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

B.TECH - ACADEMIC REGULATIONS - R20

B.Tech Regular Four Year Degree Programme

(For the batches admitted from the academic year 2020-21) and

B.Tech (Lateral Entry Scheme)

(For the batches admitted from the academic year 2021-22)

PRELIMINARY DEFINITIONS AND NOMENCLATURE

AICTE: Means All India Council for Technical Education, New Delhi.

Autonomous Institute: Means an institute designated as Autonomous by University Grants Commission (UGC), New Delhi in concurrence with affiliating University (**Jawaharlal Nehru Technological University Anantapur**).

Academic Autonomy: Means freedom to an institute in all aspects of conducting its academic programmes granted by UGC for promoting excellence.

Academic Council: The Academic Council is the highest academic body of the institute and is responsible for the maintenance of standards of instruction, education and examination within the institute. Academic Council is an authority as per UGC regulations and it has the right to take decisions on all academic matters including academic research.

Academic Year: It is the period necessary to complete an actual course of study within a year. It comprises two main semesters i.e., one odd and one even.
Branch: Means specialization in a programme like B.Tech degree programme in Civil Engineering, B.Tech degree programme in Computer Science and Engineering etc.

Board of Studies (BOS): BOS is an authority as defined in UGC regulations, constituted by Head of the Organization for each of the departments separately. They are responsible for curriculum design and updation in respect of all the programmes offered by a department.

Backlog Course: A course is considered to be a backlog course, if the student has obtained a failure grade in that course.

Commission: Means University Grants Commission (UGC), New Delhi.

Choice Based Credit System: It provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching along with provision of choice for the student in the course selection.

Certificate Course: It is a course that makes a student to have hands-on expertise and skills required for holistic development in a specific area/field.

Internal Examination: It is an examination conducted towards sessional assessment.

Core: The courses that are the essential constituents of each engineering discipline are categorized as professional core courses for that discipline.

Course: A course is a subject offered by a department for learning in a particular semester.

Course Outcomes: The essential skills that need to be acquired by every student through a course.

Credit: A credit is a unit that gives weight to the value, level or time requirements of an academic course. The number of 'Contact Hours' in a week of a particular course determines its credit value.

Credit Point: It is the product of grade point and number of credits for a course.

Cumulative Grade Point Average (CGPA): It is a measure of cumulative performance of a student overall the completed semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places.

Curriculum: Curriculum incorporates the planned interaction of students with instructional content, materials & resources.

Department: An academic entity that conducts relevant curricular and co-curricular activities, involving both teaching and non-teaching staff, and other resources in the process of study for a degree.

Detention in a Semester: Student who does not obtain minimum prescribed attendance in a Semester shall be detained in that particular Semester. A Student can also be detained for lack of required number of credits at the end of IV semester or VI semester respectively.

Elective Course: A course that can be chosen from a set of courses. An elective can be Professional Elective and/or Open Elective.

Evaluation: Evaluation is the process of judging the academic performance of the student in her/his courses. It is done through a combination of continuous internal examinations and semester end examinations.

Grade: It is an index of the performance of the students in a said course. Grades are indicated by alphabets.

Grade Point: It is a numerical weight allotted to each letter grade on a 10 - point scale.

Institute: Represents Sri Venkateswara College of Engineering, Tirupati unless indicated otherwise by the context.

Massive Open Online Courses (MOOC): MOOCs inculcate the habit of self-learning. MOOCs would be additional choices in all the elective group courses.

Minor: Minor are coherent sequences of courses which may be taken in addition to the courses required for the B.Tech degree.

Pre-requisite: A specific course or subject, the knowledge of which is required to complete before student register another course at the next grade level.

Professional Elective: It indicates a course that is discipline centric. An appropriate choice of minimum number of such electives as specified in the programme will lead to a degree with specialization.

Programme: Denotes UG degree programme: Bachelor of Technology (B.Tech).

Project work: It is a design or research-based work to be taken up by a student during his/her VIII semester to achieve a particular aim. It is a credit-based course and is to be planned carefully by the student.

Registration: Process of enrolling into a set of courses in a semester of a programme.

Regulations: The regulations, common to all B.Tech programmes offered by Institute, are designated as "SVCE – R20" and are binding on all the stakeholders.

Semester: It is a period of study consisting of 90 working days. Odd semester commences usually in July and even semester in December of every year.

Semester End Examinations: It is an examination conducted for all courses offered in a semester at the end of the semester.

University: Represents Jawaharlal Nehru Technological University Anantapur (JNTUA), Ananthapuramu.

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1 General

1.1 About the College

Sri Venkateswara College of Engineering (SVCE) is a part of **SV Colleges** group established in the year 2007 with a vision to become a leader in providing quality educational services.

College is affiliated to JNTUA & approved by AICTE, recognized under section 2(f) & 12 (B) of UGC act 1956. Accredited by NAAC with A grade. Three B.Tech Programmes CSE, ECE & EEE are accredited by NBA New Delhi. The Campus is equipped with state of art laboratories of centre of excellence through advanced tools and technologies.

Learning at **Sri Venkateswara College of Engineering** has a pragmatic approach with a clear focus, valuing individual vision, intellectual discipline, and a sense of teamwork. We aim at developing our students to their full potential, preparing them to take the next step towards career success.

Sri Venkateswara College of Engineering is committed to its role in creating leaders through its innovative programmes, outstanding faculty and effective leadership. **Sri Venkateswara College of Engineering** nurtures global leaders who can speak their minds and work well with others in a wide range of cultural contexts. It will develop their ability to manage a career successfully in the global economy.

Our teaching modes and methods of assessment vary between courses to ensure that you gain the most benefit from the interactive course content, faculty members, fellow students, and invited guests. Lectures comprise only a portion of course delivery, with the remaining taken up by discussions, seminars, case analysis, simulation, individual and group projects, and presentations.

1.1.1 Applicability

All the rules specified herein, approved by the Academic Council, shall be in force and applicable to students admitted from the academic year 2020 – 21 onwards. Any reference to "College" in these rules and regulations stands for Sri Venkateswara College of Engineering.

1.1.2 Extent

All the rules and regulations, specified hereinafter shall be read as a whole for the purpose of interpretation and as and when a doubt arises, the interpretation of the Chairman, Academic Council is final. It shall be ratified by the Academic Council in the forth coming meeting. As per the requirements of statutory bodies, Principal, **Sri Venkateswara College of Engineering** shall be the Chairman, Academic Council.

1.2 Vision & Mission

VISION

To be a centre of excellence focusing on high quality technical education, research and technical services with global leadership competence to succeed in employment and higher education with ethical, social, entrepreneurial aspects updating to the real time requirements.

MISSION

To impart high quality technical education by providing the state-of-the art infrastructure, core instruction. Advanced research and technical consultancy services are carried with qualified and senior faculty to prepare the students professionally deft and intellectually adept possessing excellent skill, knowledge and behaviour with global competence.

1.3 Programmes Offered

Following programmes are offered in various branches at **Sri Venkateswara College of Engineering** leading to the award of B.Tech Degree

S No	Branch
1	Civil Engineering
2	Electrical and Electronics Engineering
3	Mechanical Engineering
4	Electronics and Communication Engineering
5	Computer Science and Engineering
6	Information Technology
7	Computer Science and Engineering (Artificial Intelligence & Machine Learning)

1.4 Semester System & Structure

A student after securing admission shall complete the B.Tech programme in a minimum period of 4 academic years (8 Semesters) and a maximum period of 8 academic years (16 semesters) starting from the date of commencement of first year first semester, failing which student shall forfeit seat in B.Tech course and their admission stands cancelled. Each student shall secure 160 credits required for the completion of the Under Graduate Programme and award of the B.Tech degree.

A student will be eligible to get undergraduate degree with Honours or one Minor engineering, if he/she completes an additional 20 credits. A student will be permitted to register for Honours degree or one Minor engineering but not both.

1.4.1 UGC / AICTE

UGC /AICTE specified definitions / descriptions are adopted appropriately for various terms and abbreviations used in these Academic regulations / Norms, which are listed below.

1.4.2 Semester scheme

The duration of an academic programme shall be four years consisting of eight semesters. The maximum period for which a student can take to complete a full-time academic programme shall be double the normal duration of programme i.e., for regular students eight years, for lateral entry students six years from the date of admission. Each semester consists of minimum of 90 instruction days.

1.4.3 Subject Course Classification

All subjects/ courses offered for the Under Graduate programme in Engineering & Technology (B.Tech degree programmes) are broadly classified as follows.

<table>
<tr><th>S. No.</th><th>Broad Course Classification</th><th>Course Group/ Category</th><th>Course Description</th><th>Credits</th></tr>
<tr><td>1</td><td rowspan="3">Foundation Courses</td><td>BS – Basic Sciences</td><td>Includes Mathematics, Physics and Chemistry subjects</td><td rowspan="3">50-60</td></tr>
<tr><td>2</td><td>ES – Engineering Sciences</td><td>Includes Fundamental Engineering subjects</td></tr>
<tr><td>3</td><td>HS – Humanities and Social sciences</td><td>Includes subjects related to Humanities, Social Sciences and Management</td></tr>
<tr><td>4</td><td>Core Courses-I</td><td>PC – Professional Core</td><td>Includes core subjects related to the Parent discipline / department/ Branch of Engineering</td><td>45-50</td></tr>
</table>

5	Elective Courses	PE – Professional Electives	Includes Elective subjects related to the Parent discipline/ department/ branch of Engineering.	15-36
6		OE – Open Electives	Elective subjects which include interdisciplinary subjects or subjects in an area outside the parent discipline/ department/ Branch of Engineering.	
7	Core Courses-II	PW- Project Work	B.Tech project or UG project or UG major Project or Project Stage I & II	15-18
8		IP - Industrial training/Summer Internship/Mini-project	Industrial training/ Summer Internship/ Industrial Oriented Mini-project/ Mini-project	
9		TS- Technical Seminar	Seminar/ Colloquium based on core contents related to parent discipline/ department/ branch of Engineering.	
10	Skill Oriented Courses (SC)	-	1 or 2 Credit courses (subset of HS)	5-10
11	Mandatory Courses (MC)	-	Mandatory courses (non-credit)	NIL
12	Audit Course (AC)	-	Audit courses (non-credit)	NIL
			Total	**160**

1.4.4 Medium of Instruction

The medium of instructions for the entire Under Graduate Programme in Engineering & Technology will be English only.

1.5 Admissions

i. Regular admissions in to the first year of B.Tech programme in **Sri Venkateswara College of Engineering** will be as per norms of Jawaharlal Nehru Technological University Anantapur, Ananthapuramu and Government of Andhra Pradesh.
ii. Lateral entry admissions in to second year of B.Tech Programme in **Sri Venkateswara College of Engineering** will be as per norms of Jawaharlal Nehru Technological University Anantapur, Ananthapuramu and Government of Andhra Pradesh.

2 Induction & Extra Academics

2.1 Induction Program

There shall be mandatory student induction program for freshers, with three-week duration before the commencement of first semester. Activities include Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by eminent people, visits to local areas, familiarization to Dept./Branch & Innovations etc.,

2.2 Extra Academic Activity

In addition to completion of the academic requirements, to become eligible for the award of degree, every student should successfully complete Extra Academic Activity. During four-year B.Tech degree, every student is required to register for at least one of the following activities which are mandatory.

i. NSS
ii. Games & Sports
iii. Yoga/ Meditation
iv. Literary/ Cultural activities
v. Community service activities.

vi. Any other extension activities

The activities shall be carried out beyond the class hours. The activities will be monitored by the respective faculty In-charge and HOD. Each student shall maintain at least 75% of attendance independent of overall attendance to earn satisfactory grade which is mandatory. Evaluation shall be on the basis of participation, performance and behaviour. Grade shall be entered in the grade sheet as satisfactory/unsatisfactory and shall not be used while computing CGPA

3 Continuous Assessment

3.1 Attendance Requirement

1. A student shall be eligible to appear for End Examinations. If he/she acquires at least 75% of attendance on cumulative basis of all subjects in the semester and 40% of minimum attendance should be maintained in each subject.
2. Condonation of shortage of attendance in genuine cases on health grounds may be recommended by the College Academic Committee, if a student puts an aggregate attendance of at least 65% and minimum of 40% in each subject. However, the student has to make an application and pay the prescribed fee.
3. Shortage of attendance below 65% in aggregate shall in no case be condoned.
4. Students whose shortage of attendance is not condoned in any semester are not eligible to take their End Examinations of that class and their registration shall stand cancelled.
5. A student shall not be promoted to the next semester unless; he/she satisfies the attendance requirements of the current semester, as applicable. The student may seek readmission for the semester when offered next. He/she shall not be allowed to register for the courses of the semester while he is in detention. A student detained due to shortage of attendance, shall have to repeat that semester when offered next.

3.2 Choice Based Credit System (CBCS)

CBCS is introduced in line with UGC guidelines in order to promote

i. Student Centred learning

ii. Students to learn courses of their choice

iii. Interdisciplinary learning

A Student has a choice of registering for courses comprising programme core, professional electives, open electives, MOOC courses, Value added / Skill based courses. Besides, choice is also offered to students for registering courses to earn Minor degree in Engineering/Honors degree.

3.3 Internal & External Assessment

The performance of a student in each semester shall be evaluated subject wise with a maximum of 100 marks for theory and 100 marks for practical subject. Mini project / Internship/ Skill oriented courses shall be evaluated for 100 marks each, Seminars shall be evaluated for 30 marks each & Project Work shall be evaluated for 250 marks whereas mandatory courses with no credits shall be evaluated for 30 mid semester marks.

1. For theory subjects the distribution shall be 30 marks for mid semester evaluation and 70 marks for the end examination.
2. For practical subjects the distribution shall be 40 marks for mid semester evaluation and 60 marks for the end examination.

3.3.1 Mid Semester Examination Evaluation

For theory subjects, during the semester, there shall be two midterm examinations. Each midterm examination shall be evaluated for 30 marks out of which 5 marks for objective paper with 10 objective type questions (10 minutes duration), 30 marks for subjective paper (90 minutes duration). The marks obtained in subjective paper will be condensed to 20 marks. The remaining 5 marks for assignment.

***Note:**

1. Any fraction shall be rounded off to the next higher mark.
2. The Objective paper shall contain 10 objective type questions each carrying 0.5 marks.
3. Subjective paper shall contain 3 either or type questions of which student has to answer one from each either-or type questions of equal weightage of 10 marks.
4. The assignment shall contain essay type questions/numerical problems/software development for each unit. It should be continuous assessment throughout the semester and shall be evaluated for 5 marks.
5. Consolidated of first and second mid semester marks shall be arrived at by considering the marks secured by the student in both the mid examinations with 80% weightage given to the better mid exam and 20% to the other.
6. Final mid semester marks shall be arrived by adding Average of Assignment

marks with the consolidated mid semester marks.

If the student is absent for the mid semester examination, no re-exam shall be conducted and mid semester marks for that examination shall be considered as zero.

First midterm examination shall be conducted for I, II units of syllabus with one either or type question from each unit and third either or type question from both the units. The second midterm examination shall be conducted for III, IV and V units.

3.3.2 End Examination Evaluation

End examination of theory subjects shall have the following pattern

a. There shall be 6 questions and all questions are compulsory.
b. Question 1 shall contain 10 compulsory short answer questions for a total of 20 marks, each question carries 2 marks. There shall be 2 short answer question from each unit.
c. In each of the questions from 2 to 11, there shall be either or type questions of 10 marks each. Student shall answer any one of them.
d. The questions from 2 to 11 shall be set by covering one unit of the syllabus for each question.

For theory subjects, consisting of two parts of different subjects, for Example Basic Electrical & Electronics Engineering, shall have the following pattern

e. End examination question paper shall be in two parts viz., Part A and Part B with equal weight age.
f. In each part there shall be 3 either or type questions for 12, 12 and 11 marks.

3.3.3 Evaluation of Practical Subjects

For practical courses, there shall be a continuous evaluation during the semester for 40 marks (Internal) and End examination shall be for 60 marks. Day-to-day work in the laboratory shall be evaluated for 30 marks by the concerned laboratory faculty based on the regularity, viva, observation & record and 10 marks for internal exam. The end examination shall be conducted for 60 marks by the concerned laboratory faculty and a senior expert in the subject from the same department.

In a practical subject consisting of two parts (Eg: Basic Electrical & Electronics Engineering laboratory), the end examination shall be conducted for 30 marks in each part. Mid semester examination shall be evaluated as above for 20 marks in each part and final mid semester marks shall be arrived by considering the sum of marks obtained in two parts.

3.3.4 Evaluation of Design and / or Drawing

For the subject having design and/or drawing,

a. There shall be no objective paper in mid semester examination and subjective paper will be for 30 marks, of which 10 marks will be for day-to-day evaluation, 15 marks for mid semester examination, 5 marks for assignment
b. The end examination pattern shall consist of 5 questions, either/or type, of 14 marks each. There shall be no short answer questions in the end examination.

3.3.5 Summer Internship / Mini Project

There shall be one Industrial /Research internship, at the end of IV semester. This course is to be registered during IV Semester taken up during the summer vacation for a period of minimum four weeks duration. The Summer Internship shall be submitted in a report form and a presentation of the same shall be made before a Department Evaluation Committee (DEC) and it should be evaluated for 100 marks. The DEC shall consist of the Head of the Department, the concerned Supervisor and a Senior Faculty Member of the Department. The DEC is constituted by the Principal/Controller of Examinations on the recommendations of the Head of the Department. There shall be no internal marks for Internship. The Internship shall be evaluated at the end of the V Semester.

There shall be one mini project at the end of VI semester. This is to be registered during VI Semester taken up during the summer vacation, for a period of four weeks duration. A report/dissertation certified in the prescribed format by the concerned Supervisor and HOD shall be submitted to the Department. The viva voce shall be conducted by a committee consisting of Head of the Department, project supervisor and a senior faculty member of the department constituted by the Principal/Controller of Examinations and it should be evaluated for 100 marks. There shall be no internal marks for mini project. The mini project shall be evaluated at the end of the VII Semester.

3.3.6 Skill Oriented Courses

Five skill-oriented courses shall be offered during III semester to VII semester. Out of these, two courses shall be from the same domain and shall be completed in III and IV semesters. Of the remaining three courses, one shall be a soft skill course and the remaining two shall be skill-advanced courses either from the same domain or job-oriented skill courses, which can be of inter disciplinary nature.

The student shall be given an option to choose either the skill courses being offered by the college or to choose a certificate course being offered by external agencies (Industries / Professional bodies / APSSDC / NPTEL or any other accredited bodies) as approved by the college level committee. **Refer Appendix-1.**

3.3.6.1 Internal Assessment

Course Category	Internal Evaluation
Soft Skills Courses	Continuous internal evaluation for 30 marks through Quiz, Presentation, Group tasks, Group Discussion, Debates, and Assignments etc.
Skill-Advanced Courses with Theory Component	Two sessional exams for 30 marks each shall be conducted and marks will be finalized with a weightage of 80% for the better score and 20% for the other.
Skill-Advanced Courses with Laboratory Component	Continuous internal evaluation for 40 marks through tests, assignments and model building etc.

3.3.6.2 External Assessment

There shall be comprehensive examination of three hours duration for 70 marks for the skill-oriented courses offered by the department / institution. If a student completes the certificate course offered by external agencies in view of these courses offered by the department/institution, the student shall submit the certificate issued by the recognized external agencies. The college level committee shall evaluate the grades / marks given by the external agencies and convert to the equivalent grade / marks.

3.3.7 Project Work

Procedure and Evaluation of Project Stage – I:

There shall be a presentation of abstract of the main project in the VII Semester. After selecting the specific topic, the student shall collect the information and prepare a report, showing his/her understating of the topic and submit the same to the department before presentation. The report and the presentation shall be evaluated by the Project Evaluation Committee (PEC) consisting of concerned supervisor and two senior faculty members. It shall be evaluated for 50 marks. A student shall acquire 2 credits, when he/she secures 40% or more marks for the total of 50 marks. It will be evaluated at the end of VII semester by PEC. There shall be no external evaluation.

Procedure and Evaluation of Project Stage – II:

Project work shall start in VII Semester and continue in the VIII Semester. The evaluation of project is as follows.

Out of 200 marks for the Project stage-II, 60 marks for Internal Evaluation and 140 marks for the end semester examination (viva-voce) shall be awarded.

(i) Internal Evaluation: The internal evaluation shall be made by the PEC, on the basis of TWO project reviews on the topic of the project. Each review shall be conducted for a maximum of 60 marks. For a total of 60 marks, 80% of better one of the two and 20% of the other one are added and finalized. The PEC is constituted by the Principal on the recommendations of the Head of the Department.

(ii) Semester end Evaluation: The semester end project work viva-voce examination shall be conducted by a committee consisting of external examiner, HOD and PEC members. The evaluation of project work shall be done at the end of the VIII Semester.

Three copies of the dissertation certified in the prescribed format by the concerned Supervisor and HOD shall be submitted to the Department. One copy is to be submitted to the Principal/Controller of Examinations. The external examiner shall be nominated by the Principal/Controller of the Examinations from the panel of three examiners submitted by the department.

3.3.8 Technical Seminars

There shall be 3 technical seminar presentations during III semester to VII semester. For the technical seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his/her understanding about the topic, and submit to the department before presentation. The report and the presentation shall be evaluated by the departmental committee consisting of Head of the Department, technical seminar supervisor and a senior faculty member. The technical seminar shall be evaluated for 30 marks. A student shall acquire 0.5 credit assigned to the technical seminar when he/she secures 40% or more marks for the total of 30 marks. In case, if a student fails in technical seminar, he/she shall reappear as and when supplementary examinations are conducted. The technical seminar shall be conducted anytime during the year as per the convenience of the department committee and students. There shall be no external examination for technical seminar.

