accumulators and Intensifiers: Types of accumulators – Accumulators circuits, sizing of accumulators, intensifier – Applications of Intensifier–Intensifier circuit. - Reservoir design - Selection of components. Hydraulic circuits - Reciprocating - Quick return - Sequencing synchronizing - Safety circuits - Industrial circuits - Press - Milling Machine - Planner - Fork Lift.

Learning Outcomes:

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

- Design the circuits for different industrial applications. (L4)

UNIT – 4:

Pneumatic Systems: Pneumatic fundamentals - Properties of air – Compressors – Filter, Regulator, and Lubricator unit – Air control valves, Quick exhaust valves, and pneumatic actuators. Control Elements - Logic Circuits -Position - Pressure Sensing - Switching – Electro Pneumatic - Electro Hydraulic Circuits - Robotic Circuits.

Learning Outcomes:

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

- Differentiate the various parts of pneumatics systems. (L3)

UNIT – 5:

Design of Pneumatic Circuits: Classic-Cascade-Step counter - Combination - Methods - PLC-Microprocessors -Uses - Selection criteria for Pneumatic components - Installation and Maintenance of Hydraulic and Pneumatic power packs - Fault finding - Principles of Low Cost Automation - Case studies.

Learning Outcomes:

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

- Apply and select the suitable microprocessor for pneumatics. (L4)

Textbooks:

1. Anthony Esposito, “Fluid Power with Applications”, Pearson Education 2000.
2. Majumdar S.R, “Oil Hydraulics”, Tata McGraw Hill, 2000.
3. Majumdar S.R, “Pneumatic Systems – Principles and Maintenance”, Tata McGraw Hill, 2001.
4. Dudelyt, A. Pease and John T. Pippenger, “Basic Fluid Power”, Prentice Hall, 1987.

Reference Books:

1. Andrew Parr, Hydraulic & Pneumatics, 2/e, Jaico Publishing House Elsevier, 1999.
2. Harry L. Stevart D.B, “Practical Guide to Fluid Power”, Taraoeala Sons and Port Ltd. Broadey, 1976.

Course Outcomes:

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

- Compare the differences between hydraulic and pneumatic systems. (L2)
- Identify the practical applications in automation. (L3)
- Build the circuits for a given applications. (L6)
- Develop hydraulic and pneumatic power packs. (L6)
- Discuss the importance of PLC and microprocessor in hydraulic and pneumatic systems. (L6)

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(ME20APE707) MECHANICAL BEHAVIOR OF MATERIALS

(Professional Elective – IV)

Prerequisites:

Course Objectives:

The objectives of the course are to

- Explain the structure of material over the effects of mechanical properties.
- Familiarize the defects inside the structure and their effects on the mechanical properties.
- Train the methods for characterization of the mechanical behavior of materials.
- Impart knowledge about strengthening mechanisms of materials.
- Teach mechanisms of failures of materials (fracture, fatigue and creep) and their relationship with the different types of stress.

UNIT – 1:

Elastic and plastic behaviour: Elastic behaviour of materials – Hooke's law, plastic behaviour: dislocation theory – Burger's vectors and dislocation loops, dislocations in FCC, HCP and BCC lattice, stress fields and energies of dislocations, forces on and between dislocations, slip and twinning.

Learning Outcomes:

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

- Understand the structure and elastic behavior of materials (L2)

UNIT – 2:

Strengthening mechanisms: Cold Working, Grain Size Strengthening, Solid Solution Strengthening, Martensitic Strengthening, Precipitation Strengthening, Dispersion Strengthening, Fibre Strengthening, Examples. Yield Point Phenomenon, Strain aging and Dynamic strain aging.

Learning Outcomes:

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

- Familiar with strengthening methods to improve the material properties. (L3)

UNIT – 3:

Fracture and fracture mechanics: Types of Fracture, Basic Mechanism of Ductile and Brittle Fracture, Griffith's Theory of Brittle Fracture, Ductile to Brittle Transition Temperature (DBTT), Factors Affecting DBTT, Determination of DBTT. Fracture Mechanics-Introduction, Modes of Fracture, Stress Intensity Factor, Strain Energy Release Rate, Fracture Toughness and Determination of KIC.

Learning Outcomes:

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

- Analyze the type of fracture occurred in a material and also able to identify the root cause to create a fracture in a material. (L4)

UNIT – 4:

Fatigue behaviour and testing: Stress Cycles, S-N Curves, Effect of Mean Stress, Factors Affecting Fatigue, Structural Changes Accompanying Fatigue, Cumulative Damage, HCF / LCF, Thermo-mechanical Fatigue, Application of Fracture Mechanics to Fatigue Crack Propagation, Fatigue Testing Machines.

Learning Outcomes:

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

- Test the type fracture occurred in a material. (L3)

UNIT – 5:

Creep behaviour and testing: Creep Curve, Stages in Creep Curve and Explanation, Structural Changes During Creep, Creep Mechanisms, Metallurgical Factors Affecting Creep, High Temperature Alloys, Stress Rupture Testing, Creep Testing Machines.

Learning Outcomes:

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

- Apply and select the suitable microprocessor for pneumatics. (L4)

Textbooks:

1. Dieter, G.E., “Mechanical Metallurgy”, McGraw-Hill, SI Edition, 1995.
2. Davis. H. E., Troxell G.E., Hauck.G. E. W., “The Testing of Engineering Materials”, McGraw-Hill, 1982.

Reference Books:

1. Wulff, The Structure and Properties of Materials, Vol. III “Mechanical Behavior of Materials”, John Wiley and Sons, 1983.
2. Honey Combe R. W. K., “Plastic Deformation of Materials”, Edward Arnold Publishers, 1984.
3. Suryanarayana, A. V. K., “Testing of Metallic Materials”, Prentice Hall India, 1979.

Online Learning Resources:

- https://nptel.ac.in/courses/113102080
- https://onlinecourses.nptel.ac.in/noc21_me93/preview
- https://archive.nptel.ac.in/courses/113/104/113104104/
- https://onlinecourses.nptel.ac.in/noc21_mm27/preview
- https://www.youtube.com/watch?v=Q_hcS6DDNkM
- http://keck.ac.in/206/documents.pdf

Course Outcomes:

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

- Understand the structure of materials (L2)
- Apply materials based on their structure and failure modes. (L2)
- Characterize materials using different machines. (L3)
- Summarize the various strengthening mechanisms with suitable examples. (L2)
- Identify the creep in different materials and its influence in selection of materials. (L3)

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(ME20APE708) MECHANICAL VIBRATIONS

(Professional Elective – IV)

Pre-requisite:

Course Objectives:

- Demonstrate basic concepts and definitions of mechanical vibrations. To write equation of motion for discrete spring-mass systems with different configuration using classical and energy methods.
- To train the students about basic concepts of forced vibrations, vibration transmissibility and isolation and seismic instruments. Further to understand about various vibration control methods.
- To familiarize the students about two degree freedom system and various types of vibration absorbers.
- To analyze the two degree and multi degree of freedom systems.

UNIT – 1:

Single Degree Freedom Systems: Un-damped free vibration: Classical method, Energy method, equivalent systems, torsional systems. Damped free vibration-Viscous damping, under damping, critical damping, over damping. Coulomb damping, equivalent damping coefficient. Simple problems.

Learning Outcomes:

After completion of this unit student will able to

- Find natural frequency of un-damped single degree freedom systems.(L4)
- Find the behavior of single degree freedom systems with damping.(L4)

UNIT – 2:

Forced vibrations of Single Degree Freedom Systems : Steady state forced vibration, sources of excitation, impressed harmonic force, resonance impressed force due to unbalance, motion excitation, transmissibility and isolation, performance of different type of isolators, power absorbed by viscous damping.

Learning Outcomes:

After completion of this unit, students will be able to

- Solve vibration problems with forcing function.(L4)
- Calculate transmissibility and isolation.(l4)
- Explain different types of isolators and power absorbers.(l3)

UNIT – 3:

Two Degree Freedom Systems: Formulation of Equation of motion, Natural frequencies and modes of vibration by classical method, coupled pendulum, forced vibration, dynamic vibration absorber.

Learning Outcomes:

After completion of this unit the students will be able to

- Analyze the two degree freedom systems with and without damping.(L4)
- Solve problems on vibration absorber.(L5)

UNIT – 4:

Multi Degree Freedom Systems: Lagrangian method for formulation of equation of motion Influence co- efficient method, Lumped mass and distributed mass systems, Stodola method, Holzer's method, model analysis of free and forced vibrations. Whirling of shafts: Critical speed of shafts, Rayleigh's upper bound approximation, Dunkerley's lower bound approximation, critical speed of shafts with damping.

Learning Outcomes:

After completion of this unit the student will be able to

- Analyze the multi degree freedom systems using Stodola method, Holzer's method and Matrix iteration method.(L5)
- Calculate natural frequencies with Rayleigh's method and Dunkerley's method.(L4)

UNIT – 5:

Vibration measurement and Applications: Transducers: variable resistance transducers, Piezoelectric transducers, electrodynamics transducers and linear variable differential transformer transducer; Vibration pickups: vibrometer, accelerometer, velocity meter and phase distortion; Frequency-measuring instruments; Vibration exciters- Mechanical exciters and electrodynamics shaker.

Learning Outcomes:

After completion of this unit the students will be able to

- Identify various transducers.(l3)
- Use different vibration pickups. (l4)
- Explain mechanical exciters and electrodynamics shaker. (l2)

Textbooks:

1. Singrasu S. Rao, “Mechanical Vibrations”, 6th edition, Pearson Education, 2018.
3. William Thomson, “Theory of Vibrations with Applications”, 5th edition, Pearson, 2008.

Reference books:

1. L. Meirovich, “Elements of Vibrations Analysis”, Tata McGraw Hill, 1986
2. S. Graham Kelly, “Mechanical Vibrations”, Tata McGraw Hill, 1996
3. William Weaver, “Timoshenko, and Young, Vibration Problems in Engineering”, 5th Edition, John Wiley, 2013.
4. C. Nataraj, “Vibration of Mechanical Systems”, 1st edition, Cenage Learning, 2012.

Course outcomes:

After successful completion of the course, the student will be able to

- Find natural frequency of un-damped single degree freedom systems (L4)
- Analyze the two degree freedom systems with and without damping. (L4)
- Calculate transmissibility and isolation. (L4)
- Solve problems on vibration absorber. (L5)
- Calculate natural frequencies of multi degree freedom system. (L4)
- Measure vibration parameters. (L4)
- Use mechanical exciters and electrodynamics shaker. (L5)

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(ME20APE709) ADDITIVE MANUFACTURING

(Professional Elective – V)

Pre-requisite:

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, RP data formats: SLC, CLI, RPI, LEAF, IGES, CT, STEP, HP/GL.

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: MIMICS, MAGICS. 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): 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 this unit, the student will be able to

- Learn the Additive Manufacturing process of Stereo lithography (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): Principle, Process, Advantages, Limitations, Applications. 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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(ME20APE710) MODERN MANUFACTURING METHODS

(Professional Elective – V)

Prerequisites:

Course Objectives:

- To make the students to understand the advanced manufacturing techniques evolved in manufacturing scenario.
- To learn about the advanced manufacturing techniques USM, AJM, ECM, CM, EDM, PM, EBM, LSB.

UNIT – 1:

Need for Modern Manufacturing Methods

Non-traditional machining methods their relevance for precision and lean manufacturing, Classification of non-traditional processes - their selection for processing of different materials and the range of applications.

Learning Outcomes:

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

- To understand importance of non-traditional machining processes, features, classifications and applications of non-traditional methods. (L3)

UNIT – 2 :

Ultrasonic Machining

Ultrasonic machining – Elements of the process, mechanics of material removal, process parameters, applications and limitations. Abrasive jet, Water jet and abrasive water jet machining: Basic mechanics of material removal, descriptive of equipment, process variables, applications and limitations.

Learning Outcomes:

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

- To understand the processes of USM and AIM, process parameters, application and limitations. (L2)

UNIT – 3:

Electro – Chemical Processes

Fundamentals of electro chemical machining, electrochemical grinding, metal removal rate in ECM, Tooling, process variables, applications, economic aspects of ECM.

Chemical Machining

Fundamentals of chemical machining- Principle of material removal- maskants – etchants- process variables, advantages and applications.

Learning Outcomes:

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

- To understand the Electro-chemical process and applicable in manufacturing environment in terms of accuracy, surface finish and MRR and their relative advantages and disadvantages.
- To understand the chemical machining advantages and applications.

UNIT – 4:

Thermal Metal Removal Processes: Basic principle of spark erosion (EDM), Wire cut EDM, and Electric Discharge Grinding processes - Mechanics of machining, process parameters, selection of tool electrode and dielectric fluids, choice of parameters for improved surface finish and machining accuracy – Applications of different processes and their limitations.

Learning Outcomes:

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

- To understand the types of thermal based metal removal processes, principl of working, accuracy in machining, surface finish, tool selection and other machining parameters.

UNIT – 5:

Electron Beam Machining: Generation and control of electron beam for machining, theory of electron beam machining, comparison of thermal and non-thermal processes - process mechanics, parameters, applications and limitations. Laser Beam Machining: Process description, Mechanism of material removal, process parameters, capabilities and limitations, features of machining, applications and limitations.

Learning Outcomes:

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

- To understand and it's the applications of electron beam and laser beam in manufacturing environment, accuracy, machining speed and etc, with respect to all non-traditional machining processes.

Textbooks:

1. Advanced machining processes, VK Jain, Allied publishers.
2. Manufacturing processes for engineering materials by Serope Kalpakjian and Steven R Schmid, 5edn, Pearson Pub.

Reference Books:

1. Manufacturing processes for engineering materials by Serope Kalpakjian and Steven R Schmid, 5edn, Pearson Pub.
2. Manufacturing Technology, Kalpakzian,Pearson.
3. Modern Machining Process , Pandey P.C. and Shah H.S., TMH.

Course Outcomes:

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

- Model the material removal in various modern manufacturing processes.
- Analyze the processes and evaluate the role of each process parameter during machining of various advanced materials.
- Understand material removal mechanism by using electro-thermal energy and its applications.
- Select the chemical and electro chemical processes for micro-machining to fabricate micro device.
- Know the Complex shape can be machined easily by using EBM and LBM.

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(ME20APE711) PRODUCT MARKETING
(Professional Elective – V)

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, 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 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)
- Infer the importance and role of marketing in a global environment. (L2)

UNIT – 2:

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 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)
- Analyze industrial buying process and patterns for end users and industrial users. (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. Branding: Reasons for branding, functions of branding features of types of brands, kinds of brand name.

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)
- Analyze dynamic business opportunities and their implications on a firm's product and branding strategy. (L4)

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)
- Measure consumers' price sensitivity, to measure utility of different price levels to consumers and to measure price consumers are willing to pay. (L3)
- Analyze competition for pricing decisions. (L3)

UNIT – 5:

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 unit, the student will be able to

- Identify different pricing strategies a firm can utilize. (L2)
- Analyze various factors which can affect for pricing decisions. (L4)
- 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. 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.

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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(ME20APE712) TOTAL QUALITY MANAGEMENT

(Professional Elective – V)

Pre-requisite: Industrial Engineering, Operations Management

Course Objectives:

- Introduce the students, the basic concepts of Total Quality Management.
- Expose with various quality issues in Inspection.
- Gain Knowledge on quality control and its applications to real time.
- Know the extent of customer satisfaction by the application of various quality concepts.
- Understand the importance of Quality standards in Production.

UNIT – 1:

Introduction: Definition of Quality, Dimensions of Quality, Definition of Total quality management, Quality Planning, Quality costs – Analysis, Techniques for Quality costs, Basic concepts of Total Quality Management.

Learning Outcomes:

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

- Define what is quality. (L2)
- Explain the principles of quality planning. (L2)
- Explain the techniques of quality costs. (L2)
- Interpret the concepts of total quality management. (L2)
- Contrast the present quality issues with the past. (L2)

UNIT – 2:

Historical Review: Quality council, Quality statements, Strategic Planning, Deming Philosophy, Barriers of TQM Implementation, Benefits of TQM, Characteristics of successful quality leader, Contributions of Gurus of TQM, Case studies.

Learning Outcomes:

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

- Define what is quality. (L2)
- Explain the principles of quality planning. (L2)
- Explain the techniques of quality costs. (L2)
- Interpret the concepts of total quality management. (L2)
- Contrast the present quality issues with the past. (L2)

UNIT – 3:

TQM Principles: Customer Satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment teams, Continuous Process Improvement – Juran Trilogy, PDSA Cycle, Kaizen, Supplier Partnership – Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts, Strategy, Performance Measure Case studies

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

- Explain the importance of customer satisfaction, Service Quality and Customer Retention. (L2)
- Apply the principles of motivation and Empowerment. (L3)
- Compare the perfection and continuous improvement. (L2)
- Measure the Process improvement using Juran Trilogy. (L5)
- Demonstrate the concepts of performance measures using a case study. (L2)

UNIT – 4:

TQM Tools: Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs, FMEA – Stages of FMEA, The seven tools of quality, Process capability, Concept of Six Sigma, New Seven management tools, Case studies.

Learning Outcomes:

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

- Infer the benefits of benchmarking. (L2)
- List the benefits of QFD Process. (L1)
- Identify various zones in House of Quality. (L3)
- Apply Six sigma towards quality improvement. (L3)

- List the seven tools of quality. (L1)

UNIT – 5:

Quality Systems: Need for ISO 9000 and Other Quality Systems, ISO 9000: 2000 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, QS 9000, ISO 14000 – Concept, Requirements and Benefits, Case Studies.

Learning Outcomes:

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

- Explain the importance of ISO Standards. (L2)
- Discuss the need of ISO9000 and Other Quality systems. (L6)
- Build awareness on the services of ISO9000. (L6)
- Infer the process of documentation. (L2)
- Compare ISO 9000 and ISO 14000. (L2)

Textbooks:

1. Dale H Biesterfield, "Total Quality Management", 4th Edition, Pearson Education, 2015.
2. Subbu raj Ramaswamy, "Total Quality Management", Tata Mcgraw Hill Publishing Company Ltd., 2005.
3. Joel E.Ross , "Total Quality Management", 3rd edition, CRC Press, 2017.

Reference books:

1. Narayana V and Sreenivasan N.S, "Quality Management – Concepts and Tasks", New Age International, 1996.
2. Robert L.Flood, "Beyond TQM, First Edition", John Wiley & Sons Ltd, 1993.
3. Richard S. Leavenworth & Eugene Lodewick Grant, "Statistical Quality Control, Seventh Edition", Tata Mcgraw Hill, 2015.
4. Samuel Ho, TQM, "An Integrated Approach", Kogan Page Ltd, USA, 1995.

Course Outcomes:

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

- Develop an understanding on quality Management philosophies and frameworks
- Adopt TQM methodologies for continuous improvement of quality

- Measure the cost of poor quality, process effectiveness and efficiency to identify areas for improvement
- Apply benchmarking and business process reengineering to improve management processes.
- Determine the set of indications to evaluate performance excellence of an organization.