3.3.9 Mandatory Courses

Mandatory courses carry "zero" credits. There shall be no Semester-end examination. However, attendance in Mandatory courses shall be considered while calculating aggregate attendance in a semester. The internal examination shall be conducted and evaluated similar to the theory courses. The student shall be declared to have passed the mandatory courses only when he / she secures 40% marks in the internal examination. If the student fails, a re-examination shall be conducted for failed candidates in the consecutive semester. The performance of the student shall be indicated in the grade sheets "satisfactory" (or) "not satisfactory". The student should pass all the mandatory courses, for the award of B.Tech degree.

3.3.10 Audit Courses

Audit courses carry "zero" credits. There shall be no internal and semester end examination. However, attendance in audit courses shall be considered while calculating aggregate attendance in a semester. The student should study all the audit courses, and it shall be indicated in the grade Sheet.

3.3.11 Weightages for internal & external examinations

<table>
<tr><th>S No</th><th>Course</th><th>Marks</th><th colspan="3">Examination and Evaluation</th></tr>
<tr><td rowspan="4">1</td><td rowspan="4">Theory</td><td>70</td><td colspan="3">End examination for 3 hours duration (External evaluation)</td></tr>
<tr><td rowspan="3">30</td><td colspan="2">5</td><td>Assignments (Internal evaluation).</td></tr>
<tr><td rowspan="2">25</td><td>5</td><td>Objective paper for 10 minutes duration with 10 objective type questions each is carrying 0.5 marks (Internal evaluation).</td></tr>
<tr><td>20</td><td>30 marks for subjective paper (90 minutes duration). The marks obtained in subjective paper will be condensed to 20 marks</td></tr>
<tr><td>2</td><td>Laboratory</td><td>60</td><td colspan="3">End Lab Examination for 3 hours duration</td></tr>
</table>

<table>
<tr><td rowspan="2"></td><td rowspan="2"></td><td rowspan="2">40</td><td>30</td><td>Regularity, viva, observation & record</td></tr>
<tr><td>10</td><td>Internal exam</td></tr>
<tr><td>3</td><td>Internship</td><td>100</td><td colspan="2">A report and a presentation shall be made before a committee</td></tr>
</table>

<table>
<tr><td>4</td><td>Mini Project</td><td>100</td><td colspan="2">viva voce shall be conducted by a committee</td></tr>
<tr><td rowspan="2">5</td><td rowspan="2">Skill Oriented Theory Courses</td><td>70</td><td colspan="2">End examination for 3 hours duration (External evaluation)
or
Student shall complete a certificate course offered by external agencies</td></tr>
<tr><td>30</td><td colspan="2">Internal examination shall be conducted and evaluated similar to theory courses.
or
30 marks through Quiz, Presentation, Group tasks, Group Discussion, Debates, and Assignments etc</td></tr>
<tr><td rowspan="3">6</td><td rowspan="3">Skill Oriented laboratory Courses</td><td>60</td><td colspan="2">End Lab Examination for 3 hours duration</td></tr>
<tr><td rowspan="2">40</td><td>30</td><td>Regularity, viva, observation & record</td></tr>
<tr><td>10</td><td>Internal exam</td></tr>
<tr><td rowspan="3">7</td><td>Project Work Stage - I</td><td>50</td><td colspan="2">A report and a review shall be made before a committee</td></tr>
<tr><td rowspan="2">Project work Stage - II</td><td>140</td><td colspan="2">Viva voce shall be conducted by a committee including external examiner.</td></tr>
<tr><td>60</td><td colspan="2">A report and a review shall be made before a committee</td></tr>
<tr><td>8</td><td>Technical Seminar</td><td>30</td><td colspan="2">A report and a presentation shall be made before a committee</td></tr>
<tr><td>9</td><td>Mandatory courses</td><td>30</td><td colspan="2">Internal examination shall be conducted and evaluated similar to theory courses.</td></tr>
<tr><td>10</td><td>Audit Courses</td><td>-</td><td colspan="2">There shall be no internal and semester end examination. However, attendance in audit courses shall be considered</td></tr>
</table>

3.3.12 Recounting / Revaluation

Students shall be permitted to apply for Recounting / Revaluation of the end examination answer scripts within a stipulated period after payment of the prescribed fee. After completion of the process of Recounting / Revaluation, the records are updated with changes if any, and the student shall be issued a revised grade sheet. If there are no changes, the student shall be intimated the same through a notice.

The Revaluation shall be carried out by an expert not less than Associate Professor cadre, as per the scheme of evaluation supplied by the examination branch in the presence of Principal/Controller of Examinations. Neither the students nor his parents shall be permitted to the present during the valuation.

3.3.13 Supplementary Examinations

In addition to the regular end examinations conducted, the college may also schedule and conduct supplementary examinations for all the subjects of other semesters when feasible for the benefit of students. Such candidates writing supplementary examinations may have to write more than one examination per day. For eighth semester advanced supplementary examinations will be conducted.

3.3.14 Withholding of Results

In case of indiscipline or malpractice is pending against the candidate, the result of the candidate shall be withheld and he/she shall not be allowed/promoted to the next higher semester.

3.3.15 Re-Registration for Improvement of Internal Marks

Following are the conditions to avail the benefit of improvement of internal marks.

i. The candidate should have completed the 4 years of B.Tech course work and obtained examinations results from I semester to VIII semester.
ii. He/she should have passed all the subjects for which the internal evaluation marks secured are more than 50%.
iii. Out of the subjects the candidate has failed in the examinations due to internal evaluation marks secured being less than 50%, the candidate shall be given a chance for Theory subjects and for a maximum of **three** theory subjects for improvement of internal evaluation marks.
iv. This provision is only for Theory courses. The candidate has to re-register for the chosen courses and fulfill the academic requirements (i.e., a student has to attend the classes regularly and appear for the mid-examinations and satisfy the

attendance requirements to become eligible for appearing at the semester-end examinations).

v. For each subject, the candidate has to pay a prescribed fee.

vi. In the event of availing the provision of Improvement of Internal evaluation marks, the internal evaluation marks as well as the Semester-end Examinations marks secured in the previous attempt(s) for the re-registered courses shall stand cancelled.

4 Promotional Rules

The following academic requirements have to be satisfied in addition to the attendance requirements for promotion/completion of regular B. Tech Programme of study.

1. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, practical, design, drawing subject or project if he/she secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum of the mid and end examination marks taken together. In case of mandatory courses, he/she should secure 40% of the total marks.
2. A student shall be promoted from IV semester to V semester only if he/she fulfills the academic requirement of securing 40% of the credits in the subjects that have been studied up to IV semester from the following examinations, irrespective of whether the candidate takes the End examination or not as per the normal course of study.
   - One regular and three supplementary examinations of I semester
   - One regular and two supplementary examinations of II semester
   - One regular and one supplementary examinations of III semester
   - One regular examinations of IV semester
3. A student shall be promoted from VI semester to VII semester only if he/she fulfills the academic requirement of securing 40% of the credits in the subjects that have been studied up to VI semester from the following examinations, irrespective of whether the candidate takes the End examination or not as per the normal course of study.
   - One regular and five supplementary examinations of I semester
   - One regular and four supplementary examinations of II semester
   - One regular and three supplementary examinations of III semester
   - One regular and two supplementary examinations of IV semester
   - One regular and one supplementary examinations of V semester

- One regular examinations of VI semester

4. A student shall register for all the 160 credits and earn all the 160 credits. Marks obtained in all the 160 credits shall be considered for the calculation of the DIVISION based on CGPA.

4.1 Student Transfers

Student transfers shall be as per the guidelines issued by the Government of Andhra Pradesh from time to time.

5 Grading System

5.1 Credits

All subjects / courses are to be registered by the student in a semester to earn credits which shall be assigned to each subject / course in an L T P C (lecture periods tutorial periods practical periods credits) structure based on the following general pattern.

Particulars	No. of Credits
1 Hour Lecture (L) per week	1
1 Hour Tutorial (T) per week	1
1 Hour Practical (P) per week	0.5
2 Hours Practical (P) per week	1
Technical Seminar	0.5
Skill Oriented Course / Skill Advanced Course / Soft Skill Course	2
Industrial / Research Internship (Summer Break after IV semester)	1.5
Mini Project (Summer Break after VI semester)	3
Major Project	12
Open Elective (MOOCs)	3
Mandatory Courses / Audit Courses	0

Student activities like NSS, Sports, etc. shall not carry any credits.

For Mini Project, Internship and Project Work where formal contact periods are not specified, credits are assigned based on the complexity of the work to be carried out.

5.1.1 Total Credits

The curriculum is designed for every programme so that the total credits will be 160 (121 only for lateral-entry students). To become eligible for the award of degree, every regular admitted student shall earn all the credits of 160 (121 for lateral-entry students) specified in the curriculum of the programme.

The student opting for B.Tech degree with Honors or B.Tech degree with Minor is required to earn additional 20 credits.

5.2 Award of Grades

After each subject is evaluated for 100 marks, the marks obtained in each subject will be converted to a corresponding letter grade as given below, depending on the range in which the marks obtained by the student fall.

Structure of Grading of Academic Performance

Range in which the marks in the subject fall	Level	Grade	Grade points Assigned
≥ 90	Superior	A+	10
80-89	Excellent	A	9
70-79	Very Good	B	8
60-69	Good	C	7
50-59	Fair	D	6
40-49	Satisfactory	E	5
< 40	Fail	F	0
Absent	Absent	AB	0
Mandatory Courses			
>=40	Satisfactory	Y	-
<40	Not Satisfactory	N	-

i. A student obtaining Grade 'F' or Grade 'AB' in a subject shall be considered failed and will be required to reappear for that subject when it is offered the next supplementary examination.

ii. For mandatory courses, "Satisfactory" or "Unsatisfactory" shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.

5.2.1 Semester Grade Point Average SGPA and Cumulative Grade Point Average CGPA

The Semester Grade Point Average SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses and the sum of the number of credits of all the courses undergone by a student, i.e.,

$$SGPA = \Sigma\, Ci \times Gi / \Sigma\, Ci$$

where, Ci is the number of credits of the i^{th} subject and Gi is the grade point scored by the student in the i^{th} course.

i The Cumulative Grade Point Average CGPA will be computed in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.,

$$CGPA = \Sigma\, Ci \times Si / \Sigma\, Ci$$

ii Where "Si" is the SGPA of the i^{th} semester and Ci is the total number of credits up to that semester.

iii Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the mark sheets.

iv While computing the SGPA the subjects in which the student is awarded Zero grade points will also be included.

Grade Point: It is a numerical weight allotted to each letter grade on a 10-point scale.

Letter Grade: It is an index of the performance of students in a said course. Grades are denoted by letters A+, A, B, C, D, E and F.

5.3 Award of Class

After a student has satisfied the requirements prescribed for the completion of the programme and is eligible for the award of B.Tech degree, he/she shall be placed in one of the following four classes.

Class Awarded	CGPA Secured
First Class with Distinction	≥ 7.5
First Class	≥ 6.5 & < 7.5
Second Class	≥ 5.5 & < 6.5
Pass Class	≥ 4.5 & < 5.5

6 Gap Year Concept

Gap year concept for student entrepreneur in residence is introduced and outstanding students who wish to pursue entrepreneurship are allowed to take a break of one year at any time after IV semester to pursue full-time entrepreneurship. This period may be extended to two years at the most and these two years would not be counted for the time for the maximum time for graduation. The Head of the departments shall forward such proposals submitted by the students to the Principal. An evaluation committee constituted by the Principal shall evaluate the proposal submitted by the student and the committee shall decide whether to permit the students to avail the Gap Year or not.

7 Transitory Regulations

Discontinued, detained or failed candidates are eligible for readmission as and when the semester is offered after fulfilment of academic regulations. Candidates who have been detained for want of attendance or not fulfilled academic requirements or who have failed after having undergone the course in earlier regulations or have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects.

Candidates who are permitted to avail Gap Year shall be eligible for rejoining into the succeeding year of their B.Tech from the date of commencement of class work and they will follow the academic regulations into which they are re-admitted.

8 Curricular Framework for Honors Programme

1. Students of a Department/Discipline are eligible to opt for Honors Programme offered by the same Department/Discipline.
2. A student shall be permitted to register for Honors programme at the beginning of IV semester provided that the student must have acquired a minimum of 8.0 CGPA up to the end of II semester without any backlogs. In case of the declaration of the III semester results after the commencement of the IV semester and if a student fails to score the required minimum of 8.0 SGPA, his/her registration for Honors Programme stands cancelled and he/she shall continue with the regular Programme.
3. Students can select the additional and advanced courses from their respective branch in which they are pursuing the degree and get an Honors degree in the

same. E.g. If a Mechanical Engineering student completes the selected advanced courses from same branch under this scheme, he/she will be awarded B.Tech (Honors) in Mechanical Engineering.

4. In addition to fulfilling all the requisites of a Regular B.Tech Programme, a student shall earn 20 additional credits to be eligible for the award of B.Tech (Honors) degree. This is in addition to the credits essential for obtaining the Under Graduate Degree in Major Discipline (i.e. 160 credits).
5. Of the 20 additional Credits to be acquired, 16 credits shall be earned by undergoing specified courses listed as **pools in Appendix-2**, with four courses, each carrying 4 credits. The remaining 4 credits must be acquired through two MOOCs, which shall be domain specific, each with 2 credits and with a minimum duration of 8 to 12weeks as recommended by the Board of studies.
6. It is the responsibility of the student to acquire/complete prerequisite before taking the respective course. The courses offered in each pool shall be domain specific courses and advanced courses.
7. The concerned BOS shall decide on the minimum enrolments for offering Honors programme by the department. If minimum enrolments criteria are not met then the students shall be permitted to register for the equivalent MOOC courses as approved by the concerned Head of the department in consultation with BOS.
8. Each pool can have theory as well as laboratory courses. If a course comes with a laboratory component, that component has to be cleared separately. The concerned BOS shall 16 explore the possibility of introducing virtual labs for such courses with laboratory component.
9. MOOC courses must be of minimum 8 weeks in duration. Attendance will not be monitored for MOOC courses. Students have to acquire a certificate from the agencies approved by the BOS with grading or marks or pass/fail in order to earn 4 credits. If the MOOC course is a pass/fail course without any grades, the grade to be assigned will be decided by the Academic council.
10. The concerned BOS shall also consider courses listed under professional electives of the respective B.Tech programmes for the requirements of B.Tech (Honors). However, a student shall be permitted to choose only those courses that he/she has not studied in any form during the Programme.
11. If a student drops or is terminated from the Honors programme the additional credits so far earned cannot be converted into free or core electives; they will

remain extra. These additional courses will find mention in the transcript (but not in the degree certificate). In such cases, the student may choose between the actual grade or a "pass (P)" grade and also choose to omit the mentioned course. None of the courses done under the dropped Minor will be shown in the transcript.

12. In case a student fails to meet the CGPA requirement for Degree with Honors at any point after registration, he/she will be dropped from the list of students eligible for Degree with Honors and they will receive regular B.Tech degree only. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.
13. Honors must be completed simultaneously with a major degree programme. A student cannot earn Honors after he/she has already earned bachelor's degree.

9 Curricular Framework for Minor Programme

1. a) Students who are desirous of pursuing their special interest areas other than the chosen discipline of Engineering may opt for additional courses in minor specialization groups offered by a department other than their parent department. For example, If Mechanical Engineering student selects subjects from Civil Engineering under this scheme, he/she will get Major degree of Mechanical Engineering with minor degree of Civil Engineering

   b) Student can also opt for Industry relevant tracks of any branch to obtain the Minor Degree, For example, a B.Tech Mechanical Engineering student can opt for the industry relevant tracks like Data Mining track, IOT track, Machine learning track etc.
2. The BOS concerned shall identify as many tracks as possible in the areas of emerging technologies and industrial relevance / demand. For example, the minor tracks can be the fundamental courses in CSE, ECE, EEE,CE,ME etc or industry tracks such as Artificial Intelligence (AI), Machine Learning (ML), Data Science (DS), Robotics, Electric vehicles, Robotics, VLSI etc.
3. The list of disciplines/branches eligible to opt for a particular industry relevant minor specialization shall be clearly mentioned by the respective BOS.
4. There shall be no limit on the number of programmes offered under Minor. The Institution can offer minor programs in Emerging technologies based on expertise in the respective departments or can explore the possibility of collaborating with the relevant Industries/Agencies in offering the program.

5. The concerned BOS shall decide on the minimum enrolments for offering Minor programme by the department. If a minimum enrolments criterion is not met, then the students may be permitted to register for the equivalent MOOC courses as approved by the concerned Head of the department in consultation with BOS.
6. A student shall be permitted to register for Minors programme at the beginning of IV semester subject to a maximum of two additional courses per semester, provided that the student must have acquired 8 CGPA (Cumulative Grade Point Average) upto the end of II semester without any history of backlogs. It is expected that the III semester results may be announced after the commencement of the IV semester. If a student fails to acquire 8 CGPA upto 3rd semester or failed in any of the courses, his registration for Minors programme shall stand cancelled. A SGPA of 8.0 has to be maintained in the subsequent semesters without any backlog in order to keep the Minors registration active.
7. A student shall earn additional 20 credits in the specified area to be eligible for the award of B.Tech degree with Minor. This is in addition to the credits essential for obtaining the Under Graduate Degree in Major Discipline (i.e. 160 credits).
8. Out of the 20 credits, 16 credits shall be earned by undergoing specified courses listed as **pools in Appendix-3(A) & 3(B)** by the concerned BOS along with prerequisites. It is the responsibility of the student to acquire/complete prerequisite before taking the respective course. If a course comes with a laboratory component, that component has to be cleared separately. A student shall be permitted to choose only those courses that have not studied in any form during the Programme.
9. In addition to the 16 credits, students must pursue at least 2 courses through MOOCs. The courses must be of minimum 8 weeks in duration. Attendance will not be monitored for MOOC courses. Student has to acquire a certificate from the Agencies approved by the BOS with grading or marks or pass/fail in order to earn 4 credits. If the MOOC course is a pass/fail course without any grades, the grade to be assigned as decided by the Academic council.
10. Student can opt for the Industry relevant minor specialization as approved by the concerned departmental BOS. Student can opt the courses from Skill Development Corporation (APSSDC) or can opt the courses from an external agency recommended and approved by concerned BOS and should produce

course completion certificate. The Board of studies of the concerned discipline of Engineering shall review such courses being offered by eligible external agencies and prepare a fresh list every year incorporating latest skills based on industrial demand.

11. A committee should be formed at the level of College/Universities/department to evaluate the grades/marks given by external agencies to a student which are approved by concerned BOS. Upon completion of courses the departmental committee should convert the obtained grades/marks to the maximum marks assigned to that course. The controller of examinations can take a decision on such conversions and may give appropriate grades.
12. If a student drops (or terminated) from the Minor programme, they cannot convert the earned credits into free or core electives; they will remain extra. These additional courses will find mention in the transcript (but not in the degree certificate). In such cases, the student may choose between the actual grade or a "pass (P)" grade and also choose to omit the mention of the course as for the following

All the courses done under the dropped Minors will be shown in the transcript. None of the courses done under the dropped Minor will be shown in the transcript.

13. In case a student fails to meet the CGPA requirement for B.Tech degree with Minor at any point after registration, he/she will be dropped from the list of students eligible for degree with Minors and they will receive B.Tech degree only. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.
14. Minor must be completed simultaneously with a major degree programme. A student cannot earn the Minor after he/she has already earned bachelor's degree.

10 Academic Regulations (R20) for B.Tech (Lateral Entry Scheme, for the batches admitted from the academic year 2021 - 2022)

10.1 Award of B.Tech Degree

A student admitted in Lateral Entry Scheme (LEs) will be declared eligible for the award of the B.Tech degree if the student fulfills the following academic regulations

a. Pursues a course of study for not less than three Academic years and not more than six Academic years.

b. Registers for 121 credits and secures all 121 credits from IV to VIII semester of Regular B.Tech programme.

Students, who fail to fulfill the requirement for the award of the degree within six consecutive academic years from the year of admission, shall forfeit their seat.

The regulations except 4 are to be adopted as that of B.Tech (Regular).

10.2 Minimum Academic Requirements

The following academic requirements have to be satisfied in addition to the attendance requirements

A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, practical, design, drawing subject or project if he/she secures not less than 40% of marks in the End examination and a minimum of 40% of marks in the sum total of the mid semester and End examination marks taken together. In case of mandatory courses he/she should secure 40% of the total marks.

1. A student shall be promoted from VI semester to VII semester only if he/she fulfills the academic requirement of securing 40% of the credits in the subjects that have been studied up to VI year from the following examinations, irrespective of whether the candidate takes the End examination or not as per the normal course of study.
    - One regular and three supplementary examinations of III semester
    - One regular and two supplementary examinations of IV semester
    - One regular and one supplementary examinations of V semester
    - One regular examinations of VI semester
2. A student shall register for all the 121 credits and earn all the 121 credits. Marks obtained in all the 121 credits shall be considered for the calculation of the division based on CGPA.

10.3 Course Pattern

1. The entire course of study is three Academic years on semester pattern.
2. A student eligible to appear for the End examination in a subject, but absent at it or has failed in the End examination may appear for that subject at the next supplementary examination offered.
3. When a student is detained due to lack of credits/shortage of attendance the student may be re-admitted when the semester is offered after fulfilment of academic regulations.
4. There shall be additional four mandatory courses with zero credits English in III semester, Mathematics in IV semester, Problem Solving & Programming in V semester and AI Tools, Techniques and Applications in VI semester. There shall be no external examination for these mandatory courses. However, attendance in the mandatory course shall be considered while calculating aggregate attendance and student shall be declared to have passed the mandatory course only when he/she secures 40% or more in the mid semester examinations. In case, the student fails, a re-examination shall be conducted for failed candidates every six months/semester at a mutually convenient date of college/student satisfying the conditions mentioned in item 1 & 2 of the regulations.

11 General Instructions

a. The academic regulations should be read as a whole for purpose of any interpretation.
b. Malpractices rules-nature and punishments are appended.
c. Where the words "he", "him", "his", occur in the regulations, they also include "she", "her", "hers", respectively.
d. In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Academic Council is final.

12 Amendments to Regulations

The Academic Council of **Sri Venkateswara College of Engineering (Autonomous)** reserves the right to revise, amend, or change the Regulations, Scheme of Examinations, and / or Syllabi or any other policy relevant to the needs of the society or industrial requirements etc., with the recommendations of the concerned Board(s) of Studies.

NOTE: FAILURE TO READ AND UNDERSTAND THE RULES & REGULATIONS IS NOT AN EXCUSE

13 Rules for Disciplinary Action for Malpractices / Improper Conduct in Examinations

S No	Nature of Malpractices / Improper conduct	Punishment
	If the candidate	
1. (a)	Possesses or keeps accessible in Examination Hall, any paper, note book, programmable calculators, Cell phones, Pager, Palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he/she is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination).	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the Exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he/she will be handed over to the police and a case is registered against him/her.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the notice of Principal.

3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred for four consecutive semesters from class work and all End examinations. The continuation of the course by the candidate is subject to the Academic regulations in connection with forfeiture of seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practical's and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester / year. The candidate is also debarred for four consecutive semesters from class work and all end examinations, if his / her involvement is established. Otherwise, the candidate is debarred for two consecutive semesters from class work and all End examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him/her.

4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester / year. The candidate is also debarred for two consecutive semesters from class work and all End examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in Cancellation of the performance in that subject only. The answer paper or in letters to the examiners or writes to the examiner requesting him/her to award pass marks.	Cancellation of the performance in that subject only.
6.	Refuses to obey the orders of the Chief Superintendent / Assistant - Superintendent / any Officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-In charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester / year. If the candidate physically assaults the invigilator / officer-In-charge of the

	spoken or written or by signs or by visible representation, assaults the officer-In-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	Examinations, then the candidate is also debarred and forfeits his/her seat. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.

8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the college's expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person (s) who do not belong to the College will be handed over to police and, a police case will be registered against them .
10	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.

11.	Copying detected on the basis of internal evidence, such as during valuation or during special scrutiny.	Cancellation of the performance in that subject only or in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester / year examinations, depending on the recommendation of the committee.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the Principal for further action to award suitable punishment.	

Note -

Whenever the performance of a student is cancelled in any subject / subjects due to malpractice, he has to register for End Examinations in that subject / subjects consequently and has to fulfill all the norms required for the award of Degree.

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ANNEXURE-1

Subjects for skill-oriented courses:

1. BOS chairman concerned can add more subjects/tracks as per the availability of individual department needs.
2. Two skill-oriented subjects will be from the Domain knowledge only.
3. One skill subject shall be communication skills (including laboratory)
4. Remaining two skill subjects will be from the same domain / interdisciplinary / Industry relevant subjects as per the choice of the student.
5. Pre requisites and eligibility can be decided by the concerned BOS.

SKILL, JOB ORIENTED TRACKS FOR MECHANICAL ENGINEERING

1. Design / Analysis / Simulation- CAD, UGNX, Solid Works, Ansys, FEA, CATIA, CREO etc
2. Production / Manufacturing- CAM, Piping, A/QC, CNC
3. Thermal / Computational- Computational Fluid Dynamics, MATLAB etc
4. Service Sector- Industrial Safety and Management, Operation Research, Oil & Gas safety.

SKILL, JOB ORIENTED TRACKS FOR CIVIL ENGINEERING

1. Structural Design- AutoCAD 2D 3D, ANSYS Civil, ETABS, PRO Steel, etc.
2. Building Design- Revit Architecture, ANSYS Civil, STAAD.PRO, AECOsim etc.
3. Land survey and Transportation Design- Surveying, 2D Drafting, 3D Modeling, Analysis, Road & Transport Design etc.

SKILL, JOB ORIENTED TRACKS FOR COMPUTER SCIENCE & ENGINEERING / INFORMATION TECHNOLOGY/ ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

1. Animation course- VFX, CARTOONING, ANIMATION DESIGN, Game Designing Using Unity 3D etc.
2. Mobile app development- App design for IOS and Android etc.
3. Data Science- Natural language processing, sentiment analysis, fore casting, regression models etc.
4. Python programming- Machine learning, Deep learning, IOT, Natural Language Processing, Game Graphics Programming, Data analysis etc.
5. Networking & Cyber Security
6. Robotics Process Automation & Sales Force
7. Web Designing, Development & Services

SKILL, JOB ORIENTED TRACKS FOR ELECTRONICS AND COMMUNICATION ENGINEERING

1. Mobile Communications
2. CCNA Certification
3. Artificial Intelligence/ Deep learning/ Industrial Automation etc.
4. Design & Fabrication: Digital and Analog VLSI Design/Micro & Nano IC Fabrication
5. Designing and Interfacing: LabView, Arduino, Raspberry Pi
6. Maintenance and Control: PLC and SCADA
7. Robotics Technology/IOT Programming/Advanced Embedded Systems

SKILL, JOB ORIENTED TRACKS FOR ELECTRICAL AND ELECTRONICS ENGINEERING

1. Design/Analysis/Simulation: MATLAB, ETAP, PLECS, HOMER, E-CADD
2. Circuit design and PCB Design: Multisim, OrCAD PSpice
3. Designing and Interfacing: d-SPACE, LabVIEW, Arduino, Raspberry Pi
4. Maintenance and Control: PLC and SCADA

ANNEXURE-2

Subjects for Honors degree:

1. The subjects opted for Honors should be Advanced type which are not covered in regular curriculum
2. Students has to acquire 16 credits with minimum one subject from each pool.
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)

DEPARTMENT OF MECHANICAL ENGINEERING (FOR HONORS)		
S No	**Course Name**	**Offered To**
POOL 1		
1	Automobile Engine Design	ME
2	Automotive Transmission	ME
3	Autotronics & Safety	ME
4	Alternative Energy Sources for Automobiles	ME
POOL 2		
1	Robotics: Modelling, Analysis and Control	ME
2	Modelling and Analysis of Dynamic Physical	ME
3	Theory and Design of Control Systems	ME
4	Smart Materials for Mechatronic Applications	ME
POOL 3		
1	Mechanical Vibrations	ME
2	Product Design / CAD / CAM	ME
3	Flexible Manufacturing Systems/Design for manufacturing	ME
4	Reverse Engineering and Rapid Prototyping / Concurrent Engineering	
POOL 4		
1	Advanced Thermodynamics	ME
2	Heat transfer / Heat power Engineering	ME
3	Jet Propulsion and rocket Engineering	ME
4	Computational Fluid Dynamics	ME

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING / INFORMATION TECHNOLOGY / ARTIFICIAL INTELLIGENCE & MACHINE LEARNING (FOR HONORS)		
S No	**Course Name**	**Offered To**
	POOL 1	
1	Data Mining and Data Warehousing	CSE / IT / AI&ML
2	Object Oriented Modelling and Design	CSE / IT / AI&ML
3	Cryptography	CSE / IT / AI&ML
4	Network Security and Cyber Law	CSE / IT / AI&ML
	POOL 2	
1	Social Mobile Analytics & Cloud	CSE / IT / AI&ML
2	Security Governance Risk and Compliance	CSE / IT / AI&ML
3	Python Application Programming	CSE / IT / AI&ML
4	Software Design and System Integration	CSE / IT / AI&ML
	POOL 3	
1	Software Architecture and Design Patterns	CSE / IT / AI&ML
2	Advanced JAVA and J2EE	CSE / IT / AI&ML
3	Storage Area Networks	CSE / IT / AI&ML
4	High Performance Computing	CSE / IT / AI&ML
	POOL 4	
1	Machine Learning	CSE / IT / AI&ML
2	Natural Language Processing	CSE / IT / AI&ML
3	Perception and Computer Vision	CSE / IT / AI&ML
4	Multi Agent Systems	CSE / IT / AI&ML

DEPARTMENT OF CIVIL ENGINEERING (FOR HONORS)		
S No	**Course Name**	**Offered To**
	POOL 1	
1	Stability of Structures	CE
2	Experimental Methods in Structural Engineering	CE
3	Non-Linear Structural Analysis	CE
4	Advanced Design of Steel Structures	CE

POOL 2		
1	Advanced Geotechnical Engineering	CE
2	Geotechnical Measurements and Explorations	CE
3	Geotechnical Earthquake Engineering	CE
4	Rock Mechanics	CE
POOL 3		
1	Intelligent Transportation Systems	CE
2	Transportation Safety Systems	CE
3	Advanced Geometric Design of Highways	CE
4	Computer Simulation in Traffic Engineering	CE
POOL 4		
1	Global Navigation Satellite System	CE
2	Machine Processing of Remotely Sensed Data	CE
3	Geospatial Data Processing	CE
4	Introduction to Geodesy	CE

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING (FOR HONORS)		
S No	**Course Name**	**Offered To**
POOL 1		
1	Advanced Embedded Systems	ECE
2	Advanced Digital Signal Processing	ECE
3	Digital Image Processing	ECE
4	Wireless Broadband Communications	ECE
POOL 2		
1	Non-Linear Optical Communication	ECE
2	Satellite Communications	ECE
3	Advanced VLSI	ECE
4	Internet of Things	ECE
POOL 3		
1	Radar Engineering	ECE
2	Cellular and Mobile Communications	ECE
3	Advanced Wireless Broadband Communications	ECE
4	Optical Networks	ECE

POOL 4		
1	Multicarrier Communication Systems	ECE
2	Nano Electronics	ECE
3	RF and Mixed Signals Circuits	ECE
4	Microelectronic Devices, Technology and Circuits	ECE

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING (FOR HONORS)		
S No	**Course Name**	**Offered To**
POOL 1		
1	Advance Power Electronics	EEE
2	Opto Electronics	EEE
3	Electric power quality	EEE
4	Remote sensing systems	EEE
POOL 2		
1	Advanced Power systems	EEE
2	Photonic network	EEE
3	Power Systems dynamics and control	EEE
4	Advanced Electrical Vehicles	EEE
POOL 3		
1	Embedded systems	EEE
2	Power system protection	EEE
3	Distribution system Engineering	EEE
4	Microwave design and measurement	EEE
POOL 4		
1	Advanced High voltage Engineering	EEE
2	Grid Integration of Renewable Energy Systems	EEE
3	Advanced Electric Machines	EEE
4	Semiconductor Device Modelling	EEE

ANNEXURE-3 (A)

GENERAL MINOR TRACKS

Note:

1. The student can opt any 4 subjects from each pool.
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	Subject	Offered To
1	Engineering Mechanics	ME
2	Thermal Engineering	ME
3	Production Technology	ME
4	Fundamentals of Engineering Design	ME
5	Production Planning and control	ME
6	Materials Technology	ME

Department of Civil Engineering

S No	Subject	Offered To
1	Strength of Materials	CE
2	Fluid Mechanics	CE
3	Hydraulic Machines	CE
4	Structural Analysis	CE
5	Surveying	CE
6	Geology/ Soil Mechanics	CE

Department of Computer Science and Engineering

S No	Subject	Offered To
1	Operating systems	CSE
2	Data Structures Using C	CSE
3	Computer organization and Architecture	CSE
4	Data Base Management Systems	CSE
5	Object oriented Programming	CSE
6	Computer Networks	CSE

Department of Electrical and Electronics Engineering

S No	Subject	Offered To
1	Network Theory	EEE
2	Electronic Devices & Circuits/Electro-Magnetic Field Theory	EEE
3	DC Machines	EEE
4	Electronic circuit analysis	EEE
5	Network Analysis	EEE
6	AC Machines	EEE

Department of Electronics and Communications Engineering

S No	Subject	Offered To
1	Microprocessors	ECE
2	Electronic Devices & Circuits/Electro-Magnetic Field Theory	ECE
3	Digital Logic Design	ECE
4	Electronic circuit analysis	ECE
5	Network Analysis	ECE
6	Signals and systems	ECE

ANNEXURE-3 (B)

(FOR MINOR) SPECIALIZED TRACKS

Note:

1. A student can opt four subjects from each track @ 4 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 ELECTRICAL & ELECTRONICS ENGINEERING		
S No	**Course Name**	**Offered To**
POOL 1		
1	Nanoengineering	ME
2	Green nanotechnology	ME
3	Nano-biotechnology	ME
4	Nano architectonics	ME
POOL 2		
1	Nano mechanics	ME
2	Chassis design and packaging:	ME
3	Vehicle body styling and aerodynamics	ME
4	Ergonomics, seating and Instrument panels	ME
5	Analysis of vehicle handling:	ME
6	Vehicle stability and design considerations	ME
POOL 3		
1	Biomechanics	ME
2	Bio materials	ME
3	Medical Device Design	ME
4	micro electro mechanical systems	ME
5	advanced lithography techniques	
POOL 4		
1	Machining of advanced workpiece materials	ME
2	Hybrid machining approaches	ME
3	Automatic machining algorithms	ME
4	Tool and part probing integration	ME
5	Statistical process control and six sigma	ME

DEPARTMENT OF CIVIL ENGINEERING		
S No	**Course Name**	**Offered To**
POOL 1		
1	Advanced Design of Steel Structures	CE
2	Bridge Engineering	CE
3	Earthquake Resistant Design of Structures	CE
4	Prestressed Concrete	CE
5	Prefabricated Structures	CE
POOL 2		
1	Ground Improvement Techniques	CE
2	Advanced Foundation Engineering	CE
3	Geotechnical Earthquake Engineering	CE
4	Design of Earth Retaining Structures	CE
5	Geo synthetics and reinforced soil structure	CE
POOL 3		
1	Design of Hydraulics Structures	CE
2	Advanced Water Resources Engineering	CE
3	Environmental impact assessment	CE
4	Solid waste management and landfills	CE
5	Advanced Environmental Engineering	CE
POOL 4		
1	Advanced Highway Engineering	CE
2	Traffic Engineering	CE
3	Advanced Pavement Design Engineering	CE
4	Urban Transport Systems Planning	CE
5	Railways, Docks, Harbors and airports	CE

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING/ INFORMATION TECHNOLOGY/ ARTIFICIAL INTELLIGENCE & MACHINE LEARNING		
S No	**Course Name**	**Offered To**
POOL 1		
1	TCP/IP Protocol Suite	CSE / IT / AI&ML
2	Network Architecture and Design	CSE / IT / AI&ML
3	Network Security	CSE / IT / AI&ML
4	Cryptography	CSE / IT / AI&ML
5	Computer Forensics	CSE / IT / AI&ML

POOL 2		
1	Software Metrics and Measurements	CSE / IT / AI&ML
2	Software Verification and Validation	CSE / IT / AI&ML
3	Software Architecture and Design Patterns	CSE / IT / AI&ML
4	Software Project Management	CSE / IT / AI&ML
5	Fault Tolerant Computing	CSE / IT / AI&ML
POOL 3		
1	Enterprise Storage Systems	CSE / IT / AI&ML
2	Parallel Algorithms	CSE / IT / AI&ML
3	Cloud Networking	CSE / IT / AI&ML
4	Cloud Computing	CSE / IT / AI&ML
5	High Performance Computing	CSE / IT / AI&ML
POOL 4		
1	Soft Computing	CSE / IT / AI&ML
2	Machine Learning	CSE / IT / AI&ML
3	Natural Language Processing	CSE / IT / AI&ML
4	Perception and Computer Vision	CSE / IT / AI&ML
5	Multi Agent Systems	CSE / IT / AI&ML

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING		
S No	**Course Name**	**Offered To**
POOL 1		
1	Analog VLSI Design/VSLI Technology	ECE
2	Applications of MEMS Technology	ECE
3	CAD for VLSI Design	ECE
4	Design for Testability/ Low power VLSI	ECE
5	Design of Semi-Conductor Memories	ECE
POOL 2		
1	RF System Design	ECE
2	Radiation Systems	ECE
3	RADAR and Navigational Aids	ECE
4	Cellular Communications	ECE
5	Satellite Communication	ECE

POOL 3		
1	Computer Architecture	ECE
2	PLD's & FPGAs	ECE
3	VLSI Design	ECE
4	Embedded System Design	ECE
5	DSP Processors	ECE
POOL 4		
1	Intelligent Systems and Control	ECE
2	Adaptive Signal Processing	ECE
3	Statistical Signal Processing	ECE
4	Speech Signal Processing	ECE
5	Multimedia Signal Processing	ECE

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING		
S No	**Course Name**	**Offered To**
POOL 1		
1	Distribution System Planning & Automation	EEE
2	Restructured Power Systems	EEE
3	HVDC & FACTS	EEE
4	Power Quality	EEE
5	Smart Grid Technologies	EEE
POOL 2		
1	Advanced Power Electronics	EEE
2	Advanced Electrical Drives	EEE
3	HVDC & FACTS	EEE
4	Power Quality	EEE
5	Hybrid Electrical Vehicles	EEE
POOL 3		
1	State Estimation & System Identification	EEE
2	Digital Control Systems	EEE
3	Non Linear Control Systems	EEE
4	Optimal Control Systems	EEE
5	Adaptive Control Systems	EEE

POOL 4		
1	Energy Conservation & Audit	EEE
2	Utilization of Electrical Energy	EEE
3	Solar & Fuel cell Energy Systems	EEE
4	Wind & Biomass Energy Systems	EEE
5	Nuclear, Geothermal & Tidal Energy Systems	EEE

SRI VENKATESWARA COLLEGE OF ENGINEERING

(AUTONOMOUS)

Karakambadi Road Tirupati - 517 507

B.Tech EEE

Course Structures and Syllabus under R20 Regulations

Electrical and Electronics Engineering

Semester - I (Theory - 6, Lab - 4)					
S. No	**Course No**	**Course Name**	**Category**	**L-T-P/D**	**Credits**
1.	MA20ABS101	Linear Algebra and Calculus	BS	3-0-0	3
2.	PH20ABS103	Applied Physics	BS	3-0-0	3
3.	EG20AHS101	Communicative English	HS	3-0-0	3
4.	EE20AES103	Fundamentals of Electrical Circuits	ES	3-0-0	3
5.	ME20AES102	Engineering Drawing	ES	1-0-0/2	2
6.	ME20AES103	Engineering Graphics Lab	ES	0-0-2	1
7.	PH20ABS104	Applied Physics Lab	BS	0-0-3	1.5
8.	EG20AHS102	Communicative English Lab	HS	0-0-3	1.5
9.	EE20AES104	Fundamentals of Electrical Circuits Lab	ES	0-0-3	1.5
10.	MA20AMC101	Logical Skills for Professionals-I	MC	2-0-0	0.0
				Total	**19.5**

Semester – II (Theory – 6, Lab – 5)					
S. No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	MA20ABS201	Differential Equations and Vector Calculus	BS	3-0-0	3
2.	CH20ABS103	Chemistry	BS	3-0-0	3
3.	CS20AES101	Problem Solving using C	ES	3-0-0	3
4.	EE20AES201	Electrical Circuit Analysis	ES	3-0-0	3
5.	ME20AES101	Engineering Workshop	ES	0-0-3	1.5
6.	CS20AES103	IT Workshop	ES	0-0-3	1.5
7.	CS20AES102	Problem Solving using C Lab	ES	0-0-3	1.5
8.	CH20ABS104	Chemistry Lab	BS	0-0-3	1.5
9.	EE20AES202	Electrical Circuit & Simulation Lab	ES	0-0-3	1.5
10.	CH20AMC201	Environmental Science	MC	2-0-0	0.0
11.	EG20AMC101	Speech & Oral Communication	MC	2-0-0	0.0
				Total	**19.5**

Electrical and Electronics Engineering

Semester -III (Theory - 7, Lab - 4) (Second Year)					
S. No	**Course No**	**Course Name**	**Category**	**L-T-P/D**	**Credits**
1.	MA20ABS302	Complex Variables & Transforms	BS	3-0-0	3
2.	EE20APC301	Control Systems	PC	3-0-0	3
3.	EE20APC302	DC Machines & Transformers	PC	3-0-0	3
4.	EC20APC307	Semiconductor Devices and Circuits	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.	EE20APC303	DC Machines &Transformers Lab	PC	0-0-3	1.5
7.	EC20APC308	Semiconductor Devices and Circuits Lab	PC	0-0-3	1.5
8.	EE20APC304	Control Systems & Simulation Lab	PC	0-0-3	1.5
9.	IT20ASC301	Application Development using Python	SC	1-0-2	2
10.	CH20AMC301	Biology For Engineers	MC	2-0-0	0.0
11	MA20AMC301	Logical Skills for Professionals-II	MC	2-0-0	0.0
12	EG20AMC301	Enhancing English Language Skills (Only for Lateral Entry Students)	MC	2-0-0	0.0
				Total	**21.5**

Semester – IV (Theory – 7, Lab – 4) (Second Year)					
S. No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	CS20AES401	Data Structures using C	ES	3-0-0	3
2.	MA20ABS401	Numerical Methods, Probability & Statistics	BS	3-0-0	3
3.	EE20APC401	Rotating AC Machines	PC	3-0-0	3
4.	EC20AES301	Digital Electronics & Microprocessors	PC	3-0-0	3
5.	EE20APC402	Electromagnetic Field Theory	PC	3-0-0	3
6.	CS20AES402	Data Structures Lab	ES	0-0-3	1.5
7.	EC20AES302	Digital Electronics & Microprocessors Lab	PC	0-0-3	1.5
8.	EE20APC403	AC Machines Lab	PC	0-0-3	1.5
9.	EG20ASC301	Soft Skills	SC	1-0-2	2
10	*BA20AHS201	Universal Human Values	HS	2-0-0	*3
11	SH20AAC401	Extra Academic Activities (NSS/Yoga/Cultural/Games and Sports/ Societal Relationship)	AC	2-0-0	0.0
12.	MA20AMC401	Engineering Mathematics (Only for Lateral Entry Students)	MC	2-0-0	0.0
				Total	**24.5**
	Community Service Project – After the end of IV Semester – 4 Weeks – 1.5 Credits				
	Honors / Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)			4-0-0	4