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(CE20AOE701) AIR POLLUTION AND QUALITY CONTROL

(Open Elective – III)

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 – 1:

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 – 2:

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 – 3:

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 – 4:

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 – 5:

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

Textbooks:

1. Noel De Nevers, “Air Pollution Control Engineering” , Waveland Pr Inc 2016
2. Anjaneyulu Y, “Text book of Air Pollution and Contr ol 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.

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.

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(EE20AOE702) ENERGY STORAGE SYSTEMS
(Open Elective – III)

Course Objectives:

1. To understand the need for energy storage
2. To understand about the fundamentals of ESS
3. To know about types, features and benefits of ESS
4. To know about various management and control including market potential of ESS
5. To study about various applications of ESS

UNIT – 1:

Fundamentals of ESS

Definitions, Characteristics of ESS, Electricity and roles of ESSs, Emerging needs in ESS, Classification of ESSs, Roles of Electrical storage technologies

UNIT – 2:

Types and features of ESS Technologies

Mechanical storage systems, Electromechanical storage systems, Chemical energy storage, Electrical storage systems, Thermal storage systems, standards for EES, Comparison of ESS technology storage systems, Power and discharge duration, Energy and power density, Storage operating cost, Power quality, Reactive power capability

UNIT – 3:

Storage Benefits

Definitions, Applications, specifications, benefits, Electric energy time shift, Electric supply capacity, reserve capacity, voltage support, Electric service power quality and reliability, Incidental benefits, energy losses, access charges, Risk, dynamic operating benefits, p.f. correction, reduced air emissions, flexibility, energy benefits

UNIT – 4:

EES Market and Management

Utility and Consumer use, Measurement and Control hierarchy, Internal configurations, External connections, Battery SCADA, Market potential, estimation, role of aggregators, Maximum market potential estimates, Demand change management, Time-of-use energy cost management, storage modularity

UNIT – 5:

Applications of EES

Power Vs Energy, Capacity Vs energy applications, specific power and discharge durations, Electric supply applications, ancillary service applications, End user/utility customer applications, Distributed energy storage applications, Locational, Non-locational and incidental applications

Textbooks:

1. James M. Eyer, Joseph J. Iannucci and Garth P. Corey, “Energy Storage Benefits and Market Analysis”, Sandia National Laboratories, 2004.
2. IEC Market Strategy Board, “ The Electrical Energy Storage” White paper.

Reference Book:

1. Jim Eyer, Garth Corey, “Energy Storage for the Electricity Grid: Benefits and Market Potential Assessment Guide, Report, Sandia National Laboratories”, Feb 2010.

Course Outcomes:

- To get exposed to latest technology of ESS
- To understand the Principle, features and benefits of ESS
- To understand about marketing and management strategies of ESS in working environment in future
- To distinguish wide variety of applications of EES for practical applications
- To know about latest technology applications of Battery SCADA, which is going to be vital in future applications, trend in new and renewable energy sources

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(EC20AOE702) PRINCIPLES OF COMMUNICATION ENGINEERING

(Open Elective – III)

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 analyze various modulation schemes.
- To evaluate various modulation scheme in real time applications.

UNIT – 1:

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 – 2:

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 – 3:

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 – 4:

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 – 5:

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", 3rdEdition, Tata McGraw-Hill Publishing Company Ltd., 2008.
2. Simon Haykin, "Communication Systems", 4th Edition, John Wiley & Sons, 2004

Reference Books:

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:

- Analyze and design of various continuous wave modulation and demodulation techniques.
- Attain the knowledge about angle modulation and FM Transmitters and Receivers.
- Analyze and design the various Pulse Modulation Techniques.

- Understand the concepts of Digital Modulation Techniques and Baseband transmission.
- Comprehend the principles of radio communication systems like GSM.CDMA, Bluetooth, Mobile and satellite communications etc.,

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(AM20AOE502) WEB TECHNOLOGIES

(Open Elective – III)

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 – 1:

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 (onclick, 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 webpages. (L6)
- List different types of CSS to design webpage attractively. (L1)
- Utilize different tools like Adobe Dream weaver and Microsoft Frontpage.(L3)

UNIT – 2:

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 webpages using DHTML.(L6)
- Illustrate validation for webpages.(L2)

UNIT – 3:

Web Servers and Servlets: Introduction to Servlets, Lifecycle 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 – 4:

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 – 5:

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.

Java Beans: Introduction to Beans, Deploying java Beans in a JSP page.

Learning Outcomes:

- Explain the importance of AJAX Architecture.
- Integrate and test web services.

Textbooks:

1. Web Programming, building internet applications, Chris Bates 2nd edition, WILEYDreamtech (UNITs 1,2)
2. Core SERVLETS ANDJAVASERVER PAGES VOLUME 1: CORE TECHNOLOGIES By Marty Hall and Larry Brown Pearson (UNITs 3, 4,5)

Reference Books:

1. Programming world wide web-Sebesta, Pearson Education,2007.
2. Internet and World Wide Web – How to program by Dietel and Nieto PHI/ PearsonEducation Asia.

Course Outcomes:

- 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.

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(AM20AOE601) MACHINE LEARNING TOOLS & TECHNIQUES

(Open Elective – IV)

Course Objectives:

This course is designed to:

- Understand the basic theory underlying machine learning
- Formulate machine learning problems corresponding to different applications.
- Illustrate a range of machine learning algorithms along with their strengths and weaknesses
- Apply machine learning algorithms to solve problems of moderate
- complexity.
- Understand how Machine Learning imbibes the philosophy of Human learning.

UNIT – 1:

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.

Learning Outcomes:

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

- Understand Bias and Variance(L1)
- Learn the basics of learning problems with hypothesis and version spaces(L1)

UNIT – 2:

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.

Learning Outcomes:

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

- Understand how to evaluate models generated from data(L1)

UNIT – 3:

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.

Learning Outcomes:

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

- Understand Instance Based learning and Bayes learning(L1).

UNIT – 4:

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;

Learning Outcomes:

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

- Understand the Support Vector Machine and Artificial Neural Networks algorithms(L1)

UNIT – 5:

Ensembles: Introduction, Bagging and boosting, Random forest, Clustering: Introduction, K-mean clustering, agglomerative hierarchical clustering, Python exercise on k-mean clustering.

Learning Outcomes:

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

- Understand the Ensemble and clustering algorithms(L1)
- Apply Clustering Techniques to real world problems (L3)

Textbooks:

1. Machine Learning. Tom Mitchell. First Edition, McGraw- Hill, 1997.
2. Alpaydin, Ethem. Introduction to machine learning. MIT press, 2020.

Reference Books:

1. Kevin P. Murphy, “Machine Learning: A Probabilistic Perspective”, MIT Press, 2012.

Course Outcomes:

- Learn the basics of learning problems with hypothesis and version spaces(L2)
- Understand the features of machine learning to apply on real world problems(L1)
- Understand how to evaluate models generated from data(L1)
- Understand the Ensemble and clustering algorithms(L1)
- Apply Clustering Techniques to real world problems (L3)
- Understand how to evaluate models generated from data(L1)

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(CE20AOE704) ENVIRONMENTAL IMPACT ANALYSIS & MANAGEMENT

(Open Elective – III)

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 – 1:

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 – 2:

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 water environment, 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 – 3:

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 – 4:

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 – 5:

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

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.

Course Outcomes (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

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(EC20AOE705) INTRODUCTION TO IMAGE PROCESSING

(Open Elective – III)

Course Objectives:

- To introduce fundamentals of Image Processing
- To expose various relationships between pixels
- To descript various intensity transformations in spatial domains.
- To descript various spatial and frequency domains filters.
- To dissimilate various segmentation and compression techniques for image processing.

UNIT – 1:

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 – 2:

Fundamentals of Image Processing – II:

Image sampling and quantization, basic relationships between pixels – neighbourhood, adjacency, connectivity, distance measures, mathematical operations in image processing.

UNIT – 3:

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 – 4:

Image Enhancement in frequency domain:

Spatial Filtering, Smoothing filters, Sharpening filters, Enhancement in Frequency domain –image smoothing, image sharpening and Homomorphic filtering.

UNIT – 5:

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.

Textbooks:

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.

Reference Books:

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:

- Understand fundamentals of digital image processing and apply engineering mathematics in processing of digital image.
- Compute the relationship between the pixels in image processing
- Analyze different image enhancement techniques in spatial domain.
- Describe various image spatial filters and Analyze different image enhancement techniques in frequency domain
- Analyze various techniques in image segmentation and apply various algorithms to perform image compression.

B.Tech - VII Sem

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(EE20AOE705) UTILIZATION OF ENERGY IN ELECTRICAL UTILITIES
(Open Elective – IV)

Course Objectives:

The objectives of the course are to make the students learn about:

- The laws of illumination and their application for various lighting schemes
- Principles and methods for electric heating and welding.
- Systems of electric traction, study of traction equipment, mechanics of train movement and associated calculations.

UNIT – 1:

Lumination

Definition –Laws of Illumination–Polar Curves – Calculation of MHCP and MSCP. Lamps: Incandescent Lamp, Sodium Vapour Lamp, Fluorescent Lamp, CFL and LED. Requirement of Good Lighting Scheme – Types, Design and Calculation of Illumination. Street Lighting and Factory Lighting – Numerical Problems – Energy Conservation methods.

UNIT – 2:

Electric Heating & Welding

Electrical Heating: Advantages. Methods of Electric Heating – Resistance, Arc, Induction and Dielectric Heating – Energy conservation methods.

Electric Welding: Types – Resistance, Electric Arc, Gas Welding. Ultrasonic, Welding Electrodes of Various Metals, Defects in Welding.

UNIT – 3:

Electric Traction – I

Introduction – Systems of Electric Traction. Comparison Between A. C. and D. C. Traction – Special Features of Traction Motors - The Locomotive – Wheel arrangement and Riding Qualities – Transmission of Drive – DC Equipment – AC Equipment – Electric Braking with DC Motors and with AC Motors – Control Gear – Auxiliary Equipment – Track Equipment and Collector Gear – Conductor-Rail

Equipment – Overhead Equipment – Calculation of Sags and Tensions – Collector Gear for Overhead Equipment.

UNIT – 4:

Electric Traction - II

Mechanics of Train Movement. Speed-Time Curves of Different Services – Trapezoidal and Quadrilateral Speed-Time Curves – Numerical Problems. Calculations of Tractive Effort, Power, Specific Energy Consumption - Effect of Varying Acceleration and Braking Retardation, Adhesive Weight and Coefficient of Adhesion – Problems.

UNIT – 5:

Economic Aspects of Utilising Electrical Energy

Power Factor Improvement, Load Factor improvement, Off Peak Loads- Use of Exhaust Steam, Waste Heat recovery, Pit Head Generation, Diesel Plant, General Comparison of Private Plant and Public Supply- Initial Cost and Efficiency,

Textbooks:

1. Utilization of Electric Energy, E. Openshaw Taylor and V. V. L. Rao, Universities Press, 2009.
2. Art & Science of Utilization of electrical Energy, Partab, DhanpatRai& Co., 2004.

Reference books:

1. Generation, distribution and utilization of electrical energy, C.L Wadhwa, Wiley Eastern Limited,1993
2. Electrical Power, S. L. Uppal, Khanna pulishers,1988.

Course Outcomes:

Student should be able to:

- Develop a lighting scheme for a given practical case.
- Analyze the performance of Heating and Welding methods
- Make all numerical calculations associated with electric traction.
- Evaluate the Mechanics of Train and its parameters
- Analyze the economic aspects in utilisation of electrical energy

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B.Tech - VII Sem

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(BA20AHS701) BUSINESS ETHICS & CORPORATE GOVERNANCE

(HUMANITIES ELECTIVE – II)

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 – 1:

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 – 2:

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 – 3:

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 – 4:

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.

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 Safe guarding Health and wellbeing of Customers

UNIT – 5:

Organizational 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

Textbooks:

- Murthy CSV:" Business Ethics and Corporate Governance", HPH
- Bholananth Dutta,S.K. Podder–"Corporation Governance" ,VBH.

Reference Books:

- Dr.K.Nirmala,KarunakaraReaddy:"BusinessEthicsandCorporateGovernance",HPH.
- H.R.Machiraju:"Corporate Governance"
- K.Venkataramana, "Corporate Governance", SHBP.
- N.M.Khandelwal:"Indian Ethos and Values for Managers".

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

B.Tech - VII Sem	L T P C
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(BA20AHS705) MANAGEMENT SCIENCE

(HUMANITIES ELECTIVE – II)

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 Min 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 – 1:

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.

UNIT – 2:

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 – 3:

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 – 4:

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 – 5:

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.

Textbooks:

1. A.R. Aryasri,“Management Science”, TMH,2013
2. Stoner, Freeman, Gilbert, Management, Pearson Education, NewDelhi,2012.

Reference Books:

1. Koontz & Weihrich, “Essentials of Management”, 6thedition, 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”, 9thedition,PHI,2005.

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.

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(BA20AHS706) STRATEGIC MANAGEMENT

(HUMANITIES ELECTIVE – II)

Course Objectives:

- To introduce the concepts of strategic management and understand its nature in
  Competitive and organizational landscape
- Toprovideanunderstandingofinternalandexternalanalysisofafirm/individual
- To provide understanding of strategy formulation process and framework
- Impart knowledge of corporate culture
- Encourage the student in understanding SWOT analysis BCG Matrix

UNIT – 1:

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 Stake holders their roles in strategic management

UNIT – 2:

External and Internal Analysis: The Strategically relevant components of a Company's External Environment Analysis, Industry Analysis - Porter's Five Forces model – Industry diving 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
- KnowhowtoanalyzeindustrycompetitionthroughthePorter'sFiveForcesmodel
- Analyze Key Success Factors in a company's competitive position

UNIT – 3:

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, and 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 – 4:

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 – 5:

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

Textbooks:

- Strategic Management – J.S.Chandan & Nitish sen Gupta, Vikas
- Business Strategy: Managing Uncertainty, Opportunity, and Enterprise by J.C. Spender

Reference Books:

- 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. Subba Rao, Himalaya.
- Business policy and strategic management, Sukul Lomash, P.K.Mishra, Vikas.

Course Outcomes

- Demonstrate an appreciation of areas which are fundamental to the development of successful strategy.
- Outline and critique the major perspectives on the conduct of strategy.
- Explain and use the most common tools of strategic analysis.
- Demonstrate an understanding of, and ability to assess the complexities of strategic decision making.

- 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.
- Integrate strategic thinking into the holistic management of an organization.

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(ME20ASC701) MECHANISM AND ROBOTICS (VIRTUAL LAB)

(Skill Oriented Course)

Pre-Requisite:

Course Objectives:

1. To Study different types of Kinematic of robots.
2. To Study different types of mechanisams.
3. To study single-acting and double-acting cylinder and direction control valve.
4. To select the proper cylinder and direction control valve.
5. To build a pneumatic circuit.
6. To understand the working of the control valve.

List of Experiments:

1. Forward kinematics of movemaster RM-501
2. Forward kinematics of PUMA 560
3. Inverse kinematics of PUMA 560
4. Simulation of KGP 50
5. Oldham coupling mechanism
6. Quick return mechanism
7. CAM follower mechanism
8. Select pneumatic cylinder for given load and speed requirement
9. Develop pneumatic circuit to operate direct single acting cylinder
10. Develop pneumatic circuit to operate direct double acting cylinder
11. Develop pneumatic circuit to operate indirect single acting cylinder
12. Develop pneumatic circuit to operate indirect double acting cylinder
13. Develop pneumatic circuit to transfer block from a magazine

Web Reference:

1. http://vlabs.iitkgp.ernet.in/mr/
2. https://pc-coep.vlabs.ac.in/List%20of%20experiments.html

Course Outcomes:

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

- Identify the geometric relationship between input and output motion parameters of robotic arms.
- Formulate the transformation matrix through which a relationship is established between different links of the manipulator.
- Create the workspace through a 3D graph plot of manipulator position for various inputs. CO4: Assess the robot motion for various inputs of the joint angular value.
- Interpret the simulation of mechanisms for different input parameters.
- Analyse the various types of circuits used in construction of robots.

HONORS DEGREE SYLLABUS

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B.Tech - IV Sem

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(ME20AHO401) PRINCIPLES OF ROBOTICS

Pre-Requisite:

Course Objectives:

Brief History - Robot – Definition, Various robot Manipulators – Linear and Angular Velocities, Tactile, Proximity and Range Sensors, End Effectors and Robot Economics

UNIT – 1:

Basic Concepts:

Brief history, Robot - Definition, Anatomy; Co-ordinate Systems, Work Envelope types and Classification, Robotic Specifications, Pitch, Yaw, Roll, Joint Notations, Speed of Motion, Pay Load, Robot Parts and their Function; Need for Robots, Applications.

Learning Outcomes:

After Completing this Unit, the student will be able to

- Explain Robot Anatomy with Coordinate Systems and its Specifications. (L2)
- Illustrate the Coordinate Systems and its Work Envelop Types(L2)

UNIT – 2:

Robot Manipulators:

Various Robot Manipulators, Linear and Angular Velocities, Manipulator Jacobian, Prismatic and Rotary Joints, Robotic Inverse, Wrist and Arm Singularity.

Learning Outcomes:

After Completing this Unit, the student will be able to

- Explain the Various Robot Manipulator with its Linear and Angular Velocities. (L2)
- Understand the Working Principle of Prismatic, Rotary Joints and Robotic Inverse. (L2)

UNIT – 3:

Robot Sensors:

Desirable Features of Sensors; Tactile, Proximity and Range Sensors; Uses of Sensors in Robotics; Work Cell; Introduction to Programming Languages.

Learning Outcomes:

After Completing this Unit, the student will be able to

- Summarize Desirable Features of Sensors like Tactile, Proximity and Range Sensors. (L2)
- Explain the uses of Sensors in Robotics and Work Cell. (L2)

UNIT – 4:

Robot end Effectors:

End Effectors-Grippers-Mechanical Grippers, Pneumatic and Hydraulic Grippers, Magnetic Grippers, Vacuum Grippers; Two Fingered and Three Fingered Grippers; Internal Grippers and External Grippers; Selection and Design Considerations.

Learning Outcomes:

After Completing this Unit, the student will be able to

- Explain Different Types of Grippers and its Design Considerations(L2)

UNIT – 5:

Implementation and Robot Economics:

RGV, AGV; Implementation of Robots in Industries-Various Steps; Safety Considerations for Robot Operations - Economic Analysis of Robots.

Topics for self-study are provided in the Lesson Plan.

Learning Outcomes:

After Completing this Unit, the student will be able to

- Interpret the Various steps in Implementation of Robots(L2)

Textbooks:

1. R.K.Mittal and I.J.Nagrath, Robotics and Control, Tata McGraw Hill, New Delhi,4th Reprint, 2005.
2. M.P.Groover, M.Weiss, R.N. Nageland N. G.Odrej, Industrial Robotics, McGraw-Hill Singapore, 1996.