***UHV is considered as credit based course from 2021 batch**

Electrical and Electronics Engineering

Semester - V (Theory - 7, Lab - 3) (Third Year)					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P/D**	**Credits**
1.	EC20APC403	Linear & Digital IC Applications	PCC	3-0-0	3
2.	EE20APC501	Power Electronics	PCC	3-0-0	3
3.	EE20APC502	Power System Architecture	PCC	3-0-0	3
4	EE20APE501 EE20APE503 EE20APE504	**Professional Elective Courses-I** • Advanced Control systems • Programmable Logic Controllers • Smart Grid & Electric Vehicles	PEC-I	3-0-0	3
5	CE20AOE502 AM20AOE503 CS20AOE501 EC20AOE501	**Open Elective Course/ Job oriented elective-I** • Principles of Waste Management • Soft Computing Techniques • Computer Applications using programming Tools • Basic VLSI Design	OEC-I	3-0-0	3
6.	EC20APC405	Linear & Digital IC Applications Lab	PCC LAB	0-0-3	1.5
7.	EE20APC503	Power Electronics & Simulation Lab	PCC LAB	0-0-3	1.5
8.	EE20ASC501	Software tools for Electrical Applications development	SC	1-0-2	2
9.	BA20AMC501	Constitution of India	MC	2-0-0	0.0
10	EE20ATS501	Technical Seminar Presentation-I	TS	0-0-0	0.5
11	IT20AMC501	Problem Solving & Programming (Only for Lateral Entry Students)	MC	2-0-0	0.0
12	EE20ACS501	Community Service Project (Completed after the end of IV Semester with 4 Weeks duration)	CS	0-0-0	1.5
				Total	**22**
Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)				4-0-0	**4**
MOOCS/NPTEL					**2**

Electrical and Electronics Engineering

Semester - VI (Theory - 7, Lab - 4) (Third Year)					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	EE20APC601	Electrical Measurements & Sensors	PCC	3-0-0	3
2.	EE20APC602	Power System Analysis	PCC	3-0-0	3
3.	EE20APC603	Power System Protection	PCC	3-0-0	3
4.	EE20APE601 EE20APE602 EE20APE603	**Professional Elective Courses-II** • Applications of Power Electronics to Renewable Energy Source • Battery Technologies • Energy Auditing & Energy Conservation	PEC-II	3-0-0	3
5.	CS20AOE601 CE20AOE601 CS20AOE602 EC20AOE602 ME20AOE502	**Open Elective Course/ Job oriented elective-II** • Data Analysis Using R • Disaster Management • JAVA Programming • Signal Processing • Solar & Wind Energy Systems	OEC-II	3-0-0	3
6	EE20APC604	Electrical Measurements & Sensors Lab	PCC LAB	0-0-3	1.5
7.	EE20APC605	Power Systems & Protection Lab	PCC LAB	0-0-3	1.5
8.	EE20APC606	Power Systems Simulation Lab	PCC LAB	0-0-3	1.5
9.	EC20ASC601	Graphical System Design Using LabVIEW	SC	1-0-2	2
10.	BA20AMC502	Intellectual Property Rights & Patents	MC	2-0-0	0
11	EE20ATS601	Technical Seminar Presentation-II	TS	0-0-0	0.5
12	AM20AMC601	AI Tools, Techniques and Applications (Only for Lateral Entry Students)	MC	2-0-0	0
				Total	**22**
Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)				4-0-0	**4**
Industrial Internship/Mini Project minimum of 4weeks during summer vacation					
MOOCS/NPTEL					**2**

Electrical and Electronics Engineering

Semester - VII (Theory – 6 Lab-1) (Fourth Year)					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	EE20APE701 EE20APE702 EE20APE703	**Professional Elective-III** • Power Quality • Power System Operation & Control • Switched mode Power Converters	PEC-III	3-0-0	3
2.	EE20APE704 EE20APE705 EE20APE706	**Professional Elective-IV** • Design of Photovoltaic Systems • Power semiconductor Drives • Utilization of Electrical Energy	PEC-IV	3-0-0	3
3.	EE20APE707 EE20APE708 EC20APE603	**Professional Elective-V** • Electrical & Electronics Instrumentation • HVDC and FACTS • Introduction to Digital Signal Processing	PEC-V	3-0-0	3
4.	CE20AOE701 AM20AOE702 CS20AOE701 EC20AOE702 ME20AOE602	**Open Elective Course/ Job oriented elective-III** • Air Pollution and Quality Control • Introduction of Computer Networks • Mobile Application Development Using Android • Principles of Communication Engineering • Power Generation Technologies	OEC-III	3-0-0	3
5.	AM20AOE701 CE20AOE704 EC20AOE704 ME20AOE703 CS20AOE702 AM20AOE601	**Open Elective Course/ Job oriented elective-IV** • Cyber Security & Techniques • Environmental Impact Analysis & Management • Internet of Things • Introduction to Industrial Engineering • Mobile Computing Techniques • Machine Learning Tools & Techniques	OEC-IV	3-0-0	3
6.	BA20AHS702 BA20AHS703 BA20AHS705	**Humanities Elective-II** • E BUSINESS • Entrepreneurship & Incubation • Management science	HS	3-0-0	3
7.	EE20ASC701	Energy Conservation and Audit	SC	1-0-2	2
8	EE20ATS701	Technical Seminar Presentation-III	TS	0-0-0	0.5
9	EE20APW701	Project Work Stage-I	PW	0-0-0	2
10	EE20AIP701	Industrial/ Research Internship	IP	0-0-0	3
				Total	**25.5**
Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)				**4-0-0**	**4**

Electrical and Electronics Engineering

Semester –VIII (Fourth year)					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	EE20APW801	Project Work Stage-II/ Full Internship in Industry	PW	0-0-0	8.5
				Total Credits	**8.5**

Note:

- Eligible and interested students can register either for Honors or for Minors in IV Semester as per the guidelines
- Students shall register for NCC/NSS/NSO activities and will be required to participate in an activity for two hours in a week during the semester.
- Lateral entry students shall undergo a bridge course in Mathematics during third Semester.

B.Tech Honors Degree in EEE Course Code	B.Tech Honors Degree in EEE Course Name
IV Semester(Track-I)	**IV Semester(Track-I)**
EE20DPE105	Modern Control Engineering & Principles Of Optimal Control
EE20DPC101	Power Quality
EE20DPE107	Power System Wide Area Monitoring and Control
EE20DPE208	Smart Grid Technologies
V Semester(Track-II)	**V Semester(Track-II)**
EE20DPC102	Advanced Power System Protection
EE20DPE301	Distributed Generation & Micro Grid Control
VI Semester(Track-III)	**VI Semester(Track-III)**
EE20DPE103	HVDC & EHVAC Transmission Systems
EE20DPE108	Optimization & Heuristic search Techniques
VII Semester(Track-IV)	**VII Semester(Track-IV)**
EE20AOE701	Embedded Systems
EE20DPC201	Power System Stability & Control

B. Tech Minor Degree in EEE Course Code	B. Tech Minor Degree in EEE Course Name
IV Semester(Pool-I)	**IV Semester(Pool-I)**
EE20APC302	DC Machines & Transformers
EE20APC401	Rotating AC Machines
V Semester (Pool-II)	**V Semester (Pool-II)**
EE20APC501	Power Electronics
EE20APC502	Power System Architecture
VI Semester (Pool-III)	**VI Semester (Pool-III)**
EE20APE603	Energy Auditing & Energy Conservation
EE20APE504	Introduction to Smart Grid & Electric vehicles
VII Semester (Pool-IV)	**VII Semester (Pool-IV)**
EE20AOE701	Embedded Systems
EE20APE706	Utilization of Electrical Engineering

** B.Tech (Honors) & B.Tech (Minors) students must complete TWO MOOCs Courses before VIII Semester.

I SEMESTER

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech- I Sem

L	T	P	C
3	0	0	3

(MA20ABS101) LINEAR ALGEBRA & CALCULUS

(Common to All Branches)

Course Objectives:

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

Unit -1:

Matrices

Rank of a matrix by echelon form, normal form. Solving system of homogeneous and non homogeneous linear equations. Eigen values and Eigen vectors and their properties, Cayley- Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, Diagonalisation of a matrix.

Learning Outcomes:

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

- Solving systems of linear equations, using technology to facilitate row reduction determine the rank, eigen values and eigen vectors. (L3)
- Identify special properties of a matrix, such as positive definite, etc., and use this information to facilitate the calculation of matrix characteristics. (L3)

Unit -2:

Mean Value Theorems

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

Learning Outcomes:

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

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

Unit -3:

Multivariable Calculus

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

Learning Outcomes:

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

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

Unit -4:

Multiple Integrals

Double integrals, change of order of integration, change of variables. Evaluation of triple integrals, change of variables between Cartesian, Cylindrical and Spherical polar co-ordinates.

Learning Outcomes:

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

- Evaluate double integrals of functions of several variables in two dimensions using Cartesian and polar coordinates. (L5)
- Apply double integration techniques in evaluating areas bounded by region. (L4)
- Evaluate multiple integrals in Cartesian, cylindrical and spherical geometries. (L5)

Unit -5:

Beta and Gamma functions

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

Learning Outcomes:

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

- Understand Beta and Gamma functions and its relations. (L2)
- Conclude the use of Special function in evaluating definite integrals. (L4)

Text Books:

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

Reference Books:

1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
3. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.
4. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education.
5. H. k Das, Er. 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 Sem

L	T	P	C
3	0	0	3

(PH20ABS103) APPLIED PHYSICS

(ECE, EEE, CSE, CSE (AI & ML), IT)

Course Objectives:

- To make a bridge between the physics in school and engineering courses.
- 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 explain the significant concepts of dielectric and magnetic materials that leads to potential applications in the emerging micro devices.
- To enlighten the concepts of Quantum Mechanics and to provide fundamentals of de'Broglie waves, quantum mechanical wave equation and its applications, the importance of free electron theory and band theory of solids.
- Evolution of band theory to distinguish materials, basic concepts and transport phenomenon of charge carriers in semiconductors. To give an impetus on the subtle mechanism of superconductors using the concept of BCS theory and their fascinating applications.

Unit-1:

Wave Optics

Interference- Principle of superposition – Interference of light – Interference by division of wave front and amplitude -Interference in thin films (Reflection Geometry) – Colors in thin films – Newton's Rings – Determination of wavelength and refractive index– Applications.

Diffraction- Introduction – Fresnel and Fraunhofer diffraction – Fraunhofer diffraction due to single slit, double slit and N-slits (qualitative) – Grating spectrum–Applications.

Polarization- Introduction – Types of polarization – Polarization by reflection, refraction and double refraction - Nicol's Prism - Half wave and Quarter wave plates–Applications.

Learning Outcomes:

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

- Explain the need of coherent sources and the conditions for sustained interference (L2)
- Identify engineering applications of interference(L3)
- Analyze the differences between interference and diffraction with applications(L4)
- Illustrate the concept of polarization of light and its applications(L2)
- Classify ordinary polarized light and extraordinary polarized light(L2)

Unit-2:

Lasers and Fiber optics

Lasers- Introduction – Characteristics of laser – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Lasing action – Pumping mechanisms – Nd-YAG laser – He-Ne laser– GaAs Laser – Applications oflasers.

Fiber optics- Introduction – Principle of optical fiber – Acceptance Angle – Numerical Aperture – Classification of optical fibers based on refractive index profile and modes – Propagation of electromagnetic wave through optical fibers – Attenuation – Optical fiber communication system – Applications.

Learning Outcomes:

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

- Demonstrate the basic concepts of LASER light Sources(L2)
- Apply the concepts to learn the types of lasers(L3)
- Identifies the Engineering applications of lasers(L3)
- Explain the working principle of optical fibers(L2)
- Classify optical fibers based on refractive index profile and mode of propagation(L2)
- Identify the applications of optical fibers in various fields(L3)

Unit-3:

Dielectric and Magnetic Materials

Dielectric Materials- Introduction – Dielectric polarization – Dielectric polarizability, Susceptibility and Dielectric constant – Types of polarizations: Electronic, Ionic and Orientational polarizations (Qualitative) – Lorentz internal field – Clausius- Mossotti equation-Ferro electricity- Dielectric loss-Applications.

Magnetic Materials- Introduction – Magnetic dipole moment – Magnetization – Magnetic susceptibility and Permeability – Origin of permanent magnetic moment – Classification of magnetic materials: (Dia, Para, Ferro Ferri, & Antiferro) - Domain theory of Ferromagnetism (Qualitative), – Hysteresis – Soft and Hard magnetic materials- Applications.

Learning Outcomes:

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

- Explain the concept of dielectric constant and polarization in dielectric materials(L2)
- Summarize various types of polarization of dielectrics(L2)
- Interpret Lorentz field and Claussius- Mosotti relation in dielectrics(L2)
- Classify the magnetic materials based on susceptibility and their temperature dependence(L2)
- Explain the applications of dielectric and magnetic materials(L2)
- Apply the concept of magnetism to magnetic devices(L3)

Unit-4:

Quantum Mechanics, Free Electron Theory and Band theory of Solids

Quantum Mechanics- Dual nature of matter – de-Broglie hypothesis- Heisenberg uncertainty principle(Qualitative) – Significance of wave function- Schrodinger's time independent and dependent wave equation – Particle in a one-dimensional infinite potential well.

Free Electron Theory- Classical free electron theory (Merits and demerits) – Quantum free electron theory – Equation for electrical conductivity based on quantum free electron theory – Density of States–Fermi**-** Dirac distribution.

Band theory of Solids- Origin of energy bands- Classification of solids – Bloch's Theorem (Qualitative) – Kronig- Penney model (Qualitative) – E vs k diagram.

Learning Outcomes:

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

- Explain the concept of dual nature of matter(L2)
- Explain the significance of wave function(L2)
- Interpret the concepts of classical and quantum free electron theories(L2)
- Explain the importance of K-Pmodel(L2)

- Classify the materials based on band theory(L2)

Unit-5:

Semiconductors and Superconductors

Semiconductors- Introduction – Intrinsic semiconductors – Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors – Density of charge carriers – Dependence of Fermi energy on carrier concentration and temperature – Drift and diffusion currents – Einstein's equation – Direct and indirect band gap semiconductors – Hall effect – Hall coefficient – Applications of Hall effect.

Superconductors- Introduction – Concept & Properties of superconductors – Meissner effect – Type I and Type II superconductors – BCS theory – Josephson effects (AC and DC) – High T_c superconductors – Applications of superconductors.

Learning Outcomes:

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

- Interpret the direct and indirect band gap semiconductors(L2)
- Identify the type of semiconductor using Hall effect(L2)
- Identify applications of semiconductors in electronic devices(L2)
- Explain how electrical resistivity of solids changes with temperature(L2)
- Classify superconductors based on Meissner's effect(L2)

Text books:

1. A text book of Engineering Physics – Dr. M.N. Avadhanulu& Dr. P.G. Kshirsagar, S. Chand andCompany, 11 Edition, 2019
2. Engineering Physics – B.K. Pandey and S. Chaturvedi, CengageLearning,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. Sahasram budhe and Girish, UniversityPress,2010
4. Semiconductor physics and devices- Basic principle - Donald A,Neamen, McGraw Hill,2011
5. Solid State Physics, A.J. Dekker, Macmillan Education UK,1969
6. Kittel's Introduction to Solid State Physics, CharlesKittel ,Wiley India Edition Paperback, 2019

Course Outcomes:

- Study the different realms of physics and their applications in both scientific and technological systems through physical optics.(L2)
- Identify the wave properties of light and the interaction of energy with the matter(L3).
- Asses the electromagnetic wave propagation and its power in different media(L5).
- Understands the response of dielectric and magnetic materials to the applied electric and magnetic fields.(L3)
- Study the quantum mechanical picture of subatomic world along with the discrepancies between the classical estimates and laboratory observations of electron transportation phenomena by free electron theory and band theory.(L2)
- Elaborate the physical properties exhibited by materials through the understanding of properties of semiconductors and superconductors.(L5)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B. Tech I Sem

L	T	P	C
3	0	0	3

(EG20AHS101) COMMUNICATIVE ENGLISH

(Common to all Branches of Engineering)

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 the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.
Writing: Letter-writing, Essay-writing.
Grammar and Vocabulary: Misplaced Modifiers, Synonyms and Antonyms, Essay-writing.

Learning Outcomes:

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

- Infer and predict content of spoken discourse.

- Understand verbal and non-verbal features of communication and hold formal/informal conversations.
- Interpret graphic elements used in academic texts.
- Produce a coherent paragraph interpreting a figure/graph/chart/table.
- Use language appropriate for description and interpretation of graphical elements.

Unit-5:

Lesson: Politics and the English Language: George Orwell

Listening: Identifying key terms, understanding concepts and answering a series of relevant questions.

Speaking: Formal oral presentations on topics from academic contexts - without the use of PPT slides.

Reading: Reading for comprehension.

Writing: Summary-writing, Note- making.

Grammar and Vocabulary: Clichés, Redundancies, Common Abbreviations, Writing a summary.

Learning Outcomes:

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

- Take notes while listening to a talk/lecture and make use of them to answer questions.
- Make formal oral presentations using effective strategies.
- Comprehend, discuss and respond to academic texts orally and in writing.
- Produce a well-organized essay with adequate support and detail.
- Edit short texts by correcting Common Errors.

Web links

1. www.englishclub.com
2. www.easyworldofenglish.com
3. www.languageguide.org/english/
4. www.bbc.co.uk/learningenglish
5. www.eslpod.com/index.html
6. www.myenglishpages.com

Text Books:

1. Language and Life: A Skills Approach- I Edition 2019, Orient BlackSwan.

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:

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

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech – I Sem **L T P C**

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(EE20AES103) FUNDAMENTALS OF ELECTRICAL CIRCUITS

Course Objectives:

To make the student learn about

- Basic characteristics of R, L, C parameters, their Voltage and Current Relations and Various combinations of these parameters.
- The Single Phase AC circuits and concepts of real power, reactive power, complex power, phase angle and phase difference
- Network theorems and their applications
- Network Topology and concepts like Tree, Cut-set, Tie-set, Loop, Co-Tree.
- To know the analysis of three phase balanced and unbalanced circuits and to measure active and reactive powers in three phase circuits.

UNIT-1

Introduction to Electrical & Magnetic Circuits

Electrical Circuits: Circuit Concept – Types of elements - Source Transformation-Voltage-Current Relationship for Passive Elements. Kirchhoff's Laws – Network Reduction Techniques-Series, Parallel, Series Parallel, Star-to-Delta or Delta-to-Star Transformation. Examples. Loop and Nodal Methods of Analysis of Networks & Independent Voltage and Current Sources

Magnetic Circuits: Faraday's Laws of Electromagnetic Induction-Concept of Self and Mutual Inductance-Dot Convention-Coefficient of Coupling-Composite Magnetic Circuit-Analysis of Series and Parallel Magnetic Circuits, MMF Calculations.

Learning Outcomes:

- Know about Kirchhoff's Laws in solving series, parallel, non-series-parallel configurations in DC networks (L2)
- Know about voltage source to current source and vice-versa transformation in their representation (L2)
- Understand Faraday's laws (L1)
- Distinguish analogy between electric and magnetic circuits(L3)
- Understand the analysis of series and parallel magnetic circuits (L1)

UNIT-2

Single Phase A.C Circuits

R.M.S, Average Values and Form Factor for Different Periodic Wave Forms – Sinusoidal Alternating Quantities – Phase and Phase Difference – Complex and Polar Forms of Representations, j-Notation, Steady State Analysis of R, L and C (In Series, Parallel and Series Parallel Combinations)
with Sinusoidal Excitation- Phasor diagrams - Concept of Power Factor-Concept of Reactance, Impedance, Susceptance and Admittance-Apparent Power, Active and Reactive Power, Examples.

Learning Outcomes:

- Understand fundamental definitions of 1-φAC circuits(L2)
- Distinguish between scalar, vector and phasor quantities(L3)
- Understand voltage, current and power relationships in 1-φAC circuits with basic elements R, L, and C. (L2)
- Understand the basic definitions of complex immittances and complex power (L2)
- Solve 1-φAC circuits with series and parallel combinations of electrical circuit elements R, L and C (L5)

UNIT-3

Network Theorems

Superposition, Reciprocity, Thevenin's, Norton's, Maximum Power Transfer, Millmann's, Tellegen's and Compensation Theorems for D.C and Sinusoidal Excitations.

Learning Outcomes:

- Understand that the electrical circuits are 'heart' of electrical engineering subjects and network theorems are main part of it.(L1)
- Distinguish between various theorems and inter-relationship between various theorems(L4)
- know about applications of certain theorems to DC circuit analysis (L2)
- Understands about applications of certain theorems to AC network analysis (L1)
- Know about applications of certain theorems to both DC and AC network analysis(L2)

UNIT-4

Network Topology

Definitions – Graph – Tree, Basic Cutset and Basic Tieset Matrices for Planar Networks– Duality & Dual Networks, problems.