Reference Books:

1. JohnJ.Craig, Introduction to Robotics Mechanics and Control, Pearson Education, Third edition, 2009.
2. Ashitava Ghoshal, Robotics-Fundamental Concepts and Analysis, Oxford University Press, Sixth Impression, 2010.

Course Outcomes:

After successful completion of this course, the students will be able to:

- Demonstrate Knowledge of Robotics, its Specifications, Functions and Different Applications. (L2)
- Apply the Knowledge of Various robot Manipulators to Control the Robot Automation System. (L3)
- Illustrate the Various Sensors, Work Cells and Programming Languages. (L2)
- Analyze Functional Characteristics of Robot end Effectors Through Design Considerations. (L3)
- Analyze the Economic Aspects of Robots by Considering Different Safety Parameters. (L4)

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B.Tech - V Sem	L T P C
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(ME20AHO501) CNC PROGRAMMING

Pre-Requisite: Machine Tools

Course Objectives:

Students will set up and operate CNC lathes, CNC mills, and grinding equipment, write CNC programs, identify and select tooling, and perform precision measurements.

UNIT – 1:

Introduction to Computer Numerical Control (CNC)

Numerical control, Functions of a machine tool, Concept of numerical control, Historical Development, Definition, Advantages of CNC machine tools, Evolution of CNC, Advantages of CNC, Limitations of CNC, Features of CNC, The Machine Control Unit (MCU) for CNC, Classification of CNC Machine Tools, CNC MACHINING CENTERS, Classification, Features of CNC Machining Centers

Learning Outcomes:

- How to identify the right machine tool for the production process.
- Selection of cutting tools according to the ISO standard.
- How to develop a basic CNC code.
- Implementation of necessary pre-production adjustments.

UNIT – 2:

Blue print reading

Reading the machining sketches, Different Geometrical Tolerance symbols, Reading Dimensional Tolerances, Understanding the Views, Concept of First angle & Third angle projection.

Learning outcomes:

- GD&T is a complicated subject and understanding it correctly can be the difference between a perfect part and scrap
- A blueprint title block contains the high-level identification information

UNIT – 3:

Auto CAD basics

Sketching Points line, Circles & Arcs, Simple exercises based on above, Isometric Views, Splines & poly lines, Identifying the points in given drawing.

Learning outcomes

Upon completion of the course students will be able to:

- Utilize the power and precision of AutoCAD as a drafting and design tool used in the mechanical design and manufacturing industries.
- Apply basic CAD concepts to develop and construct accurate 2D geometry through creation of basic geometric constructions.
- Create, manipulate and edit 2D drawings and figures.
- Apply elements of mechanical drafting such as layers, dimensions, drawing formats, and 2D figures in projects with a focus on ANSI industry standards.

UNIT – 4:

Conventional milling Awareness

Introduction to milling machine & its parts, Different operations of milling. Plain milling Step milling Slot milling Pocket milling Co-ordinate drilling Job setting in vice by dialing Job setting on bed with clamps, Knowledge of different cutting tool materials used, Selecting speed feeds & depth of cut, Indexing (simple & compounding).

Learning outcomes:

- Identification of different milling cutters and work mandrels ,Work holding devices , Milling operations –and Cutting parameters.
- Understanding Indexing methods: direct, Plain or simple, compound, differential and angular indexing, numerical problems on indexing.
- Identification of Milling machine accessories and attachment – Arbors, adaptors, collets, vices, circular table, indexing head and tail stock, vertical milling attachment.

UNIT – 5:

CNC Milling- Fundamentals of CNC milling, Familiarization of control panel, Fundamentals of CNC programming, Part programming techniques, Machining practice on CNC Milling, Practice session at Industry.

CNC Turning-Work piece setting methods, Tool setting methods, Practice on CNC Turning, Exercises on machine & Practice.

Learning outcomes

- Optimize programs for CNC Milling operations. Calculate parameters like speed feed, depth of cut etc. and set a reference for the various operations.
- Optimize programs for CNC turning operations. Calculate parameters like speed feed etc. and set references for the various operations. Prepare operation and operation sequence for the lathe operations like turning, grooving etc. Prepare & set.
- Execute program and inspect simple geometrical forms / standard parts.

Textbooks:

1. Machining and CNC Technology by Fitzpatrick published Mc Graw hill education.
2. CNC Programming by S.K. Sinha published Galgotia publications pvt ltd.

Reference Books:

1. Kaushik Kumar, Chikesh Ranjan, J. Paulo Davim "CNC Programming for Machining" published by Springer edition 2020.
2. Mattson Mike "CNC Programming Principles & Applications" 1st Edition published by Cengage Learning India

Course Outcomes:

- Understand the basic procedures and concepts of programming, set up and operation of a CNC Machining Center.
- Identify and understand the basic programming codes.
- Prepare and understand line program for various profiles Identify and set parameters for various simulators.
- Prepare Programs, Demonstrate, Simulate and Operate CNC lathe machines/milling for various machining operations.
- Define and explain Modern CNC systems and explain its importance in manufacturing.

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B.Tech - VI Sem L T P C

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(ME20AHO601) FLEXIBLE MANUFACTURING SYSTEMS

Pre-Requisite: Knowledge on manufacturing process

Course Description:

This course reviews the understanding of FMS, Overview of Material Handling Equipment, Storage Systems, Designing and analyzing the FMS using simulation and different analytical techniques, Tool management in FMS & to handle the production management problems in planning, loading, scheduling, routing and breakdown in a typical FMS, group technology and cellular manufacturing.

Course Objectives:

- Designing and analyzing the FMS using simulation and different analytical techniques.
- Tool management in FMS & to handle the production management problems in planning, loading, scheduling, routing and breakdown in a typical FMS.
- The need for flexibility in manufacturing industries.
- To learn the representation of systems with standard symbols and drawings.
- To learn the different types of automated material handling systems its design and calculations for different applications both Automated Storage and Retrival System (AS/RS). Concepts of group technology and cellular manufacturing.

UNIT - 1:

Understanding of FMS

Evolution of Manufacturing Systems, Definition, objective and Need, Components, Merits, Demerits and Applications Flexibility in Pull and Push type, Types & configurations concepts – Types of flexibility & performance measures. Function of FMS host computer, FMS host and area controller function distribution. Development and Implementation of FMS: Planning phase, Integration, System configuration, FMS layouts, FMS Project development steps.

Learning outcomes:

- Understand the basic concepts of FMS.
- Apply the concept of system design procedures to different levels of Production.
- Identify the system modeling issues and control them.

UNIT – 2:

Material Handling System

An introduction, Conveyor, Robots, Automated Guided Vehicle (AGV), Automated Storage Retrieval System (ASRS) Management technology: Tool Management, tool magazine, Tool preset, identification, Tool monitoring and fault detection, routing, Analysis of material handling equipment, Design of Conveyor & AGV systems, Benefits of Automated material handling systems.

Learning outcomes:

- Classify the material Handling equipment
- Explain the usage of different material handling equipment in industry
- Discuss how to connect loading stations to the different discharge conditions
- Associate the usage of cranes at industries
- Extend the knowledge for working on special material handling equipment

UNIT – 3:

Modelling and Analysis of FMS

Need for FMS modeling, Analytical model and Simulation model of FMS, Scope applicability and limitations.

Group Technology and Cellular Manufacturing: Introduction, Part families, parts classification and coding, production flow analysis, Machine cell design, Benefits of Group Technology

Learning Outcomes

- Apply the concept of system design procedures to different levels of production.
- Identify the system modeling issues and control them.
- Understand and Apply system modeling techniques.
- Distinguish between continuous and discrete modeling techniques.
- Design models of manufacturing systems

UNIT – 4:

Scheduling & loading of FMS

Introduction, scheduling of operations on a single machine, 2 machine flow shop scheduling, 2 machine job shop scheduling, 3 machine flow shop scheduling, scheduling ‘n’ operations on ‘n’ machines, scheduling rules, loading problems, Tool management of FMS, material Handling system schedule.

Learning outcomes:

- Apply the concept of scheduling.
- Understand and Apply system model techniques.

UNIT – 5:

FMS Rational

Economic and technological justification for FMS, JIT: Operation and evaluation, Personnel and Infrastructural aspects, Typical case, Future prospects.

Learning Outcomes:

- Summarize the concepts of modern manufacturing such as JIT

Textbooks:

1. William W Luggen, “Flexible Manufacturing Cells and System” Prentice Hall of Inc New Jersey,1991.
2. Reza A Maleki “Flexible Manufacturing system” Prentice Hall of Inc New Jersey, 1991.

Reference Books:

1. Considine D M, and Considine G D, Chopman, Standard Handbook of Industrial Automation -Hall, London, 1986.
2. H.K.Shivanand, M.M.Benal “Flexible Manufacturing system” New Age Publications.

Course Outcomes:

- Explain the Components of FMS, development and implementation of FMS.
- Design the material handling system and storage systems used in FMS environments.
- Analyze FMS using simulation and analytical techniques and understand the

concepts of group technology and cellular manufacturing.

- Analyze the production management problems in planning, loading, scheduling, routing and breakdown in a typical FMS.
- Understand the concepts of FMS, JIT and Typical cases.

B.Tech - VII Sem

L	T	P	C
4	0	0	4

(ME20AHO701) DESIGN OF HEAT EXCHANGERS

Pre-Requisite: Thermal Engineering, Heat and Mass Transfer

Course Objectives:

- It provides exposure to different kind of heat exchanger, their working and selection for a given application.
- Students will come to know about different techniques of heat exchanger analysis.
- Student will be able to learn construction and thermal design methodology of Double Pipe compact, shell and tube heat exchanger.