Learning Outcomes:

- To understand basic graph theory definitions which are required for solving electrical circuits(L1)
- To understand about loop current method(L1)
- To understand about nodal analysis methods(L1)
- To understand about principle of duality and dual networks(L1)
- To identify the solution methodology in solving electrical circuits based on the topology(L4)

UNIT-5

Three Phase A.C. Circuits

Introduction - Analysis of Balanced Three Phase Circuits – Phase Sequence- Star and Delta Connection - Relation between Line and Phase Voltages and Currents in Balanced Systems - Measurement of Active and Reactive Power in Balanced and Unbalanced Three Phase Systems.

Analysis of Three Phase Unbalanced Circuits - Loop Method - Star Delta Transformation Technique – for balanced and unbalanced circuits - Measurement of Active and reactive Power – Advantages of Three Phase System.

Learning Outcomes:

- To know about advantages of 3-φcircuits over 1-φcircuits (L2)
- To distinguish between balanced and unbalanced circuits (L4)
- To know about phasor relationships of voltage, current, power in star and delta connected balanced and unbalanced loads (L2)
- To know about measurement of active, reactive powers in balanced circuits (L2)
- To understand about analysis of unbalanced circuits and power calculations (L2)

Text Books:

1. Circuit Theory (Analysis & Synthesis) A. Chakrabarti, DhanpatRai & Sons, 7th Revised Edition, 2018.

2. Fundamentals of Electric Circuits Charles K. Alexander and Matthew. N. O. Sadiku, McGraw Hill, 5th Edition, 2013.

Reference Books:

1. Engineering circuit analysis William Hayt and Jack E. Kemmerly, McGraw HillCompany, 7th Edition, 2006.

2. Network Analysis M.E Van Valkenberg, Prentice Hall (India), 3rd Edition, 1999.

3. Electrical Engineering Fundamentals V. Del Toro, Prentice Hall International, 2ndEdition, 2019.

4. Electric Circuits- Schaum's Series, McGraw Hill, 5th Edition, 2010.

5. Electrical Circuit Theory and Technology John Bird, Routledge, Taylor & Francis, 5thEdition, 2014.

Course Outcomes:

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

- Given a network, able to find equivalent impedance by using network reduction techniques and determine the current through any element and voltage across and power through any element. (L5)
- Given a circuit and the excitation, determine the real power, reactive power, power factor etc, (L5)
- Apply the network theorems suitably to analyze complex circuits and determine the effective voltages and currents in the circuit. (L6)
- Determine the Dual of the Network, develop the Cut Set and Tie-set Matrices for a given Circuit. (L5)
- Analyze the three phase balanced and unbalanced circuits and to measure active and reactive powers in three phase circuits. (L5)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech I Sem

L	T	P	C
1	0	2	2

(ME20AES102) ENGINEERING DRAWING

(Common to all Branches of Engineering)

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.
- Identify and draw curves obtained in different conic sections.
- Draw different curves such as cycloids and involutes.

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.
- Differentiate between projected length and true length and find the true length of the lines.
- Draw the projection of regular plane surfaces.

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.
- Draw the projection of solid inclined to one plane.
- Draw the projection of solids inclined to both the planes.

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.
- Obtain the true shapes of the sections of prism, cylinder, pyramid and cone.
- Draw the sectional views of prism, cylinder, pyramid and cone.

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.
- Draw the development of regular solids such as prism, cylinder, pyramid and cone.
- Obtain the development of sectional parts of regular shapes.

Text Books:

1. K.L. Narayana& P. Kannaiah, Engineering Drawing, 3/e, SciTech Publishers, Chennai, 2012.
2. N.D. Bhatt, Engineering Drawing, 53/e, Charotar Publishers, 2016.

Reference Books:

1. Dr K. PrahladaRao, 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. BasantAgarwal& C.M. Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

Course Outcomes:

After completing the course, the student will be able to

- **Draw** basic geometrical constructions, curves used in engineering practices. (L1)
- **Understand** the concept of projection and acquire visualization skills, projection of points, Lines and Planes. (L2)
- **Illustrate** the projections of solids graphically. (L3)
- **Draw** and explore the sectional views of right regular solids.(L3)
- **Draw** the development of surfaces of solids. (L3)

SRI VENKATESWARA COLLEGE OF ENGINEERING

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	L	T	P/D	C
B.Tech I Sem	**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 Bhat, Charotar Publishing House.
3. Textbook on Engineering Drawing, K.L Narayana, SciTech Publishers.
4. D. M. Kulkarni, A. P. Rastogi, A. K. Sarkar, Engineering Graphics with AutoCAD, PHI Learning Private Limited, New Delhi, Revised edition, 2010.

Course Outcomes:

After completing the course using CAD package, the student will be able to

- **Draw** the basic views related to projections of Lines, Planes. (L1)
- **Draw** the basic views related to projections of Planes. (L1)
- **Illustrate** orthographic views of simple objects. (L3)
- **Illustrate** isometric projections of simple solids. (L3)
- **Interpret** and comprehend with drafting packages for engineering practice. (L2)

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B.Tech I Sem

L	T	P	C
0	0	3	1.5

(PH20ABS104)APPLIED PHYSICS LAB

(ECE, EEE, CSE, CSE (AI & ML), IT)

Course Objectives:

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

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

List of Applied Physics Experiments:

1. Determine the thickness of the wire using wedge shape method.
2. Determination of the radius of curvature of the lens by Newton's ring method.
3. Determination of wavelength by plane diffraction grating method.
4. Determination of dispersive power of prism.
5. Determination of wavelength of LASER light using diffraction grating.
6. Determination of particle size using LASER.
7. To determine the numerical aperture of a given optical fiber its acceptance angle.
8. Determination of dielectric constant by charging and discharging method.
9. Magneticfieldalongtheaxisofacircularcoilcarryingcurrent–StewartGee'smethod.
10. Study the variation of B versus H by magnetizing the magnetic material (B-Hcurve).
11. To determine the energy gap of a semiconductor by temperature by Four-Probe Method.
12. Determination of thermistor negative temperature coefficient of resistance.

References:

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

Course Outcomes:

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

1. Utilize optical instruments like microscope and spectrometer.(L3)
2. Determine thickness of a hair/paper with the concept of interference.(L5)
3. Estimate the wavelength of different colors using diffraction grating and resolving power. (L5)
4. Organize the intensity of the magnetic field of circular coil carrying current with distance.(L3)
5. Evaluate the acceptance angle of an optical fiber and numerical aperture.(L5)
6. Determine the resistivity of the given semiconductor using four probe method. (L5)
7. Identify the type of semiconductor i.e., n-type or p-type using hall effect.(L3)
8. Determine the band gap of a given semiconductor.(L5)

B.Tech I Sem

L	T	P	C
0	0	3	1.5

(EG20AHS102) COMMUNICATIVE ENGLISH LAB

(Common to all Branches of Engineering)

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 and Group Discussions and Public speaking.
- To equip students with knowledge of the use of computers in resume preparation, report-writing, format-making etc.

Unit-1:

1. Phonetics (sounds symbols, transcription and 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, and language and body language.
2. Debate –arguing in favor of and against a topic- logical questioning.

Unit-4:

1. Oral/ Poster Presentations –structure, preparation and 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, 3rdedition; Laxmi publications 2017.

Web Links

1. www.esllab.com
2. www.englishmedialab.com
3. www.englishinteractive.net

Course Outcomes:

After completing the course, the students will be:

1. Able to handle and excel in a variety of self-instructional, learner-friendly modes of language learning.
2. Able to employ better stress and intonation patterns and utter English sounds correctly.
3. Able to avoid the impact of mother tongue in English and neutralize their accent.
4. Able to participate with skill and confidence in Group Discussions, Interviews and Public Speaking.
5. Able to use computers in resume preparation, report-writing, and format-making etc.

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B.Tech I Sem **L T P C**

0 0 3 1.5

(EE20AES104) FUNDAMENTALS OF ELECTRICAL CIRCUITS LAB

Course Objectives:

- Remember, analyze active, understand and apply various theorems and verify practically.
- Understand and reactive power measurements in three phase balanced &unbalanced circuits.

List of Experiments:

1. Verification of KCL and KVL for DC circuits
2. Determination of Self, Mutual Inductances and Coefficient of Coupling
3. Verification of Superposition Theorem for DC Circuits
4. Maximum Power Transfer Theorem for DC and AC circuits
5. Verification of Compensation Theorem for DC circuits
6. Verification of Reciprocity, Millmann's Theorems for DC circuits
7. Measurement of Active Power for Star Connected Balanced Loads
8. Measurement of Reactive Power for Star Connected Balanced Loads
9. Measurement of Active Power for Delta Connected Balanced Loads
10. Measurement of Reactive Power for Delta Connected Balanced Loads
11. Measurement of 3-Phase Power by Two Wattmeter Method for Unbalanced Loads

Note: **Minimum of 10 experiments should be performed**

Course Outcomes:

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

- Distinguish analogy between electric and magnetic circuits and apply the principles to determine circuit parameters. (L5)
- Remember, understand and apply various theorems and verify practically. (L5)
- Understand and analyze active, reactive power measurements in three phase balanced & unbalanced circuit (L5)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech I Sem

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2	0	0	0

(MA20AMC101)LOGICAL SKILLS FOR PROFESSIONALS

(Mandatory Course)

Course Objectives:

- To learn the basic methods to find averages, percentages, Time and Distance and Time and Work concepts extended to problems on trains, Boats and Streams and different shortcut techniques to find the solution in a stipulated time.
- To understand the logic behind the series, coding- decoding, Directions, Problems on ages, Analogy concepts.

Unit-1:

Averages:

- Find the averages on some quantities.
- Find the averages on speed and distance.

Ratio and Proportions:

- Ratio between quantities of the same kind.
- Comparison of two ratios and convert into equal fractions.
- Find the 4th, 3rd terms of proportions and mean proportions.

Profit and Loss:

- Find the Profit or Loss on Selling price, cost price and market price.

Unit-2:

Partnership:

- Ratio of division of gains.
- Working and sleeping partners.

Simple Interest and Compound Interest:

- Find the Principal, Rate of interest and time.
- Find the amount of compound interest when the compound interest is Annually or half-year or quarterly or daily.
- Find the difference between the simple and compound interests

Time and Distance:

- Find the time, speed and distance by using direct formula.
- Find the time, speed and distance by using ratios and averages.

Unit-3:

Time and Work:

- The relation between days taken by individuals to complete a given work independently and to complete while working simultaneously or alternately.
- Teams of men, women, children and time taken by the teams to complete work independently or while working simultaneously.

Problems on Trains:

- Time Taken by Train to Cross any stationary Body or Platform .
- Time Taken by 2 trains to cross each other.
- Distance covered when two trains are moving in the same/opposite directions.

Boats and streams:

- Find the speed of boat in upstream and downstream.
- Find the speed of boat in still water and average speed of boat.

Unit-4:

Series:

Alphabet series

- Number series
- Alpha-Numeric series

Coding and Decoding:

- Letter coding
- Number/symbol coding
- Substitution coding

Blood relation:

- Based dialogue or conversation
- Based on puzzles

Unit-5:

Directions:

- The right and left directional movement
- The directional reference point
- The directions of sun rays and shadow

Problems on ages:

- Find the ages at present
- Find the ages in future
- Find the ages in post

Analogy:

- Alphabet analogy
- Number analogy

Text Books:

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

Reference Books:

1. Quantitative Aptitude for Competitive Examinations, 14/e, 2010, Abhijit Guha, Tata McGraw Hill Publishers, New Delhi.
2. Course in Mental Ability & Quantitative Aptitude, 3/e, 2012, Edgar Thorpe, Tata McGraw Hill Publishers, New Delhi.
3. Fast Track Objective Arithmetic, 2012, Rajesh Verma, Arihant Publications, Meerut.
4. Reasoning and Aptitude, 2013, Nem Singh, Made Easy Publications, New Delhi

Course Outcomes:

- Demonstrate knowledge basic mathematics to develop analytical skills to solving problems of Averages - Percentages - Ratio .
- Demonstrate knowledge basic mathematics to develop analytical skills to solving problems of Partnership - Simple Interest and Compound Interest and time and stance.
- Demonstrate knowledge basic mathematics to develop analytical skills to solving problems of time ad work, problems on trains and Boats and streams.
- Analyze the techniques in series, coding and decoding and blood relations
- Analyze the techniques in directions, problems on ages and analogy.

B. Tech I Year II Semester

Syllabus

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech II Sem

L	T	P	C
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(MA20ABS201) DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

(Common to All Branches)

Course Objectives:

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

Unit -1:

Differential equations

Exact, Non-Exact Linear and Bernoulli equations. Applications to Newton's law of cooling and law of natural growth and decay.

Learning Outcomes:

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

- Identify the essential characteristics of linear differential equations with constant coefficients (L3)
- Solve the linear differential equations with constant coefficients by appropriate method (L3)
- Classify and interpret the solutions of linear differential equations (L3)

Unit -2:

Linear differential equations of higher order

Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral, method of variation of parameters, Cauchy's and Legendre's linear equations. Applications to L-C-R Circuit.

Learning Outcomes:

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

- Solve the linear differential equations with variable coefficients by appropriate method (L3)
- Classify and interpret the solutions of linear differential equations of higher order (L3)

- Formulate and solve the higher order differential equation by analyzing physical situations (L3)

Unit 3:

Partial differential equations

Formation of a PDE, Linear partial differential equations of first order, non-linear PDEs of first order (standard forms). Solutions to homogenous linear partial differential equations with constant coefficients, rules for finding the complementary function and the particular integral.

Learning Outcomes:

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

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

Unit-4:

Vector differentiation

Scalar and vector point functions, vector operator del, del applies to scalar point functions-Gradient, del applied to vector point functions-Divergence, Curl and their related properties.

Learning Outcomes:

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

- Apply del to Scalar and vector point functions (L3)
- Illustrate the physical interpretation of Gradient, Divergence and Curl (L3)

Unit -5:

Vector integration

Line integral-circulation-work done by force, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof).

Learning Outcomes:

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

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

Text Books:

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

Reference Books:

1. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett,2011.
2. Michael Greenberg, Advanced Engineering Mathematics, 2/e, Pearson, 2018
3. George B.Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
4. R.K.Jain and S.R.K.Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
5. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education.
6. H. k Das, Er. 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 II Sem

L	T	P	C
3	0	0	3

(CH20ABS103) CHEMISTRY

(ECE, EEE, CSE, CSE (AI & ML), IT)

Course Objectives:

- To impart the concept of soft and hard waters, softening methods of hard water
- To familiarize engineering chemistry and its applications
- To train the students on the principles and applications of electrochemistry
- To determine the polymer molecular weights and various applications of polymers
- To introduce instrumental methods

Unit 1: Water Technology

Introduction –Soft Water and hardness of water, Estimation of hardness of water by EDTA Method, Estimation of Dissolved Oxygen by Winkler's method -Boiler troubles– Priming, foaming, scale and sludge, Caustic embrittlement, Domestic treatment of water, specifications for drinking water, Bureau of Indian Standards (BIS) and World Health Organization (WHO) standards, Industrial water treatment, ion-exchange processes - desalination of brackish water, reverse osmosis

Learning Outcomes:

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

- List the differences between temporary and permanent hardness of water. (L1)
- Explain the principles of reverse osmosis and electrodialysis. (L2)
- Compare quality of drinking water with BIS and WHO standards. (L2)
- Illustrate problems associated with hard water - scale and sludge. (L2)
- Explain the working principles of different Industrial water treatment processes. (L2)

Unit 2: Modern Engineering materials

Understanding of materials: Crystal field theory – salient features – splitting in octahedral and tetrahedral geometry. Properties of coordination compounds- Oxidation state, coordination, magnetic and colour.

Semiconductor materials, super conductors- basic concept, band diagrams for

conductors, semiconductors and insulators, Effect of doping on band structures.
Super capacitors: Introduction, Basic concept-Classification – Applications.
Nano chemistry: Introduction, classification of nano meterials, properties and applications of Fullerenes, carbon nano tubes and Graphines nano particles.

Learning Outcomes:

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

- Explain splitting in octahedral and tetrahedral geometry of complexes. (L2)
- Discuss the magnetic behaviour and colour of coordination compounds. (L3)
- Explain the band theory of solids for conductors, semiconductors and insulators. (L2)
- Demonstrate the application of Fullerenes, carbon nano tubes and Graphines nano particles. (L2)

Unit 3: Electrochemistry and Applications

Introduction to Electrochemistry: Electrodes – concepts, reference electrodes (Calomel electrode, Ag/AgCl electrode and glass electrode); Electrochemical cell, Nernst equation, cell potential calculations and numerical problems,
PH metry, Potentiometry- potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations).
Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples.
Primary cells – Zinc-air battery, Secondary cells – Nickel-Cadmium (NiCad),and lithium ion batteries- working of the batteries including cell reactions; Principles and applications of Fuel cells: hydrogen-oxygen, methanol fuel cells

Learning Outcomes:

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

- Apply Nernst equation for calculating electrode and cell potentials (L3)
- Differentiate between phmetry, potentiometric and conductometric titrations (L2)
- Explain the theory of construction of battery and fuel cells (L2)
- Solve problems based on cell potential (L3)

Unit 4: Polymer Chemistry

Introduction to polymers, functionality of monomers, types of polymerization, chain growth and step growth polymerization, coordination polymerization, copolymerization (stereospecific polymerization) with specific examples and mechanisms of polymer formation. Calculation of weight average molecular mass of polymers, polydispersity index (PDI) Plastics - Thermoplastics and Thermosettings, Preparation, properties and applications of – PVC, Teflon, Bakelite, Nylon-6,6, carbon fibres. Elastomers–Buna-S, Buna-N–preparation, properties and applications. Conducting polymers–polyacetylene, polyaniline, polypyrroles–mechanism of conduction and applications.

Learning Outcomes:

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

- Explain the different types of polymers and their applications (L2)
- Explain the preparation, properties and applications of Bakelite, Nylon-6,6, and carbon fibres (L2)
- Describe the mechanism of conduction in conducting polymers (L2)
- Discuss Buna-S and Buna-N elastomers and their applications (L2)

Unit 5: Instrumental Methods and Applications

Electro magnetic spectrum. Absorption of radiation: Beer-Lambert's law. Principle, instrumentation and applications of UV-Visible, IR Spectroscopies.

Learning outcomes:

After completion of Unit IV, students will be able to:

- Explain the different types of spectral series in electromagnetic spectrum. (L2)
- Understand the principles of different analytical instruments. (L2)
- Explain the different applications of analytical instruments. (L2)

Text Books:

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

Reference Books:

1. G.V.Subba Reddy, K.N.Jayaveera and C. Ramachandraiah, Engineering Chemistry, McGraw Hill, 2020.
2. D. Lee, Concise Inorganic Chemistry, 5/e, Oxford University Press, 2008.
3. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.

Course Outcomes:

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

- Estimate the amount of hardness and DO present in water .(L2)
- Compare the materials of construction for battery and electrochemical sensors. (L2)
- Explain the preparation, properties, and applications of thermoplastics

&thermosetting, elastomers& conducting polymers. (L2)

- Explain the principles of spectrometry. (L2)
- Apply the principle of Band diagrams in application of conductors and semiconductors. (L3)

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B.Tech- II Sem

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(CS20AES101) PROBLEM SOLVING USING C

(Common to All Branches of Engineering**)**

Course Objectives:

- To learn how to solve a given problem.
- To illustrate the basic concepts of C programming language.
- To discuss the concepts of Functions, Arrays, Pointers and Structures.
- To familiar with Dynamic memory allocation concepts.
- To apply concepts of structures and files to solve real word problems.

UNIT-1:

Introduction to Problem Solving: Problem solving Aspect, Problem identification, Problem understanding, Algorithm development, Solution planning, flowcharts, flowgorithm.

Overview of C: History of C, C Language elements, Basic structure of C 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).

Text Books:

1. ReemaThareja , 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).

B.Tech – II Sem **L T P C**

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(EE20AES201) ELECTRICAL CIRCUIT ANALYSIS

Course Objectives:

- Study of Series and parallel resonances, bandwidth, current locus diagrams
- To know the network parameters of T & π configurations
- Knowing how to determine the transient response of R-L, R-C, R-L-C series circuits for D.C and A.C excitations.
- Study of Different types of filters, equalizers.
- To learn the basics of signals and systems

UNIT–1

Locus Diagrams & Resonance

Series R-L, R-C, R-L-C and Parallel Combination with Variation of Various Parameters -Resonance-Series, Parallel Circuits, Frequency Response, Concept of Bandwidth and Q Factor.

Learning Outcomes:

The student will be able to

- Learn about basic concepts of Locus diagrams with different parameter variations of Electrical circuit elements (L2)
- Learn about occurrence of resonance with the presence of electrical circuit elements under certain operating conditions (L2)

UNIT-2

Two Port Networks

Two Port Network Parameters – Impedance – Admittance - Transmission and Hybrid Parameters and their Relations - Concept of Transformed Network - Two Port Network Parameters Using Transformed Variables.

Learning Outcomes:

The student will be able to

- Understand and estimate the network parameters of T &π configurations of DC circuits or resistive elements (L3)

- Understand how Laplace transforms studied in mathematics courses, can be applied to identifying energy storage elements in electrical circuits (L3)

UNIT-3

Transient Analysis

D.C Transient Analysis: Transient Response of R-L, R-C, R-L-C Series Circuits for D.C Excitation - Initial Conditions in network - Initial Conditions in elements - Solution Method Using Differential Equation and Laplace Transforms - Response of R-L & R-C Networks to Pulse Excitation.

A.C Transient Analysis: Transient Response of R-L, R-C, R-L-C Series Circuits for Sinusoidal Excitations - Solution Method Using Differential Equations and Laplace Transforms.

Learning Outcomes:

- Distinguish between classical method and Laplace transform approach in analyzing transient phenomenon in DC excitations (L4)
- Distinguish between classical method and Laplace transform approach in analyzing transient phenomenon in sinusoidal excitations (L4)

UNIT-4

Filters

Filters – Low Pass – High Pass and Band Pass – RC, RL filters– derived filters and composite filters design – types of Attenuators.

Learning Outcomes:

The student will be able to

- Understand about what is a Filter, Classification, where they can be used, etc. (L1)
- Understand about attenuators in electronic high frequency circuits (L1)

UNIT-5

Signals & Systems

Basic definitions and classification of Signals and Systems (Continuous time and discrete time), operations on signals, Concepts of Convolution and Correlation of signals, Statement and proof of sampling theorem, Illustrative Problems.

Learning Outcomes:

The student will be able to

- Understand different types of signals and systems. (L1)
- Illustrate signal sampling and its importance. (L4)

Course Outcomes:

- Understand the Locus diagrams for R-L,R-C and R-L-C. (L1)
- Determine network parameters for two port networks (L4)
- To get knowledge about how to determine the transient response of R-L, R-C, R-L-C series circuits for D.C and A.C excitations. (L4)
- Design of filters for electronic frequency circuits. (L6)
- Understand the mathematical description and representation of continuous-time and discrete-time signals and systems (L1)

Text Books:

1. William Hayt, Jack E. Kemmerly and Jamie Phillips, "Engineering Circuit Analysis", Mc Graw Hill, 9th Edition, 2019.

2. A. Chakrabarti, "Circuit Theory: Analysis & Synthesis", DhanpatRai& Sons, 2008.

3. A.V. Oppenheim, A.S. Willsky and S.H. Nawab, "Signals and Systems", 2nd Edition, PHI, 2009.

Reference Books:

1. M.E. Van Valkenberg, "Network Analysis", 3rd Edition, Prentice Hall (India), 1980.

2. V. Del Toro, "Electrical Engineering Fundamentals", Prentice Hall International, 2009.

3. Charles K. Alexander and Matthew. N. O. Sadiku, "Fundamentals of Electric Circuits" McGraw Hill, 5th Edition, 2013.

4. MahamoodNahvi and Joseph Edminister, "Electric Circuits" Schaum's Series, 6th Edition, 2013.

5. AAnand Kumar, "Signals and Systems", PHI Publications, 2nd Edition, 2012.

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B.Tech II Sem **L T P C**

(ME20AES101) ENGINEERING WORKSHOP **0 0 3 1.5**

(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. Corner 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 series2) Two-way switch3) Godown lighting4) 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 using hand layup method
3. Joining of plastic components

Reference Books/Laboratory Manuals:

1. P. Kannaiah and K. L. Narayana, Workshop Manual, SciTech Publishers, 2009.
2. K. Venkata Reddy, Workshop Practice Manual, BS Publications, 2008.
3. V. Ramesh Babu, Engineering Workshop Practice, V R B Publishers Private Limited, 2009.

Additional Learning Resources:

1. R. K. Jain, Production Technology, Khanna Publishers, 17th edition, 2012.
2. Kalpakjian, Serope, Manufacturing Engineering and Technology, Pearson Education, 7th edition, 2014.

Course Outcomes:

After completion of this lab the student will be able to

- 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)

B.Tech II Sem

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(CS20AES103) IT Workshop

(Common to All Branches of Engineering**)**

Course Objectives:

- To make the students to know about the internal parts of computer, Generation of Computers
- To make the students to know how to assemble and disassemble a computer from its parts
- To make the students to install Operating system for a computer.
- To provide technical training to the students on productivity tool like Word Processor, Spread Sheets, Presentations and LaTeX
- To learn about networking of computers and use Internet facility for browsing and searching

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.

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. Submit it in the form of report.

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.

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.

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.

Introduction to Web Design: Introduction to Web Design, Introduction to HTML tags, Cascading Style sheets and Applications using HTML and CSS.

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.

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

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.

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.

Introduction to LaTeX: LaTeX and its installation and different IDEs, Creating the document using Latex, content into sections using article and book class of Latex.

Styling Pages: Reviewing and customizing different paper sizes and formats.Formatting text, creating basic table, adding simple and dashed border, merging rows and columns, referencing and indexing. Student should submit a user manual of the LaTeX.

References:

1. Introduction to Computers, Peter Norton, McGraw Hill
2. PC Hardware, Maintenance & Troubleshooting In-Depth, Reddy N.S.
3. MOS study guide for Word, Excel, PowerPoint & Outlook Exams, Joan Lambert, Joyce Cox, PHI
4. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
5. Networking your computers and devices, Rusen, PHI
6. Lamport L. LaTeX: a document preparation system: user's guide and reference manual. Addison-Wesley: 1994

Course Outcomes:

- Identify the Internal parts of computers and Generation of Computers. (L1)
- Assemble and disassemble a computer from its parts and prepare the computer ready to use.(L3)
- Installation process of different types Operating system for a computer by their own.(L3)
- Interconnect two or more computers for information sharing.(L4)
- Access the Internet and browse it for required information.(L1)
- Prepare the documents using Word Processor, prepare spread sheets for calculations using Excel, and documents for LaTeX.(L3)
- Prepare slide presentation using the presentation tool.(L4)

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B.Tech II Sem

L	T	P	C
0	0	3	1.5

(CS20AES102) PROBLEM SOLVING USING C LAB

(Common to All Branches of Engineering**)**

Course Objectives:

- To learn how to solve a given problem.
- To illustrate the basic concepts of C programming language.
- To discuss the concepts of Functions, Arrays, Pointers and Dynamic Memory Allocation.
- To Understand and implement Structures and Unions
- To familiarize with Files and File Operations

Week-1: Draw flowcharts for fundamental algorithms.

Week-2: C Programs to demonstrate C-tokens.

Week-3: C Programs on usage of operators.

Week-4: C Programs to demonstrate Decision making and branching (Selection)

Week-5: C programs to demonstrate different loops.

Week-6: C programs to demonstrate 1-D arrays.

Week-7: C programs to demonstrate multi-dimensional arrays.

Week-8: C programs to demonstrate functions.

Week-9: C programs on pointers.

Week-10: C programs to perform operations on strings with String handling functions and without String handling functions.

Week-11: C programs on structures and unions.

Week-12: C programs to demonstrate files.

Text Books:

1. R.G. Dromey, How to Solve it by Computer, 1/e, Pearson Education, 2006.
2. ReemaThareja , 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. PradipDey, ManasGhosh, 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

(Autonomous)

B.Tech II Sem

L	T	P	C
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(CH20ABS104) CHEMISTRY LAB

(ECE, EEE, CSE, CSE (AI & ML), IT)

Course Objectives:

- Verify the fundamental concepts with experiments

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

List of Chemistry Experiments:

1. Determination of Hardness of a groundwater sample.
2. Estimation of Dissolved Oxygen by Winkler's method.
3. Conductometric titration of (i) strong acid vs. strong base, (ii) weak acids.strong base.
4. Determination of cell constant and conductance of solutions.
5. Potentiometry - determination of redox potentials and emfs.
6. Determination of Strength of an acid in Pb-Acidbattery.
7. Preparation of Bakelite
8. Verify Lambert-Beer'slaw.
9. Thin layerchromatography.
10. Identification of simple organic compounds byIR.
11. Preparation of nanomaterial's byprecipitation.
12. Estimation of Ferrous Iron byDichrometry.
13. PH metric titration of (i) strong acid vs. strong base, (ii) weak acids. strong base

Reference Books:

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

Course Outcomes:

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

- Determine the cell constant and conductance of solutions.(L3)
- Prepare advanced polymer- Bakelite. (L2)
- Measure the strength of an acid present in secondary batteries.(L3)
- Analyse the IR of some organic compounds.(L3)
- Estimate the amount of dissolved oxygen in water.(L3)

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B.Tech – II Sem **L T P C**

0 0 3 1.5

(EE20AES202) ELECTRICAL CIRCUITS & SIMULATION LAB

Course Objectives:

- Understand and experimentally verify various resonance phenomenon
- Understand and analyze various current locus diagrams.
- Apply and experimentally analyze two port network parameters
- Simulation of various circuits using PSPICE software.

Experiments:

1. Locus Diagram of RL Series Circuits:
   a) Variable 'R' and Fixed 'L' b) Variable 'L' and Fixed 'R'
2. Locus Diagram of RC Series Circuits:
   a) Variable 'R' and Fixed 'C' b) Variable 'C' and Fixed 'R'
3. Series Resonance
4. Parallel Resonance
5. Determination of Z Parameters
6. Determination of Y Parameters
7. Transmission Parameters
8. Hybrid Parameters

PSPICE Simulation Experiments:

1. Simulation of DC Circuits
2. Simulation of AC Circuits
3. DC Transient Response
4. Mesh Analysis
5. Nodal Analysis
6. Analysis of Three Phase balanced systems
7. Analysis of Three Phase unbalanced systems
8. Verification of Maximum Power Transfer Theorem(plot the power dissipated versus the load).

Note: **Minimum Five Experiments to be performed in each section.**

References:

1. David A. Bell, Fundamentals of Electric Circuits: Lab Manual OUP Canada, 7^{th}Edition,2009.

2. Muhammad H. Rashid, Introduction to PSPICE using OrCAD for Circuits and Electronics, Pearson Education, 3rd Edition, 2003.

Course Outcomes:

- Students will understand and experimentally verify various resonance phenomenon (L1).
- Will be able to analyze various current locus diagrams (L4).
- Can apply and experimentally analyze two port network parameters(L5).
- Can perform simulation of various circuits using PSPICE software (L5).

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B.Tech – II Sem **L T P C**

0 0 3 1.5

(CH20AMC201) ENVIRONMENTAL SCIENCE

(Common to All Branches of Engineering)

Course Objectives:

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

UNIT – I

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

Natural Resources:

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

Learning outcomes:

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

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

UNIT – II

Ecosystems:

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

a. Forest ecosystem.

b. Grassland ecosystem

c. Desert ecosystem

d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity And Its Conservation :

Introduction 0 Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitatloss, 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

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

UNIT – III

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

a. Air Pollution.

b. Water pollution

c. Soil pollution

d. Marine pollution

e. Noise pollution

f. Thermal pollution

g. Nuclear hazards

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

Learning outcomes:

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

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

UNIT – IV

Social Issues and the Environment:

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

Learning outcomes:

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

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

UNIT – V

Human Population And The Environment:

Population growth, variation among nations. Population explosion – Family Welfare Programmes. – Environment and human health – Human Rights – Value Education –

HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

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

Learning outcomes:

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

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

Text Books:

1. Text book of Environmental Studies for Undergraduate Courses ErachBharucha for University Grants Commission, Universities Press.
2. Palaniswamy, "Environmental Studies", Pearson education
3. S.AzeemUnnisa, "Environmental Studies" Academic Publishing Company
4. K.RaghavanNambiar, "Text book of Environmental Studies for Undergraduate Courses as perUGC model syllabus", Scitech Publications (India), Pvt. Ltd.

References:

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

Course Outcomes:

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

- Grasp multidisciplinary nature of environmental studies and various renewable and nonrenewable resources.

- Understand flow and bio-geo- chemical cycles and ecological pyramids.
- Understand various causes of pollution and solid waste management and related preventive measures.
- About the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation.
- Causes of population explosion, value education and welfare programmes.

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B.Tech – II Sem **L T P C**

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(EG20AMC101) Speech & Oral Communication
(Common to All Branches of Engineering)

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.

UNIT – I

Story Telling (Narrate a story)

1. Biography description (Describe a freedom fighter/politician/athlete/celebrity etc.)
2. Speech sounds
3. Formal Conversation (EnactofficialTelephone conversation/Telephone interview etc.)
4. Verb forms, Subject -Verb agreement, Vocabulary).

UNIT – II

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 – III

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 – IV

1. Tongue twisters / pronounce it…..
2. Humorous Play (Playing jokes/Telling funny dialogues in English)
3. Celebrity Interview (Enact Play), Spotting Errors, Etiquettes

UNIT – V

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)

Course Outcomes (CO):

- Improve the neutral accent and be free from mother tongue influence.
- Hypothesizing small talks on general topics and learn critiquing skills by participating in Conversations.
- Applying Vocabulary and using it in their day-to-day life.
- Understanding and mastering in verbal and non-verbal communication.

Textbooks:

1. K.R Lakshmi Narayanan, A Course book on English, SCITECH publications Pvt. Ltd, Hyd, 2009.
2. Sanjay Kumar & Pushp Lata, Communication skills, Oxford university press, New Delhi, 2019.
3. M Ashraf Rizvi, Effective Technical Communication, Tata McGraw-Hill, New Delhi, 2017.

Additional Learning Resources:

1. https://www.bbc.co.uk/skillswise/english
2. https://www.nonstopenglish.com
3. https://www.grammarly.com/blog/

B. Tech II Year I Semester

Syllabus

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B.Tech- III Sem

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(MA20ABS302) COMPLEX VARIABLES AND TRANSFORMS

(EEE & ECE)

Course Objectives:

To make the students learn about:

- To understand the knowledge on functions of complex variables. (L2)
- To evaluate improper integrals of complex functions using Residue theorem. (L5)
- To apply the knowledge on Laplace transforms and its applications in solving ordinary differential equations. (L3)
- To determine Fourier series of given function in a given interval. (L5)
- To analyze the concepts of Z-transforms in solving Difference equations. (L4)

UNIT – I: Functions of complex variables – Differentiation

Introduction to functions of complex variables - concept of limit & continuity-Differentiation, Cauchy-Riemann equations in Cartesian and Polar coordinates (without proof), analytic functions, harmonic functions, finding harmonic conjugate - construction of analytic function by Milne- Thomson method.

Learning Outcomes:

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

- Understand functions of complex variable and its properties.(L2)
- Find derivatives of complex functions.(L1)
- Understand the analyticity of complex functions.(L2)

UNIT-II: Functions of complex variables – Integration

Line integral - Contour integration, Cauchy's integral theorem, Cauchy Integral formula, Cauchy Integral formula for derivatives (All theorems without Proof).

Power series expansions: Taylor's series and Laurent's series (without proof); zeros of analytic functions, singularities.

Residues: Evaluation of residue by formula and by Laurent's series, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine.

Learning Outcomes:

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

- Understand the integration of complex functions.(L2)
- Apply Cauchy’s integral theorem and Cauchy’s integral formula to solve complex integrals.(L3)
- Understand singularities of complex functions.(L2)
- Evaluate improper integrals of complex functions using Residue theorem.(L5)

UNIT– III: Laplace Transforms

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

Learning Outcomes:

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

- Understand the concept of Laplace transforms and find the Laplace transforms of elementary functions.(L2)
- Find the Laplace transforms of general functions using its properties.(L3)
- Understand Laplace transforms of special functions (Unit step function, Unit Impulse & Periodic).(L2)
- Apply Laplace transforms to solve differential equations.(L3)

UNIT– IV: Fourier series

Fourier coefficients (Euler’s formulae) – Dirichlet conditions for the existence of Fourier series – functions having discontinuity - Fourier series of even and odd functions – Fourier series in an arbitrary interval – Half-range Fourier sine and cosine expansions.

Learning Outcomes:

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

- Understand the Fourier series expansion of the given function.(L2)
- Determine Fourier coefficients (Euler’s) and identify existence of Fourier series of the given function.(L5)

- Determine the Fourier series of given function in Half range interval.(L5)

UNIT– V: Fourier transforms & Z Transforms

Fourier Transforms: Fourier transform – Fourier sine and cosine transforms – Properties – Inverse transforms – convolution theorem – Finite Fourier Sine and Cosine transforms.

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

Learning Outcomes:

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

- Find Fourier transforms of given functions.(L1)
- Apply properties of Fourier transforms to different functions.(L3)
- Apply Z transforms to solve difference equations.(L3)

Text Books:

1. B.S. Grewal, "Higher Engineering Mathematics", Khanna publishers, 44th edition.
2. Advanced Engineering Mathematics, R K Jain and S R K Iyengar, Narosa Publishing House, New Delhi.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India

Reference Books:

1. B.V. Ramana, Higher, "Engineering Mathematics", McGraw Hill publishers.
2. Alan Jeffrey, "Advanced Engineering Mathematics", Elsevier.
3. Dr. S. Sreenadh, Dr. V. Ramesh Babu, S Ranganadham, Fourier Series and Transforms, S Chand Publications, 2014

Course Outcomes:

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

CO1: Apply Cauchy-Riemann equations to find the analyticity of complex functions.(L3)

CO2: Apply Cauchy's integral formula and Cauchy's integral theorem to evaluate improper integrals along contours.(L3)

CO3: Analyze the concepts of Laplace Transforms to solve ordinary differential equations. (L4)

CO4: Examine the Fourier series for different functions in half and full range.(L4)

CO5: Analyze the concepts of Z transforms to solve Difference equations.(L4)

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B.Tech- III Sem

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(EE20APC301) CONTROL SYSTEMS

Course Objectives:

To make the students learn about:

- The effect of feedback, the use of block diagram algebra and Mason's gain formula to find the overall transfer function
- Transient and steady state response and time domain specifications
- The concept of stability by Routh's stability criterion and Root loci
- Frequency domain specifications, Bode diagrams and Nyquist plots
- State space modelling of Control system and the concept of controllability and observability

UNIT – I

CONTROL SYSTEMS CONCEPTS

Open loop and closed loop control systems and their differences- Classification of control systems, Feedback characteristics, Mathematical models – Differential equations of translational and rotational mechanical systems and electrical systems, Analogous Systems, Block diagram reduction methods – Signal flow graphs - Reduction using Mason's gain formula.

Principle of operation of DC and AC Servo motor, Transfer function of DC servo motor - AC servo motor, Synchros.

Learning Outcomes:

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

- Write the differential equations for mechanical and electrical systems(L3)
- Obtain the transfer function from block diagrams, servo motors and signal flow graphs (L4)

UNIT-II

TIME RESPONSE ANALYSIS

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

Learning Outcomes:

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

- Analyze the time domain specifications(L4)
- Calculate the steady state errors(L4)
- Understand about Proportional, Integral and Derivative controllers along with combinations(L2)

UNIT– III

STABILITY ANALYSIS IN TIME DOMAIN

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

Learning Outcomes:

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

- Analyze the concept of stability in time domain(L4)
- Apply the concept of Routh's stability and Root locus in time domain (L5)

UNIT– IV

FREQUENCY RESPONSE ANALYSIS

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

Learning Outcomes:

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

- Evaluate the frequency domain specifications from Bode, Polar and Nyquist plots (L5)
- Design Compensators for various systems (L5)

- Deducing transfer functions from Bode Plots(L4)
- Understand difference between Phase and Gain margins (L2)

UNIT– V

STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS

Concepts of state, state variables and state model, state models - differential equations & Transfer function models - Block diagrams, Transfer function from state model, Solving the Time invariant state Equations- State Transition Matrix and it's Properties, The concepts of controllability and observability.

Learning Outcomes:

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

- Understand the concept of state space, controllability and observability (L2)
- Obtain the transfer function from sate space and vice versa (L4)
- Understand the state transition method of solving time invariant state equations (L2)

Text Books:

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

Reference Books:

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

Course Outcomes:

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

CO-1: Understand the concepts of control systems classification, feedback effect, mathematical modelling, and and state space analysis. Apply the concepts of Block diagram reduction, Signal flow graph

CO-2: Analyse time response analysis, error constants, and stability characteristics of a given mathematical model using different methods.

CO-3: Apply the concepts of RH and Root locus for stability calculations

CO-4: Analyze system behavior of the system in frequency domain. frequency response characteristics, Design and develop different compensators. Bode, Nyquist, Polar plots for stability calculations

CO-5: Analyze system behavior based on the state space analysis of that system. controllability and observability

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B.Tech- III Sem	**L**	**T**	**P**	**C**
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(EE20APC302) DC MACHINES & TRANSFORMERS

Course Objectives:

- Study magnetic materials, electromechanical energy conversions, principle and operation of DC machines and transformers and starters.
- Understand the constructional details of DC machines and Transformers.
- Analyze the performance characteristics of DC machines and transformer.
- Evaluate efficiency, regulation and load sharing of DC machines and transformers Design Equivalent circuit of transformer.

Unit -1:

Magnetic Material Properties and Applications:

Introduction, Magnetic materials and their properties, magnetically induced emf and force, hysteresis and eddy current losses, permanent magnets, and applications of permanent magnet materials.

Principles of Electromechanical Energy Conversion:

Energy in magnetic system, field energy and mechanical force, multiply-excited magnetic field systems, forces/torques in systems with permanent magnets.

Learning Outcomes:

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

- Able to understand the electromechanical energy conversion system.(L2)
- To understand about various magnetic materials, properties and Applications.(L2)

Unit -2: DC Generators

Constructional details of DC machine, principle of operation of DC generator, armature windings and its types, emf equation, armature reaction, demagnetizing and cross magnetizing ampere turns, compensating windings, commutation, methods of improving commutation, OCC and load characteristics of different types of generators. Parallel operation of DC Generators: DC shunt and series generators in parallel, equalizing connections

Learning Outcomes:

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

- Able to understand the construction, operation and armature windings of a DC generator.(L2)
- Able to analyze the characteristics of DC generators.(L2)

Unit -3: DC Motors

Principle of operation of DC Motor, back emf, Torque and power developed by armature, Necessity of starters, constructional details of 3-point and 4-point starters, characteristics of DC motors, Losses & efficiency, speed control of DC motors.

Testing of DC machines:

Brake test, Swinburne's test, Hopkinson's test, Fields test.

Learning Outcomes:

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

- Able to analyze speed control of DC motors, testing methods and parallel operation of DC machines.(L2)
- Analyze the characteristics of DC motors.(L4)

Unit -4:

Single Phase Transformers

Principle, construction and operation of single-phase transformers, equivalent circuit, phasor Diagrams(no load and on load), Magnetizing current, losses and efficiency Testing - Open circuit and short circuit tests, voltage regulation, Sumpner's test, separation of hysteresis and eddy current losses. Parallel operation of single-phase transformers, Autotransformers - construction, principle, applications and comparison with two winding transformer.