UNIT – 1:

Different Classification and Basic Design Methodologies for Heat Exchanger:

Classification of heat exchanger, selection of heat exchanger, overall heat transfer coefficient, LMTD method for heat exchanger analysis for parallel, counter, multi-pass and cross-flow heat exchanger, e-NTU method for heat exchanger analysis, fouling, cleanliness factor, percent over surface, techniques to control fouling, additives, rating and sizing problems, heat exchanger design methodology.

Learning Outcomes:

- To select appropriate heat exchanger for the given application and to measure the performance degradation of heat exchangers subject to fouling.

UNIT – 2:

Design of Double Pipe Heat Exchangers:

Thermal and hydraulic design of inner tube and annulus, hairpin heat exchanger with bare and finned inner tube, total pressure drop.

Learning Outcomes:

- To analyse thermal and hydraulic performance of shell and tube heat exchangers.

UNIT – 3:

Design of Shell & Tube Heat Exchangers:

Basic components, basic design procedure of heat exchanger, TEMA code, J-factors, conventional design methods, Bell-Delaware method.

Learning Outcomes:

- To analyze thermal and hydraulic performance of shell and tube heat exchangers.

UNIT – 4:

Design of Compact Heat Exchangers:

Heat transfer enhancement, plate-fin heat exchanger, tube fin heat exchanger, plate heat exchanger, heat transfer, and pressure drop

Learning Outcomes:

- To analyse thermal and hydraulic performance of different types of compact heat exchangers.

UNIT – 5:

Heat Transfer Enhancement and Performance Evaluation:

Enhancement of heat transfer, Performance evaluation of Heat Transfer Enhancement technique. Introduction to pinch analysis.

Learning Outcomes:

- To compare various heat transfer enhancement techniques and to apply process optimization techniques for heat exchanger design

Textbooks:

1. Sadik, Kakac, “Heat Exchanger Selection, Rating and Thermal Design” CRC Press, Second edition.
2. Ramesh K Shah, “Fundamentals of Heat Exchanger Design”, Wiley Publication, August 2003.

Reference Books:

1. Kays, V.A. and London, A.L., “Compact Heat Exchangers”, McGraw Hill,1998.
2. Kuppan, T, Macel Dekker, “Heat Exchanger Design Handbook” CRC Press ,June 2013

3. Schunder E.U., “Heat Exchanger Design Hand Book”,Hemisphere Pub,May 2015.
4. Donald Q Kern, “Process Heat transfer”,McGraw Hill,1983

Course Outcomes:

After learning the course the students should be able to:

- Outline common types of heat exchangers.
- Analyse heat exchangers.
- Design double pipe heat exchangers, Shell & tube heat exchangers, Design of compact heat exchangers.
- Evaluate the performance of heat exchangers.

MINOR DEGREE SYLLABUS

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech- III Sem

L	T	P	C
3	0	0	3

(ME20AES301) MECHANICS OF MATERIALS

Prerequisites: Engineering Physics, Basic Mathematics

Course Objectives:

- To Impart Concepts of Basic Mechanics Principles and its Uses in Day Today Life Situations.
- Introduce the Concepts of Different Stresses, Strains and Their Relationships.
- Discuss the Principal Stresses and the Stress Components on Different Planes Under Different Loads.
- To Calculate Centroid and Moment of Inertia of Solids and Surfaces.
- Explain Maximum Shear Force and Bending Moment of Different Beams under Different Loading Conditions.
- Demonstrate Bending Stress and Shear Stress Distribution of Various Cross Section of Beams and to Predict the Maximum Slope Deflection of Beams.
- Impart Strain Energy due to Axial, Bending, and Torsion Loading.
- Familiarize the Euler's Concept of Buckling in Columns & Struts.

UNIT – 1:

Introduction to Engineering Mechanics:

Composition and Resolution of Forces, Parallelogram Law, Principle of Transmissibility, Types of Force Systems - Concurrent and Concurrent Coplanar Forces, Resultant of Coplanar Force Systems Couple, Moment of a Force Varignon's Theorem, Concept of Free Body Diagrams, Concept of Equilibrium of Coplanar Force Systems.

Learning Outcomes:

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

- Resolve the Forces in Mechanical Systems. (L2)
- Identify the Moments and Forces. (L3)
- Develop Free Body Diagram. (L3)

UNIT – 2:

Stresses and Strains:

Types of Stresses and Strains, Stress-Strain Relations, Stress-Strain Diagram for Ductile and Other Materials, Axial Loaded Bars of Uniform and Varying Cross Section, Compound Bars, Relation Between Three Elastic Moduli, Thermal Stresses.

Principal Stresses and Strains:

Biaxial State of Stress with and without Shear - Mohr's Circle and Analytical Methods.

Learning Outcomes:

After Completing this Unit, the student will be able to

- Determine Stresses and Deformations due to Axial Loads in Simple Members. (L3)
- Analyse Stresses Compound bars due to Temperature Raise. (L4)
- Correlate the Elastic Constants of Materials. (L3)
- Construct the Mohr's Circle for Calculating Principal Stresses. (L3)
- Analyse Principal Stresses in Biaxial State of Loading. (L4)

UNIT – 3:

Centroid, Centre of Gravity and Moment of Inertia:

Centroid and Centre of Gravity-Simple areas, Theorems of Pappus and Guldinus, Parallel Axis and Perpendicular Axis Theorems. Moment of Inertia-Area Moment of Inertia for Simple Sections, Introduction to Mass Moment of Inertia.

Analysis of Beams: Types of Beams and Loads, Shear Force and Bending Moment Diagram for Cantilever and Simply Supported beams for Different Types of Loadings, Point of Contra Flexure, Relation Between Shearing Force and Bending Moment.

Bending Stresses: Flexural Equation, Bending Stress Distribution for I and T section of Beams. Shear Stresses: Shear Stress Distribution for I and T section of Beams.

Learning Outcomes:

After Completing this Unit, the student will be able to

- Identify the Centroid and Centre of Gravity for Simple Sections. (L3)
- Draw Shear Force and Bending Moment Diagrams of Beams Subject to Bending Loading. (L3)

- Determine Bending Stresses in Beams under Different Loading. (L4)
- Evaluate the Maximum Shear Force and Bending Moment and their Location in Beams. (L4)
- Demonstrate the Shear Stress and Bending Moment Distribution in I and T of Beams. (L4)

UNIT – 4:

Deflection of Beams: Differential Equations of the Deflection Curve, Slope, and Deflection: using Double Integration Method, and Macaulay's Method for Simply Supported, Cantilever.

Torsion of Circular Shafts: Theory of Pure Torsion, Transmission of Power in Solid and Hollow Circular Shafts, Comparison of Strengths of Solid and Hollow Shafts, Shafts in Series and Parallel, Combined Bending and Torsion.

Learning Outcomes:

After Completing this Unit, the student will be able to

- Compute the slope and deflection in beam under different loading. (L3)
- Distinguish various approaches for calculating slope and deflection. (L4)
- Analyse circular shafts subjected to twisting couple. (L4)
- Determine stresses in shafts subjected to combined loads. (L4)
- Determine angle of twist in shafts. (L4)

UNIT – 5:

Buckling of Columns: Analysis of Columns to Evaluate Buckling Loads with Different Boundary Conditions, Euler's Formula and its Limitations, Rankine's Formula, Columns under Eccentric Load, Columns under Initial Curvature.

Thin Cylinders: Hoop Stresses, Longitudinal, Cylindrical and Spherical Shells Subjected to Internal Pressure, Calculation of Volumetric Strain.

Learning Outcomes:

After Completing this Unit, the student will be able to

- Determine buckling load in compressive members. (L4)
- Apply concepts of elastic stability of columns. (L3)
- Assess hoop and longitudinal stresses in thin cylinders. (L3)
- Calculate volumetric strain. (L3)

Textbooks:

1. F.P. Beer, E.R. Johnston, Jr& John.T. DeWolf, “Mechanics of Materials”, 7th Edition, Tata McGraw-Hill, 2016.
2. SS Rattan, Strength of Materials, 3rd Edition, Tata McGraw-Hill, 2016.

Reference Books:

1. Engineering Mechanics, R. S. Khurmi, S. Chand Publishing.
2. A Textbook of Engineering Mechanics, R.K. Bansal, Laxmi Publications
3. Timoshenko, “Strength of Materials Part-I& II”, 3rd edition, CBS Publishers, 2004.
4. Popov, “Mechanics of Solids”, 2nd Edition, New Pearson Education, 2015.
5. Basudeb Bhattacharya., Engineering Mechanics, 2/e, Oxford University Press (India), 2015.

Course Outcomes:

After Successful Completion of this Course, the student will be able to

- Classify the forces and stresses involved in plane and rigid bodies (L2)
- Analyze the equilibrium of forces in static particles and rigid bodies. (L4)
- Apply the concepts of stress and strain to machine and structural members. (L3)
- Determine centroid for simple sections and construct the shear force and bending moment diagrams for beams. (L4)
- Calculate slope and deflection in beams under different loading conditions and distinguish the strengths of solid and hollow shafts. (L4)
- Analyze columns for buckling loads and estimate stresses in thin cylinders due to internal pressure. (L4)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech - IV Sem

L	T	P	C
3	0	0	3

(ME20APC402) MACHINE TOOLS & MEASUREMENTS

Prerequisites: Manufacturing Technology

Course Objectives:

- Explain Parameters in the Metal Cutting Operation, Relate Tool Wear and Tool Life and the Variables that Control them.
- Calculate Machining Times for Different Machining Processes.
- Teach Various Metal Cutting Processes. (Lathe, Drilling, Boring Shaping, Slotting, Milling and Grinding).
- Familiarize the Basic Concepts of Measurements
- Learning Characteristics of Surface Measurements Devices

UNIT – 1:

Material Removal Processes:

Metal Cutting: Introduction, Elements of Cutting Process – Geometry of Single Point Tools. Chip Formation and Types of Chips. Built up Edge and its Effects, Chip Breakers. Mechanics of Orthogonal Cutting –Merchant's Force Diagram, Cutting Forces – Cutting Speeds, Feed, Depth of Cut, Heat Generation, Tool Life, Coolants.