Learning Outcomes:

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

- Able to understand the construction, operation and parallel operation of transformer.(L2)
- To predetermine the efficiency and regulation of a transformer.(L3)

Unit -5:

Three Phase Transformers

Three-phase transformer – construction, types of connection and their comparative features, Phase conversion - Scott connection, Tap-changing transformers - No-load and on-load tap changing of transformers, Three-winding transformers.

Learning Outcomes:

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

- Able to understand and analyze the phase conversions. (L2)
- Analyze the tap changing of transformers.(L4)

Text Books:

1. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.
2. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education,2010.

Reference Books:

3. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 2013.
4. A. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBS Publishers, 2004.
5. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.

Course Outcomes:

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

- Understand the concepts of magnetic circuits, principle and operations of DC machines, starters and single and three phase transformers.
- Analyze armature reaction, parallel operation, speed control and characteristics of DC machines.
- Analyze the performance characteristics with the help of various testing methods of Dc machines & transformers.
- Evaluate generated emf, back emf, speed, efficiency and regulations of DC machines and efficiency and regulation of transformer also load sharing of parallel connected transformers.
- Design winding diagrams of DC machines and equivalent circuit of transformers.

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B.Tech-III Sem

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(EC20APC307) SEMICONDUCTOR DEVICES AND CIRCUITS

(EEE)

Course Objectives:

To make the students learn about:

- To understand the basic principles of all semiconductor devices.
- To be able to solve problems related to diode circuits, and amplifier circuits.
- To analyze diode circuits, various biasing and small signal equivalent circuits of amplifiers.
- To be able to compare the performance of BJTs, JFETs and MOSFETs.
- To design rectifier circuits and various amplifier circuits using BJTs and JFETs.

Unit - I

PN junction Diode: Qualitative theory of the PN junction, PN junction as a diode, current Components in a PN diode, Volt-Ampere characteristics, Temperature dependence of PN diode Characteristics, Diode resistance And Diode capacitances. Diode as Rectifier: Operation of Half wave and Full wave Center -Tapped rectifier, Bridge rectifier, Filters – derivation of ripple factor using Inductor and Capacitor Filter.

Learning Outcomes:

- Remember and Understand the characteristics of PN junction diode (L1)
- Design the rectifier circuits using filters. (L6)
- Analyze temperature dependence of diode characteristics (L4)

Unit - II

Special Purpose Diodes: Zener versus Avalanche breakdown, Principle of operation, Characteristics and applications of Zener diode, Tunnel diode, Photo diode, LED, PIN diode, Schottky barrier diode and Varactor diode. Bi-Polar Junction Transistor: Junction transistor, Transistor current components, Transistor as an amplifier, Input and Output characteristics of BJT in Common Base, Common Emitter and Common Collector configurations. Transistor as a switch.

Learning Outcomes:

- Remember and Understand the characteristics of various special purpose diodes and BJT configurations (L2)
- Design voltage regulator circuits and BJT based switch circuits (L6)
- Compare the BJT characteristics in various configurations (L4)

Unit – III

Transistor biasing and Stabilization: The Operating Point, Bias Stability, Fixed Bias, Collector-to-Base Bias, Self-Bias, Bias Stabilization, Bias Compensation, Thermistor and Sensistor Compensation, Thermal Runaway, Thermal Stability. Small Signal Low-frequency Transistor Models: Transistor Hybrid Model, Determination of the h parameters from the characteristics, Analysis of Transistor amplifier using h parameters, Comparison of Transistor amplifier configurations.

Learning Outcomes:

- Analyze various biasing circuits used in amplifier designs. (L2)
- Understand the concept of Thermal runaway and Thermal stability (L2)
- Apply transistor hybrid model to calculate various parameters (L3)

Unit – IV

Low-frequency Transistor Amplifier circuits: Simplified Common-emitter Hybrid Model, Simplified Calculations for the Common-Collector, Common-base and Common-emitter Amplifier with and without bypass Capacitor, Miller's Theorem and Dual of Miller's Theorem.

Learning Outcomes:

- Apply Miller's and dual of Miller's theorem in transistors circuit Analysis (L1)
- Design an Amplifier using BJT based on the given specifications (L6)
- Solve problems related to CE, CB & CC amplifier circuits. (L4)

Unit – V

Field-effect Transistors: The Junction Field-effect Transistor, The Pinch-off Voltage, The JFET Volt-Ampere Characteristics, MOSFET characteristics (Enhancement and depletion mode), The FET Small-signal Model, Biasing of FET – Self bias The Common source Amplifier with and without bypass Capacitor, Common Drain amplifier, The FET as a Voltage-Variable Resistor and characteristics of Unijunction Transistor.

Learning Outcomes:

- Understand the principle of operation of various types of JFET & MOSFET devices.(L2)

- Understand the principle of operation of V-I characteristics of JFET & MOSFET devices and their configurations. (L2)
- Design an amplifier using JFET based on the given specifications.

Text Books:

1. J. Millman, C.C.Halkias and S. Jit, "Millman's Electronic Devices and Circuits", Tata McGraw Hill, 4th edition, 2019.

2. S. Salivahanan, N. Suresh Kumar, "Electronic Devices and Circuits", 4th edition, McGraw-Hill, 2019.

References:

1. J.Milliman, C. C. Halkias and Chetan Parikh, "Integrated Electronics", 2nd edition, Mc Graw Hill, 2010.

2. David A. Bell, "Electronic Devices and Circuits", 5th edition, Oxford, 2008.

Course Outcomes:

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

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

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech –III Semester

L	T	P	C
3	0	0	3

(BA20AHS301) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course Objectives: The objective of this course is to equip the student with the basic inputs of Managerial Economics and Economic Environment of business and to impart analytical skills in helping them take sound financial decisions for achieving higher organizational productivity.

UNIT I

INTRODUCTION TO MANAGERIAL ECONOMICS

Managerial Economics – Definition- Nature- Scope - Contemporary importance of Managerial Economics - Relationship of Managerial Economics with Financial Accounting and Management. **Demand Analysis**: Concept of Demand-Demand Function - Law of Demand - Elasticity of Demand- Significance - Types of Elasticity - Measurement of elasticity of demand - Demand Forecasting- factors governing demand forecasting- methods of demand forecasting.

LO1 Students can understand the basic terms and concepts related to economics and managerial economics.
LO2 It describes decision making process of a firm.
LO3 Students are able to understand the relationship between price and demand.
LO4 Students can understand the techniques involved in forecasting the Demand.

UNIT II

THEORY OF PRODUCTION AND COST ANALYSIS

Production Function- Least cost combination- Short-run and Long- run production function- Isoquants and Isocosts, MRTS - Cobb-Douglas production function - Laws of returns - Internal and External economies of scale - Cost Analysis: Cost concepts and cost behavior- Break-Even Analysis (BEA) - Determination of Break Even Point (Simple Problems)-Managerial significance and limitations of Break-

Even Point.

LO1 Students can understand the various levels of production function.

LO2 It demonstrates the methods of costing a product.

LO3 Students are able to understand the Break even point of an organization.

LO4 It explains the merits and demerits of increase in the scale of production.

UNIT III

INTRODUCTION TO MARKETS AND NEW ECONOMIC ENVIRONMENT

Market structures: Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition- Monopoly-Monopolistic Competition-Oligopoly-Price-Output Determination - Pricing Methods and Strategies-Forms of Business Organizations- Sole Proprietorship- Partnership – Joint Stock Companies - Public Sector Enterprises – New Economic Environment- Economic Liberalization – Privatization - Globalization. GST and Demonetization.

LO1 Students can understand about different types of Market structures.

LO2 They are able to find what are the determines of different markets.

LO3 Able to get information about various Pricing strategies.

LO4 Students can understand about various business structures in India.

UNIT IV

INTRODUCTION TO FINANCIAL ACCOUNTING AND ANALYSIS

Financial Accounting – Concept - Emerging need and Importance - Double-Entry Book Keeping- Journal- Ledger – Trial Balance - Financial Statements - Trading Account – Profit & Loss Account – Balance Sheet (with simple adjustments). Financial Analysis – Ratios – Liquidity, Leverage, Profitability, and Activity Ratios (simple problems).

LO1 It explains basic concepts of Accounting.

LO2 Students can understand preparation of Final Accounts.

LO3 It describes the cycle of Accounting.

LO4 Students can understand the importance of Ratios in measuring the financial position of a company.

UNIT V

CAPITAL AND CAPITAL BUDGETING

Concept of Capital - Over and Undercapitalization – Remedial Measures - Sources of 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)

LO1 Students are able to understand the procurement of funds and its effective utilisation.

LO2 It describes the Time value of money.

LO3 Students are able to understand the difference between working capital and capital budgeting.

LO4 Students can understand the various types of finance.

TEXT BOOKS:

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

REFERENCES

1. Managerial Economics and Financial Analysis, 1/e, Aryasri, TMH, 2013.
2. Managerial Economics and Financial Analysis, S.A. Siddiqui and A.S. Siddiqui, New Age International, 2013.
3. Accounting and Financial Mangement, T.S.Reddy & Y. Hariprasad Reddy, Margham

Course Outcomes

CO1 Should be able to understand managerial economics and demand analysis.

CO2 Should be able to analyze decisions relating to production and cost analysis.

CO3 Should be able to evaluate market structures and forms of business.

CO4 Should be able to assess financial statements and ratios.

CO5 Should be able to apply capital budgeting methods.

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B.Tech – III Sem **L T P C**

3 0 0 3

(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, 13th Edition, Himalaya Publishers.
2. N.D.Kapoor (2019), Elements of Mercantile Law, 38th 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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B.Tech – III Sem **L T P C**

3 0 0 3

(BA20AHS303) ORGANIZATIONAL BEHAVIOUR

Course Objective: To Provide the Student with a Background of Various Environment Factors that has 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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B.Tech-III Sem

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0	0	3	1.5

(EE20APC303) DC MACHINES & TRANSFORMERS LAB

Course Objectives:

- To conduct various experiments on DC motors and DC Generators
- To conduct various experiments on the speed control techniques of DC motors.
- To conduct various experiments for testing on 1-phase transformers

Experiments:

1. Magnetization characteristics of DC shunt generator.
2. Load test on DC shunt generator.
3. Brake test on DC shunt motor.
4. Swinburne's test on DC shunt motor.
5. Speed control of DC shunt motor (Armature control and Field control method).
6. Hopkinson's tests on DC shunt machines.
7. OC and SC test on single phase transformer
8. Parallel operation of single phase transformers.
9. Sumpner's test on single phase transformers.
10. Load test on DC compound generator.
11. Separation of core losses in DC shunt motor.
12. Separation of core losses of single phase transformer
13. 3 - Phase transformers Connections & relationship.

Note: **Minimum TEN experiments from the following list are required to be conducted.**

References:

1. D. P. Kothari and B. S. Umre, Laboratory Manual for Electrical Machines, I.K International Publishing House Pvt. Ltd., 2017.

Course Outcomes:

- Able to conduct and analyze load test on DC shunt generator.
- Able to understand and analyze magnetization characteristics of DC shunt generator.
- Able to understand and analyze speed control techniques and efficiency of DC machines.
- Able to understand to predetermine efficiency and regulation of single-phase Transformers.

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B.Tech-III Sem

L	T	P	C
0	**0**	**3**	**1.5**

(EC20APC308) SEMICONDUCTOR DEVICES & CIRCUITS LAB (EEE)

Course Objectives:

- To verify the theoretical concepts practically from all the experiments.
- To analyze the characteristics of Diodes, BJT and FET
- To design the amplifier circuits from the given specifications.
- To Model the electronic circuits using tools such as PSPICE / MULTISIM.

PART A: Electronic Workshop Practice

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of active devices, Diodes, BJTs, JFETs, LEDs, LCDs, SCR, UJT.
3. Soldering Practice- Simple circuits using active and passive components.
4. Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multimeter, Function Generator, Regulated Power Supply and CRO.

PART B: List of Experiments:

Note: Experiments (1-8) shall be conducted on hardware and any four experiments shall be conducted using licensed PSPICE / MULTISIM software.

1. Verification of Volt- Ampere characteristics of a PN junction diode and find static, dynamic resistances under forward bias and reverse bias of the diode from the graphs obtained.
2. Verification of Volt- Ampere characteristics of a Zener diode and find Breakdown voltage, static and dynamic resistances of the diode from the graphs obtained.

3. Design a full wave rectifier for the given specifications with and without filters, and verify the given specifications experimentally. Vary the load and find ripple factor. Draw suitable graphs.
4. Verification of the input and output characteristics of BJT in Common Emitter configuration experimentally and find required h – parameters from the graphs.
5. Verification of the input and output characteristics of FET in Common source configuration experimentally and find drain resistance , Transconductance & amplification factor h – parameters from the graphs.
6. Verification of the characteristics of UJT experimentally, and determine intrinsic standoff ratio
7. Design a small signal amplifier using BJT (common emitter) for the given Specifications. Draw the frequency response and find the bandwidth.
8. Design a small signal amplifier using FET (common source) for the given specification. Draw the frequency response and find the bandwidth.

Tools/Equipment Required: Software Tools like MULTISIM/ PSPICE or Equivalent, DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices.

Course Outcomes:

After the completion of the course students will able to:

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

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

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

CO4: Design FET/ BJT based amplifiers for the given specifications (L4).

CO5: Simulate all circuits in PSPICE/MULTISIM (L5).

B.Tech -III Sem | **L T P C** | **0 0 3 1.5**

(EE20APC304) CONTROL SYSTEMS & SIMULATION LAB

Course Objectives:

- Determination of transfer functions of various systems and control of it by different methodologies.
- To provide knowledge in the analysis and design of controllers and compensators.
- The characteristics of servo mechanisms which are helpful in automatic control systems.
- To know the stability analysis using MATLAB.

Any SIX of the following experiments are to be conducted:

1. Time response of Second order system
2. Characteristics of Synchros.
3. Programmable logic controller – Study and verification of truth tables of logic gates, simple Boolean expressions and application of speed control of motor.
4. Effect of feedback on DC servo motor.
5. Transfer function of DC Machine.
6. Effect of P, PD, PI, PID Controller on a second order system.
7. Lag and lead compensation – Magnitude and phase plot.
8. Characteristics of magnetic amplifiers.
9. Characteristics of AC servo motor.

Any FOUR simulation experiments are to be conducted:-

1. PSPICE simulation of Op-Amp based Integrator and Differentiator circuits.
2. Linear system analysis (Time domain analysis, Error analysis) using MATLAB.
3. Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant system using MATLAB
4. State space model for classical transfer function using MATLAB – Verification.
5. DC Motor Control
6. Temperature controller using PID

References:

1. M.H.Rashid, "Simulation of Electrical and electronics Circuits", using PSPICE, M/s PHI Publications.
2. PSPICE A/D user's manual – Microsim, USA.
3. MATLAB and its Tool Books user's manual and – Mathworks, USA.

Course Outcomes:

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

- Get the knowledge of feedback control and transfer function of DC servo motor.
- Model the systems and able to design the controllers and compensators.
- Get the knowledge about the effect of poles and zeros location on transient and steady state behaviour of second order systems and can implement them to practical systems and MATLAB.
- Determine the performance and time domain specifications of first and second order systems.

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B. Tech-III Sem **L T P C**

1 0 2 2

(IT20ASC301) APPLICATION DEVELOPMENT USING PYTHON

(ECE, EEE, ME, CE)

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 data types 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 function

Task:

1) Write a program to find factorial of a number using recursion.

2) Write a program to define a module to find Fibonacci 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 i^{th} 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 tuple 4) Access items

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:

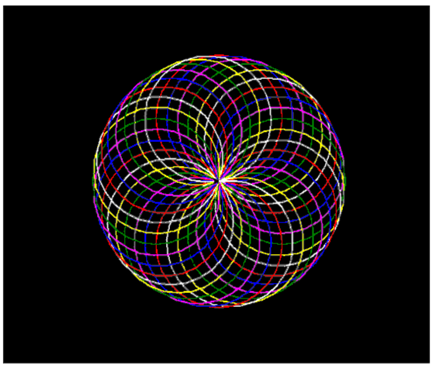
Understanding Python modules, Turtle module.

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.

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)

Reference Books:

1. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd edition,O'Reilly,2016.Or
http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf

2. Paul Barry, "Head First Python a Brain Friendly Guide" 2nd Edition, O'Reilly, 2016

3. Dainel Y.Chen "Pandas for Everyone Python Data Analysis" Pearson Education, 2019

Online Learning Resources/Virtual Labs:

- www.turorialspot.com
- www.sanoundary.com

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B.Tech–III Sem **L T P C**

2 0 0 0

(CH20AMC301) BIOLOGY FOR ENGINEERS

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 I: Introduction to Basic Biology

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

Unit Outcomes:

After completing this unit, the student will be able to

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

Unit II: Introduction to Biomolecules

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

Unit Outcomes:

After completing this unit, the student will be able to

- Understand what are biomolecules? their role in living cells, their structure, function and how they are produced. (L1)

- Interpret the relationship between the structure and function of nucleic acids. (L2)
- Summarize the applications of enzymes in industry. (L3)
- Understand what is fermentation and its applications of fermentation in industry. (L4)

Unit III: Human Physiology

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

Unit Outcomes:

After completing this unit, the student will be able to

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

Unit IV: Introduction to Molecular Biology and recombinant DNA Technology

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

Unit Outcomes:

After completing this unit, the student will be able to

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

Unit V: Application of Biology

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

Unit Outcomes:

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

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

Course Outcomes:

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

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

Text books:

1. P.K.Gupta, Cell and Molecular Biology, 5th Edition, Rastogi Publications -

2. U. Satyanarayana. Biotechnology, Books & Allied Ltd 2017

Reference Books:

1. N. A. Campbell, J. B. Reece, L. Urry, M. L. Cain and S. A. Wasserman, "Biology: A Global Approach", Pearson Education Ltd, 2018.

2. T Johnson, Biology for Engineers, CRC press, 2011

3. J.M. Walker and E.B. Gingold, Molecular Biology and Biotechnology 2nd ed.. Panima Publications. PP 434.

4. David Hames, Instant Notes in Biochemistry –2016

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

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B.Tech-III Sem

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2	**0**	**0**	**0**

(MA20AMC301) LOGICAL SKILLS FOR PROFESSIONALS-II

(Mandatory Course)

Course Objectives:

- To learn the basic methods to find HCF, LCM Factors, Simplification, Pipes, Alligation or Mixture, Table, Bar Graphs and Pie Chart concepts.
- To understand the logic behind the Syllogism, Calender, Clocks and Number Series Analogy concepts.

UNIT 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.

Text Books:

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

Reference Books:

1. Quantitative Aptitude for Competitive Examinations, 14/e, 2010, Abhijit Guha, Tata McGraw Hill Publishers, New Delhi.
2. Course in Mental Ability & Quantitative Aptitude, 3/e, 2012, Edgar Thorpe, Tata McGraw Hill Publishers, New Delhi.

3. Fast Track Objective Arithmetic, 2012, Rajesh Verma, Arihant Publications,Meerut.
4. Reasoning and Aptitude, 2013, Nem Singh, Made Easy Publications, New Delhi.

Course Outcomes:

CO1: Demonstrate knowledge basic mathematics to develop analytical skills to solving problems of HCF, LCM Factors and Simplification.

CO2: Demonstrate knowledge basic mathematics to develop analytical skills to solving problems of Pipes, Alligation or Mixture.

CO3: Demonstrate knowledge basic mathematics to develop analytical skills to solving problems of Table, Bar Graphs and Pie Chart.

CO4: Analyze the techniques in Syllogism.

CO5: Analyze the techniques in Calender, Clocks and Number Series Analogy concepts.

B.Tech-III Sem	**L**	**T**	**P**	**C**
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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 – I

- Greetings-Introducing oneself and others
- Just A Minute (JAM) & Role play
- Prepositions, Word formation

Learning Outcomes:

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

- Respond general questions on familiar topics by introducing one self and others
- Comprehend short talks on general topics.
- Use grammatical structures effectively and meaningfully

UNIT – II

- Oral Presentations – Technical presentations
- Letter Writing- Formal and Informal, Email Writing
- Articles, Punctuation

Learning Outcomes:

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

- Make formal oral presentations using effective strategies

- Write formal letters and e-mail writing appropriately in formal contexts without any mistakes
- Use articles and use punctuation contextually

UNIT – III

1. Communication – Verbal and Non- verbal communication
2. Telephone Etiquettes
3. Tenses, Subject-verb agreement, Prefixes & suffixes

Learning Outcomes:

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

- Understand non-verbal features of communication and hold Formal & informal conversations
- Use correct tense forms and structures in speech and writing
- Use grammatical structures aptly.

UNIT – IV

- Resume Writing and Technical Report writing
- Book/Film review
- Synonyms and Antonyms, Vocabulary building

Learning Outcomes:

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

- Write Resume appropriately and ready for an interview.
- Review a book/film
- Edit short texts by correcting errors

UNIT – V

1. Group Discussions
2. Debate
3. Interview Skills

Learning Outcomes:

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

- Participate in formal & informal discussions and speak clearly on a specific topic
- Understand how to face interviews effectively.
- Comprehend, discuss and respond to academic texts orally and in writing

Course Outcomes (CO):

- 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.

Textbooks:

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

Reference Books:

1. Chase R. Tarver & Kristin L. Johannsen, Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
2. Meenakshi Raman, Technical Communication, Oxford University Press, 2008
3. Raymond Murphy, English Grammar in Use, Cambridge University Press, 4th Edition, 2012.