Learning Outcomes:

At the end of this Unit Student will be able to

- Describe Cutting Processes and Variables. (L2)
- Classify Various Types of Chips. (L4)

UNIT – 2:

Machining Processes:

Engine Lathe: Principle of Working, Types of Lathe, Specifications, Taper Turning – Lathe Attachments. Capstan and Turret Lathe – Single Spindle and Multi-Spindle Automatic Lathes – Tool Layouts

Drilling And Drilling Machines: Principles of Working, Specifications, Types, and Operations Performed - Tool Holding Devices - Nomenclature of Twist Drill.

Boring And Boring Machines- Principles of Working, Specifications, Types, and Operations Performed - Tool Holding Devices - Nomenclature of Boring Tools.

Learning Outcomes:

At the end of this Unit, the Student will be able to

- List the Specifications for Various Types of Lathes. (L1)
- List the Specifications & Identify Parts of Various Types of Drilling & Boring Machines. (L3)
- Determine Cutting Speeds for Different Machining Operations. (L4)

UNIT – 3:

Machining & Finishing Processes for Other Shapes:

Shaping, Slotting and Planning Machines - Principles of Working - Principal Parts, Specification, Classification, Operations Performed, Machining Time Calculations.

Milling Operations and Milling Machines - Principles of Working, Specifications, Classifications of Milling Machines, Machining Operations, Types and Geometry of Milling Cutters, Methods of Indexing, And Accessories to Milling Machines, Machining Time Calculations.

Abrasive Machining:

Grinding and Grinding Machines: Grinding Process, Types of Grinding Machines, Grinding Process Parameters, Honing, Lapping, Broaching.

Learning Outcomes:

At the end of this Unit, the Student will be able to

- Recognize the Parts of Shaping, Slotting and Planning Machine. (L3)
- Compare Tool Geometry for Milling, Shaping, Slotting and Planning Operations. (L3)
- Recognize The Parts of Milling Machine (L3)
- List the Different Operations Performed on Milling Machine and Abrasive Machines (L3)
- Determine the Machining Time Calculations (L4)

UNIT – 4:

Concepts of Measurements:

Limits, Fits and Tolerances- Types of Fits - Unilateral and Bilateral Tolerance System, Hole and Shaft Basis System. Interchangeability And Selective Assembly.

Limit Gauges: Taylor's Principle, Design of GO And NO-GO Gauges, Measurement of Angles Using Bevel Protractor and Sine Bar. Measurement Of Flatness Using Straight Edges, Surface Plates, Optical Flat and Auto Collimator.

Learning Outcomes:

At the end of this Unit, the Student Will Be Able to

- Identify Important Parameters in Metrology. (L3)
- Differentiate Interchangeability and Selective Assembly. (L4)
- Select Limits and Tolerances for Different Assemblies. (L1)

UNIT – 5:

Surface Roughness Measurement: Differences Between Surface Roughness and Surface Waviness- Numerical Assessment of Surface Finish – CLA, R.M.S Values – Ra, Rz Values, Methods of Measurement of Surface Finish-Profilograph, Talysurf, BIS Symbols for Indication of Surface Finish.

Screw Thread Measurement: Elements of Measurement – Errors in Screw Threads – Measurement of Effective Diameter, Angle of Thread and Thread Pitch-Profile Thread Gauges.

Gear Measurement: Gear Measuring Instruments, Gear Tooth Profile Measurement. Measurement Of Diameter, Pitch, Pressure Angle and Tooth Thickness. Coordinate Measuring Machines (CMM): Types and Applications Of CMM.

Learning Outcomes:

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

- Recall the terms used in surface roughness measurement, Screw and Thread Measurements. (L1)
- Explain the factors affecting the surface finish in machining. (L2)
- Demonstrate the application of different surface measuring instruments. (L2)

Textbooks:

1. P.N. Rao, “Manufacturing Technology: Metal Cutting and Machine Tools”, (Volume 2), 3rd Edition, Tata McGraw-Hill Education, 2013.
2. Mahajan, “Engineering Metrology”, 2nd Edition, Dhanpat Rai, 2013.

Reference Books:

1. R.K. Jain, “Engineering Metrology”, 20th Edition, Khanna Publishers, 2013.
2. Thomas G.Beckwith, Marangoni, Linehard, “Mechanical Measurements”, 6th Edition, PHI, 2013
3. Kalpakzian S and Schmid SR, “Manufacturing Engineering and Technology”, 7th edition, Pearson, 2018.
4. Hindustan Machine Tools, “Production Technology”, TMH, 2001.
5. AB. Chattopadhyay, “Machining and Machine Tools”, 2nd edition, Wiley, 2017.
6. R.K. Jain and S.C. Gupta, “Production Technology”, 17th Edition, Khanna Publishers, 2012.
7. S.Bhaskar, Basic Principles - Measurments and Control Systems, Anuradha Publications, 2014.
8. Anand K Bewoor & Vinay A Kulkarni, “Metrology & Measurement”, 15th Edition, McGrawHill, 2015.

Course Outcomes:

After Completing the Course, the Student will be able to

- Understand the cutting principles involved in various Machining Process. (L2)
- Illustrate the working principles of various Machine tools. (L2)
- Evaluate the machining time and tool life for the various machining processes (L4)
- Classify various measuring instruments used in metrology(L2)
- Validate various measuring instruments in Engineering Applications. (L4)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech- V Sem

L	T	P	C
3	0	0	3

(ME20APC503) FLUID MECHANICS & HYDRAULIC MACHINES

Prerequisites: Engineering Mechanics, Engineering Physics

Course Objectives:

- To Introduce concepts of fluid statics and kinematics
- To impart the knowledge on minor losses in pipes
- To impart knowledge on power developed by hydraulic energy and hydroelectric installations.
- To impart the knowledge on design of turbines
- To impart the knowledge on design of centrifugal pumps.

UNIT -1:

Fluid Statics:

Dimensions and units: physical properties of fluids – specific gravity, porosity surface tension – vapor pressure and their influence on fluid motion – atmospheric gauge and vacuum pressure – measurement of pressure – Piezometer, U-tube differential manometers

Fluid Kinematics

stream line, path line and streak lines and steam tube, classification of flows-steady & unsteady, uniform, non-uniform, laminar, turbulent, rotational, and irrotational flows-equation of continuity for one dimensional flow.

Fluid dynamics: surface and body forces – Euler's and Bernoulli's equations for flowing stream line, momentum equation and its application on force on pipe bend.

Learning Outcomes:

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

- To introduce the concepts stream line, path line, streak line etc., (L3)
- To familiarize the concepts of rotational and irrotational flows (L3)

UNIT -2:

Conduit Flow

Reynold's experiment – Darcy Weisbach equation – Minor losses in pipes – pipes in series and pipes in parallel – total energy line-hydraulic gradient line. Measurement of flow: pitot tube, venturi meter, and orifice meter, Flow nozzle, Turbine current meter.

Learning Outcomes:

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

- To introduce the concepts of pipes in series and parallel (L3)
- To familiarize the discharge measurements by using pitot tube, venturi meter etc., (L3)

UNIT -3:

Turbo Machinery: hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work done efficiency, flow over radial vanes.

Hydroelectric Power Stations: Elements of hydroelectric power station-types, concept of pumped storage plants-storage requirements.

Learning Outcomes:

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

- To impart the knowledge on effect of impact of jets on different types of vanes. (L3)
- To familiarize with the elements of hydroelectric installations. (L3)

UNIT -4:

Hydraulic Turbines: Classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies hydraulic design-draft tube- theory- functions and efficiency.

Performance of Hydraulic Turbines: Unit and specific quantities, characteristics governing of turbines, selection of type of turbine, cavitation, surge tank, hammer.

Learning Outcomes:

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

- To impart the knowledge on working principles of hydraulic turbines along with their efficiencies. (L3)

- To evaluate the performance of different types of turbines. (L3)

UNIT -5:

Centrifugal Pumps: Classification, working, work done – manomertic head – loss efficiencies – specific speed – pumps in series and parallel – performance characteristic curves, NPSH.

Learning Outcomes:

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

- To impart the knowledge on working principles of different pumps. (L3)
- To evaluate the performance of different types of pumps. (L3)

Textbooks:

1. “Hydraulics, fluid mechanics and Hydraulic machinery MODI and SETH”. Standard book house
2. Dr. R.K.Bansal, “Fluid Mechanics” Lakshmi Publications Pvt. Ltd.
3. D. Rama Durgaiah, “Fluid Mechanics and Machinery” New Age International.

Reference Books:

1. D.S. Kumar, “Fluid Mechanics and Fluid Power Engineering”, Kotaria &Sons.
2. Banga & Sharma, “Hydraulic Machines”, Khanna Publishers.
3. James W.Dally, “Instrumentation for Engineering Measurements”, Wiley Riley, John Wiley & Sons Inc. 2004.

Course Outcomes:

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

- Understand characteristics of laminar and turbulent flows. (L2)
- Understand the energy losses in different types of pipes. (L2)
- Identify the performance of different types of turbines. (L1)
- Identify the performance of centrifugal pumps. (L1)

B.Tech - VI Sem

L	T	P	C
3	0	0	3

(ME20APE601) COMPOSITE MATERIALS

(Professional Elective – II)

Prerequisites: Material Science

Course Objectives:

- Introduce composite materials and their applications.
- Build proper background for stress analysis in the design of composite structures.
- Familiarize various properties of composite materials.
- Focus on biodegradable composites.

UNIT – 1:

Introduction to composites

Fundamentals of composites, Definition, classification: based on Matrix, based on structure, Advantages and applications of composites, Reinforcement, whiskers, glass fiber, carbon fiber, Aramid fiber, ceramic fiber, Properties and applications.

Learning Outcomes:

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

- Understand in detail about Composite Materials. (L2)
- Explain its Properties, Advantages and Applications. (L3)

UNIT – 2:

Polymer Matrix Composites

Polymers, Polymer matrix materials, PMC processes, hand layup processes, spray up processes, resin transfer moulding, Pultrusion, Filament winding, Auto clave based methods, Injection moulding, sheet moulding compound, properties and applications of PMCs.

Learning Outcomes:

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

- Understand in detail about PMCs. (L2)
- Explain its Properties, Advantages and Applications. (L3)

UNIT – 3:

Metal Matrix Composites

Metals, types of metal matrix composites, Metallic Matrices, Processing of MMC, Liquid state processes, solid state processes, In-situ processes, Properties and applications of MMCs.

Learning Outcomes:

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

- Understand in detail about MMCs. (L2)
- Explain its Properties, Advantages and Applications. (L3)

UNIT – 4:

Ceramic Matrix Composites

Ceramic matrix materials, properties, processing of CMCs, Sintering, Hot pressing, Infiltration, Lanxide process, Insitu chemical reaction techniques, solgel polymer pyrolsis, SHS, Cold isostatic pressing (CIPing), Hot isostatic pressing (HIPing), Properties and Applications of CCMs.

Learning Outcomes:

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

- Understand in detail about CMCs. (L2)
- Explain its Properties, Advantages and Applications. (L3)

UNIT – 5:

Advances in Composites

Advantages of carbon matrix, limitations of carbon matrix carbon fibre, chemical vapour deposition of carbon on carbon fibre perform, Properties and applications of Carbon-carbon composites, Composites for aerospace applications, Biodegradability, introduction of bio composites, classification, processing of bio composites, applications of bio composites, Mechanical, Biomedical, automobile Engineering.

Learning Outcomes:

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

- Understand in detail about Carbon Matrix. (L2)
- Explain the applications of carbon fiber composites & bio composites. (L3)

Textbooks:

1. Chawla K.K, Composite materials, 2/e, Springer – Verlag, 1998.
2. Mathews F.L. and Rawlings R.D., Chapman and Hall, Composite Materials: Engineering and Science, 1/e, England, 1994.

Reference Books:

1. H K Shivanand, B V Babu Kiran, Composite Materials, ASIAN BOOKS, 2011.
2. A.B. Strong , Fundamentals of Composite Manufacturing, SME, 1989.
3. S.C. Sharma, Composite materials, Narosa Publications, 2000.
4. Maureen Mitton, Hand Book of Bioplastics & Biocomposites for Engineering applications, John Wiley publications.

Course Outcomes:

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

- Explain the practical applications of composites. (L3)
- Identify the various types of Polymer Matrix Composites. (L2)
- Understand the Processing & Applications of MMCs. (L2)
- Classify the various types of Ceramic Matrix Materials. (L2)
- Explain the applications of carbon fiber composites & bio composites. (L3)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(AUTONOMOUS)

(Approved by AICTE | Accredited by NAAC with 'A' Grade | Accredited by NBA (CSE, ECE & EEE) | Permanently Affiliated to JNTUA)

Karakambadi Road, Tirupati - 517 507

First Year MCA

Course Structures and Syllabi underR20 Regulations

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)
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 & Trouble shooting 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**

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

MCA- I Sem

L T P C

3 0 0 3

(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 tress, 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.Forouzon 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)

a. Add column designation to the department table.

b. Insert values into the table.

c. List the records of emp table grouped by dept no.

d. Update the record where dept no is9.

e. 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)

a. Insert records into the table.

b. Add salary column to the table.

c. Alter the table column domain.

d. Drop salary column of the customer table.

e. Delete the rows of customer table whose ust_city is 'hyd'.

f. 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.

a. Add and drop a column to the branch table.

b. Insert values to the table.

c. 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

1. a. Create a user and grant all permissions to the user.
   b. Insert the any three records in the employee table and use rollback. Check the result.
   c. Add primary key constraint and not null constraint to the employee table.
   d. Insert null values to the employee table and verify the result.
2. a. Create a user and grant all permissions to the user.
   b. Insert values in the department table and use commit.
   c. Add constraints like unique and not null to the department table.
   d. 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 umber.

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 o pint 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

2. 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);
   a. Write a Insert Trigger to check the Passport_id is exactly six digits or not.
   b. 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.

3. 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.

4. Convert employee name into uppercase whenever an employee record is inserted or updated. Trigger to fire before the insert or update.

5. 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.

6. 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

1. Create the procedure for palindrome of given number.
2. 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 fist 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 on 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

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MCA- I Sem

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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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(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 Confliction 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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(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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(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 Desgin, 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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(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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(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, Aestheic 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

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 an H.James Hoover, " Fundamentals of Theory of Computation, Principles and Practice", Morgan Kaufmann Publishers, 1998.
4. MichealSipser, "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", Addision 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

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 ax2 + 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 StringToknizer 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 substraction 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 decimalnumber 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,PearsonEducation
2. Programming in java Sachine
3. Big Java, 2nd edition, Cay Horstmann, Wiley Student Edition, Wiley India PrivateLimited.
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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MCA-III Sem **L T P C**

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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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MCA-III Sem **L T P C**

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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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MCA-III Sem **L T P C**

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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, Sever-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

Sever 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 andAchievable 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 ofDataflow Testing.

UNIT-3

Domain Testing: Domains and Paths, Nice & Ugly Domains, Domain testing, Domains andInterfaces Testing, Domain and Interface Testing, Domains and

Testability.

UNIT-4

Paths, Path products and Regular expressions: Path Products & Path Expression, ReductionProcedure, 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, StateTesting, Testability Tips.

Graph Matrices and Application: Motivational Overview, Matrix of Graph, Relations, Power of aMatrix, 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, Camebridge
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 – Ardunio – 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 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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(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 Frameork” , 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

Progress with Progress Bar, Using Assets

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 HDFSBasics- 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, MichelineKamber, Data Mining Concepts and Techniques, Second Edition.
4. Elsevier, Reprinted 2008. Da Ruan, Guoquing 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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MCA-III Sem **L T P C**

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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 ofthese pages will be given below).

Left frame : At least four links for navigation, which will display the catalogue ofrespective 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.

<table>
<tr><td>Logo</td><td colspan="4">Web Site Name</td></tr>
<tr><td>Home</td><td>Login</td><td>Registration</td><td>Catalogue</td><td>Cart</td></tr>
<tr><td>CSE
ECE
EEE
CIVIL</td><td colspan="4">Description ofthe Web Site</td></tr>
</table>

Fig 1.1

2) LOGIN PAGE:

This page looks like below:

<table>
<tr><td>Logo</td><td colspan="4">Web Site Name</td></tr>
<tr><td>Home</td><td>Login</td><td>Registration</td><td>Catalogue</td><td>Cart</td></tr>
<tr><td>CSE
ECE
EEE
CIVIL</td><td colspan="4">Lo
Pa</td></tr>
</table>

3) CATOLOGUE PAGE:

The catalogue page should contain the details ofall the books available in the web site in a table.

The details should contain the following:

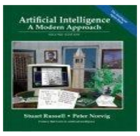
1 Snap shot ofCover Page.

2 Author Name.

3 Publisher.

4 Price.

5 Add to cart button.

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
CSE ECE EEE CIVIL	  	Book : XML Bible Author : Winston Publication : Wiely Book : AI Author : S.Russel Publication : Princeton hall Book : Java 2 Author : Watson Publication : BPB	$ 40.5 $ 63 $ 35.5	Add to cart Add to cart Add to cart

<table>
<tr><td></td><td></td><td>publications</td><td></td><td></td></tr>
<tr><td></td><td>
</td><td>Book : HTML in 24 hours
Author : Sam Peter
Publication : Sam publication</td><td>$ 50</td><td>
</td></tr>
</table>

Note: Week 2 contains the remaining pages and their description.

<u>Week-2</u>:

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:

<table>
<tr><td>Logo</td><td colspan="4">Web Site Name</td></tr>
<tr><td>Home</td><td>Login</td><td>Registration</td><td>Catalogue</td><td>Cart</td></tr>
<tr><td>CSE
ECE
EEE
CIVIL</td><td colspan="4">Book name Price Quantity Amount

Java 2 $35.5 2 $70
XML bible $40.5 1 $40.5

Total amount - $130.5</td></tr>
</table>

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 ofthe above registration page.

1. Name (Name should contains 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 (C**ascading **S**tyle **S**heets**)** 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 ofyour 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 ofthe 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'sManager's.

At the level of society: as mutually enriching institutions and organizationsSum 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

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

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1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantak, 1999.

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"
4. E. FSchumacher. "Small is Beautiful"
5. Slow is Beautiful –Cecile Andrews
6. J C Kumarappa "Economy of Permanence"
7. Pandit Sunderlal "Bharat Mein Angreji Raj"
8. Dharampal, "Rediscovering India"

9. Mohandas K. Gandhi, “Hind Swaraj or Indian Home Rule”
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11. Vivekananda - Romain Rolland (English)
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