B. Tech II Year II Semester

Syllabus

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B.Tech- IV Sem

L	T	P	C
3	0	0	3

(CS20AES401)DATASTRUCTURES USING C

(ECE, EEE, ME, CE)

Course Objectives:

- To familiarize with basic techniques of algorithm analysis.
- To familiarize Stacks, Queues using Arrays and Linked List.
- To Understand Searching and Sorting techniques.
- To learn the concepts of different types of trees and its operations.
- To familiarize with graph algorithms.

Unit-1:

Data Structures: Introduction to Data Structures, Time and Space Complexity, Asymptotic Notations. Stack, Stack operations, Implementation using arrays, Applications of stack, Queue, Queue operations, Implementation using arrays, various Queue Structures, Applications of queue.

Learning Outcomes:

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

- Analyze the given algorithm to find the time and space complexities.(L4)
- Develop the applications of stack and queue using arrays.(L3)

Unit-2:

Linked lists: Single linked list, double linked list, Circular linked list, operations on linked lists, Applications of Linked List. Implementation of Stack using Pointers, Implementation of Queue using Pointers.

Learning Outcomes:

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

- Implement Stack and Queues using Pointers.(L3)
- Construct the linked lists for various applications.(L4)

Unit-3:

Searching Techniques: Linear Search and Binary Search.

Sorting Techniques: Selection Sort, Insertion sort, Merge Sort, Quick Sort, Heap sort.

Learning Outcomes:

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

- Select sorting technique for a given sorting.(L3)
- Construct Heap and its implementation.(L4)

Unit-4:

Trees: Vocabulary and Definitions, Binary Tree, Implementation, Binary Tree Traversal, Binary Search Tree, Implementation, Heap Trees.

Learning Outcomes:

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

- Explain the concept of a tree.(L2)
- Compare different tree structures.(L4)
- Apply Trees for indexing.(L3)

Unit-5:

Graph Theory: Graphs Terminology, Graph Traversals, Shortest Paths, Minimum Spanning Trees- Prims' Algorithm, Kruskal's Algorithm.

Learning Outcomes:

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

- Recognize the importance of Graphs in solving real world problems.(L2)
- Apply various graph traversal methods to applications.(L3)
- Design a minimum cost solution for a problem using spanning trees.(L4)

Text Books:

1. Data Structures and Algorithm Analysis in C, Mark Allen Weiss,Second Edition, 2002,Pearson.
2. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, Third Edition, 2010,PHI.
3. Data Structures and Algorithms Made Easy by Narasimha Karumanchi, 2020, Career Monk Publications.

Reference Books:

1. Fundamental of Data Structures in C, Horowitz, Sahani, Anderson-Freed, Second Edition, 2008, Universities Press.
2. Classic Data Structures, Debasis 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)
- Implementtreestructuresindifferentpatternsofrepresentationofdata.(L3)
- Analyze the given problem using graph traversal techniques.(L4)

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B.Tech- IV Sem

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3	**0**	**0**	**3**

(MA20ABS401) NUMERICAL METHODS, PROBABILITY AND STATISTICS
(Common to CIVIL, ME, EEE, CSE, AI&ML, IT)

Course Objectives:

- To familiarize the students with numerical methods of solving the non-linear equations, interpolation, differentiation, integration, and ordinary differential equations.(L2)
- To impart knowledge in basic concepts and few techniques in probability and statistics in various applications in engineering.(L3)

UNIT– 1: Solution to algebraic and transcendental equations& Interpolation:

Solution of algebraic and transcendental equations: Bisection method, Newton-Raphson method and Regula-Falsi method.

Interpolation: Newton's forward and backward difference formulae. Interpolation with unequal intervals: Lagrange's formulae.

Learning Outcomes:

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

- Find approximate roots of an equation by using different numerical methods(L3)
- Explain various discrete operators and find the relation among operators(L2)
- Apply Newton forward and backward formulas for equal intervals(L3)

UNIT – II: Numerical differentiation, integration &Solution of Initial Value Problems to Ordinary Differential Equations of first order:

Numerical differentiation using Newton's forward & backward interpolation formulae; Numerical Integration by trapezoidal rule, Simpson's $1/3^{rd}$ 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 – III: Probability & Random Variables:

Probability axioms, addition law, conditional probability, Baye’s theorem.
Random variables (discrete and continuous), probability distribution: Binomial - Poisson and Normal distribution-their properties. (All concepts without proofs)

Learning Outcomes:

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

- Explain the basic concepts of probability theory and elementary theorems on probability.(L2)
- Apply the knowledge of discrete random variable and continuous random variable and the respective probability distributions.(L3)

UNIT – IV: Testing of hypothesis:

Formulation of hypothesis, critical region, level of significance. Large sample tests: test for single proportion, difference of two proportions, test for single mean and difference of two means.

Learning Outcomes:

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

- Explain the concept of testing of hypothesis(L2)
- Apply the concept of hypothesis testing for large samples(L3)

UNIT – V: Small Sample Tests:

Student t-distribution (single mean, two means and paired t-test), Testing of equality of variances (F-test), $\chi 2$ - 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)

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017, 44th edition.
2. Miller and Freunds, Probability and Statistics for Engineers,7/e, Pearson, 2008

3. S.S.Sastry, "Introductory methods of Numerical Analysis", 5th edition, PHI, 2012.
4. Advanced Engineering Mathematics, R K Jain and S R K Iyengar, Narosa Publishing House, New Delhi.

Reference Books:

1. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons
publications, 2012.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9/e, John Wiley & Sons, 2006.
3. Kandasamy, K. Thilagavathy, S. Gunavathy, Numerical Methods, S. Chand & Company, 2nd
Edition, Reprint 2012.
4. S. Ranganatham, Dr. M. V. S. S. N. Prasad, Dr. V. Ramesh Babu, Numerical Analysis, S. Chand
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

CO1: Apply different methods to find roots of algebraic and transcendental equations. (L3)

CO2: Apply different methods to find approximate solution of ordinary differential equations and Numerical Integration. (L3)

CO3: Analyse the concepts of probability and their applications. (L4)

CO4: Apply discrete and continuous probability distributions in practical problems. (L3)

CO5: Analyse the statistical inferential methods based on small and large sampling tests. (L4)

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(EE20APC401) ROTATING AC MACHINES

Course Objectives:

The student will be able to:

- Understand the fundamentals of AC machines, know equivalent circuit performance characteristics.
- Understand the methods of starting of Induction motors.
- Understand the methods of starting of Synchronous motors.
- Understand the parallel operation of Alternators.

UNIT-I Induction Machines

Operating principle, Construction, Types (squirrel cage and slip-ring), Starting and Maximum Torque, Equivalent circuit, Phasor Diagram, Torque-Slip Characteristics, power flow in induction machines, Losses and Efficiency, No load and blocked rotor test, Circle diagram-performance characteristics, Numerical problems. Methods of starting, braking and speed control for induction motors, Doubly-Fed Induction Machines, crawling and cogging.

Learning Outcomes:

By the end of the unit, student will be able to:

- Understand the construction, types, equivalent circuit, torque slip characteristics and
  various losses present in an induction machine.(L2)
- Analyze the phasor diagram, efficiency, starting and maximum torque, effect of parameter variation on torque speed characteristics(L3)
- Apply above concepts to solve numerical problems.(L4)

UNIT-II Single-phase induction motors

Constructional features, double revolving field theory, equivalent circuit, determination of parameters. Split-phase starting methods and its applications, capacitor start, Capacitor start-run and Permanent Split Capacitor single phase motors, Shaded Pole Motor.

Learning Outcomes:

By the end of the unit, student will be able to:

- Understand induction generator operation, self-excitation, doubly fed induction(L2)
- machines, various methods of starting, braking and speed control of induction motors.(L2)
- Understand the constructional features, principle involved, equivalent circuit of single(L2)
- phase induction motor and various starting methods and its applications(L2)
- Apply above concepts to solve numerical problems.(L4)

UNIT-III Synchronous generators

Constructional features, cylindrical rotor synchronous machine - generated EMF, equivalent circuit and phasor diagram, armature reaction, synchronous impedance, voltage regulation- EMF, MMF, ZPF and ASA methods. Operating characteristics of synchronous machines, Salient pole machine - two reaction theory, analysis of phasor diagram, power angle characteristics. Parallel operation of alternators - synchronization and load division.

Learning Outcomes:

By the end of the unit, student will be able to:

- Understand the constructional features, emf generated, equivalent circuit, armature reaction, voltage regulation, characteristics, two reaction theory of synchronous machine. (L2)
- Analyze the phasor diagrams, parallel operation of alternators, synchronization and load division of synchronous generators. (L4)
- Apply above concepts to solve numerical problems.(L4)

UNIT-IV: Synchronous motors

Principle of operation, methods of starting, Phasor diagram of synchronous motor, variation of current and power factor with excitation, Predetermination of V and inverted V curves, Hunting and use of damper bars, Synchronous condenser and power factor correction, Excitation and power circles.

Learning Outcomes:

By the end of the unit, student will be able to:

- Understand the principle of operation, methods of starting, concept of hunting, synchronous condenser and power factor correction of synchronous motors.(L2)

- Analyze the phasor diagram, determination of V and inverted V curves and power circles of synchronous motor. (L4)
- Apply above concepts to solve numerical problems. (L4)

UNIT-V: Special motors

Special Motors: Principle of operation - BLDC motors, reluctance motors – Hysterisis Motor, AC servomoto, Synchros, Stepper Motors, Universal Motor – Characteristics, Applications

Learning Outcomes:

By the end of the unit, student will be able to:

- Understand the principal of operation of Special motors (L2)
- Applications of Special motors(L2)

Text Books:

1 P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.
2. A. S. Langsdorf, "Alternating current machines", McGraw Hill Education, 1984.
3. Introduction to Electrical Engineering – M.S Naidu and S. Kamakshaiah, TMH Publ.

References:

1. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.
2. I. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.
3. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", McGraw Hill Education,2013.
4. P. C. Sen, "Principles of Electric Machines and Power Electronics", John Wiley & Sons, 2007.
5. Essentials of Electrical and Computer Engineering - David V. Kerns, JR. J. David Irwin

Course Outcomes:

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

- Understand the basics of ac machine windings, construction, principle of working, equivalent circuit of induction and synchronous machines.

- Analyze the phasor diagrams of induction and synchronous machines, parallel operation of alternators, synchronization and load division of synchronous generators.
- Apply the concepts to determine V and inverted V curves and power circles of Synchronous motor.
- Analyze the various methods of starting in both induction and synchronous machines.
- Analyze the concepts and applications of single phase induction machines.

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B.Tech- IV Sem

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3	0	0	3

(EC20AES301) DIGITAL ELECTRONICS & MICROPROCESSORS (EEE)

Course Objectives:

- To understand all the concepts of Logic Gates and Boolean Functions.
- To understand about Combinational Logic and Sequential Logic Circuits
- To Create Combinational logic circuits using Programmable Logic Devices.
- To understand the concepts of 8085, 8086 Microprocessor and 8051 Microcontroller.
- To Analyze Assembly Language Programming of 8086 & 8051.

Unit 1

Number systems and Boolean Algebra: Digital Systems, Introduction to number systems and conversion, Binary codes, Complements, signed and unsigned Binary numbers, Boolean Algebra and its properties, Simplification of Boolean functions, SOP and POS methods – Simplification of Boolean functions using K-maps and realization using Universal Gates.

Learning Outcomes:

- Explain number systems and convert number systems. (L2)
- Explains the simplification of logical statements with using boolean rules and de-morgan theorems(L2)
- Understand the simplification of logical statements with karnaugh maps (L2)

Unit 2

Combinational Logic Circuits : Adders & Subtractors, 4- bit binary adder and Subtractor , Decoders, Encoders ,Multiplexers, Demultiplexers, Programmable Logic devices-PROM,PAL,PLA, Design of combinational circuits using PLD's.

Learning Outcomes:

- Analyze combinational logic circuits (L4)
- Understand and Analyze the working principle of encoders ,decoders(L2)
- Design combinational circuits using PLD's.(L6)

Unit 3

Sequential Logic Circuits : Sequential Circuits, Latches ,Flipflops: RS, D, JK, Master Slave JK, T Flip-Flops, Shift Registers, Types of Shift Registers, Universal Shift registers ,Counters, Synchronous Counters, Asynchronous Counters, Up-Down Counter

Learning Outcomes:

- Analyze sequential circuits(L4)
- Understand and Analyze the counters (L2)

Unit 4

Introduction to 8085 & 8086 Microprocessor: 8085 microprocessor Review (brief details only), 8086 Architecture –Block Diagram, register organization 8086, Flag register of 8086 and its functions, Pin diagram of 8086, Minimum mode & Maximum mode operation of 8086, Interrupts in 8086, Addressing modes of 8086.

Learning Outcomes:

- To understand the concepts of 8085, 8086 Microprocessor (L2).
- To understand the addressing modes of 8086 Microprocessor (L2).

Unit 5

Instruction Set of 8086 Microprocessor: Instruction set of 8086, Assembler directives, Procedures and Macros, Simple programs involving arithmetic, logical, branch instructions, Ascending, Descending and Block move programs, String Manipulation Instructions.

Introduction to 8051 Microcontrollers: Overview of 8051 microcontroller, Architecture, Register set of 8051, Memory organization, Addressing modes & instruction set of 8051, Simple programs.

Learning Outcomes:

- Distinguish and analyze between Microprocessor and Microcontrollers.(L4)
- Understand the concepts of 8051 microcontroller.(L2)
- Apply knowledge and demonstrate programming proficiency using various addressing modes and instruction sets of 8086 & 8051 (L3)

Text Books:

1. M. Morris Mano, Michael D. Ciletti, Digital Design, Pearson Education, 5th Edition, 2013
2. Advanced microprocessors and peripherals-A.K Ray and K.M. Bhurchandani, TMH, 2 nd edition, 2006

References:

1. Switching Theory and Logic Design –A. Anand Kumar,PHI learning Pvt.Ltd.2013.

2. N.Senthil Kumar, M .Saravanan ,S.Jeevanathan ,Microprocessor and Microcontrollers, Oxford Publishers,2010.

Course Outcomes:

After the completion of the course, students will able to

After the completion of the course, students will able to

CO1: Understand the concept of Logic circuits and analyze various Boolean algebra functions.

CO2: Analyze the Combinational Logic Circuits

CO3: Analyze the Sequential Logic Circuits.

CO4: To understand the concepts of 8085, 8086 Microprocessor and 8051 Microcontroller.

CO5: Apply knowledge and demonstrate programming proficiency using various addressing modes and instruction sets of 8086 & 8051.

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B.Tech- IV Sem

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(EE20APC402) ELECTROMAGNETIC FIELD THEORY

Course Objectives:

- To understand the basic principles of electrostatics
- To understand the basic principles of magneto statics for time invariant and time varying fields
- To understand the principles of dielectrics, conductors and magnetic potentials

UNIT – I: ELECTROSTATICS

Basics of Vector Algebra & Calculus, Electrostatic Fields - Coulomb's Law - Electric Field Intensity (EFI) due to Line, Surface and Volume charges- Work Done in Moving a Point Charge in Electrostatic Field-Electric Potential due to point charges, line charges and Volume Charges - Potential Gradient - Gauss Law -Maxwell's First Law – Numerical Problems.

Laplace and Poisson Equations. Electric Dipole - Dipole Moment - Potential and EFI due to Electric Dipole - Torque on an Electric Dipole in an Electric Field – Numerical Problems.

Unit Outcomes:

- Able to Determine electric field and potentials using Coulomb's law & Gauss law (L2).
- Analyse Potential differences for different configurations.(L2)
- Able to Classify static electric magnetic fields in different engineering situations.(L3)
- Able to Determine the Concepts of Electric dipole, Electrostatic Energy and Energy
  density. (L4)

UNIT – II: CONDUCTORS AND DIELECTRICS

Behaviour of Conductors in an Electric Field-Conductors and Insulators – Electric Field Inside a Dielectric Material – Polarization – Conductor and Dielectric Boundary

Conditions – Capacitance-Capacitance of Parallel Plate, Spherical & Co-axial capacitors – Energy Stored and
Energy Density in a Static Electric Field – Current Density – Conduction and Convection Current Densities – Ohm's Law in Point Form – Equation of Continuity – Numerical Problems.

Unit Outcomes:

- Analyze the Concepts of Conduction and Convection currents.(L4)
- Understand the concept of capacitance for parallel plates, spherical & co-axial capacitors.(L2)
- Able to Calculate Energy stored and energy density in a static electric fields.(L4)

UNIT – III: MAGNETO STATICS

Static Magnetic Fields – Biot-Savart Law – Oersted's experiment – Magnetic Field Intensity (MFI) due to a Straight, Circular & Solenoid Current Carrying Wire – Maxwell's Second Equation. Ampere's Circuital Law and its Applications Viz., MFI Due to an Infinite Sheet of Current and a Long Current Carrying Filament – Point Form of Ampere's Circuital Law – Maxwell's Third Equation – Numerical Problems.
Magnetic Force –– Lorentz Force Equation – Force on Current Element in a Magnetic Field - Force on a Straight and Long Current Carrying Conductor in a Magnetic Field - Force Between two Straight and Parallel Current Carrying Conductors – Magnetic Dipole and Dipole moment – A Differential Current Loop as a Magnetic Dipole – Torque on a Current Loop Placed in a Magnetic Field – Numerical Problems.

Unit Outcomes:

- Analyze the Concepts of Magnetic field intensity using Biot-Savart Law & Ampere Law.(L4)
- Able to understand Maxwell's equations.(L2)
- Develop MFI due to an infinite sheet of current and a long filament carrying conductor in different loops.(L4)

UNIT – IV: MAGNETIC POTENTIAL

Scalar Magnetic Potential and Vector Magnetic Potential and its Properties - Vector Poisson's Equations. Self and Mutual Inductances –Neumann's Formulae – Determination of Self Inductance of a Solenoid and Toroid and Mutual Inductance

Between a Straight, Long Wire and a Square Loop Wire in the Same Plane – Energy Stored and Intensity in a Magnetic Field – Numerical Problems.

Unit Outcomes:

- Understand scalar magnetic potential and vector magnetic potential and its applications. (L2)
- Able to calculate the magnetic forces and torque produced by currents in Magnetic Field.(L3)
- Ability to calculate self and mutual Inductances. (L3)
- Analyse the concepts of Magnetic boundary conditions & Energy stored in the Magnetic field.(L4)

UNIT – V: TIMEVARYING FIELDS

Faraday's Law of Electromagnetic Induction – It's Integral and Point Forms – Maxwell's Fourth Equation. Statically and Dynamically Induced E.M.F's – Simple Problems – Modified Maxwell's Equations for Time Varying Fields – Displacement Current.

Wave Equations – Uniform Plane Wave Motion in Free Space – Velocity, Wave Length, Intrinsic Impedance and Skin Depth – Poynting Theorem – Poynting Vector and its Significance.

Unit Outcomes:

- Acquires knowledge on time varying fields & Faraday's law for Electromagnetic Induction.(L2)
- Analyse the Concepts Maxwell's Equations in Different Forms.(L3)
- Understand the Concepts Calculation of Poynting vector & Theorem.(L2)
- Analyse the Concepts of Wave Theory.(L4)

Text Books:

1. Sadiku, Kulkarni, "Principles of Electromagnetics", 6th Edition, Oxford University Press, 2015
2. William.H.Hayt, "Engineering Electromagnetics", McGraw Hill, 2010.

Reference Books:

1. J.D.Kraus, "Electromagnetics", 5th Edition, McGraw Hill Inc, 1999.
2. David K. Cheng, "Field & Electromagnetic Waves", 2nd Edition, 1989.

3. Joseph A. Edminister, “Electromagnetics”, 2nd Edition, Schaum’s Outline, McGraw Hill, 2017.
4. K.A. Gangadhar and P.M. Ramanathan, “Electomagnetic Field Theory”, 8th Reprint, Khanna Publications, 2015.

Course Outcomes (CO):

After completion of the course, the student will be able to:

- Apply the Knowledge of basic principles, concepts and fundamental laws like Colulomb's, Gauss's etc., of Electrostatics.
- Understand the behaviour of conductors and Dielectric material in a Electric field and to evaluate the capacitance of parallel spherical & Co-axial capacitors.
- Apply the Knowledge of basic principles, concepts and fundamental laws like Biot-Savart's, Ampere's Circuital etc., of Magnetostatics.
- Evaluate self-Inductance of a Solenoid, Toroid and Mutual Inductance by uisng Neumann's Formulae.
- Evaluate the quantities associated with uniform plane wave motion in different media of transmission.

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B.Tech -IV Sem	**L T P C**
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(CS20AES402) DATASTRUCTURES LAB

(ECE, EEE, ME, CE)

Course Objectives:

- To strengthen the ability to identify and apply the suitable data structure for the given real-world problem.

Tasks:

1. Demonstrate recursive algorithms with examples.
2. Develop a program to perform operations of a Stack and Queue using arrays.
3. Implement and perform different operations on Single, Double and Circular Linked Lists.
4. Develop a program to perform operations of Stack and Queue using Linked Lists.
5. Develop a program to implement Stack applications.
6. Implement Circular Queues.
7. Implement various Searching techniques.
8. Develop programs for different Sorting techniques.
9. Develop a program to represent a Tree Data Structure.
10. Develop a program to demonstrate operations on Binary Search Tree.
11. Demonstrate Graph Traversal Techniques.

Text Books:

1. Data Structures and Algorithm Analysis in C, Mark Allen Weiss, Second Edition, 2002, Pearson.
2. Introduction to Algorithms, ThomasH.Cormen, CharlesE.Leiserson, RonaldL.Rivest, Clifford Stein, Third Edition, 2010, PHI.
3. Data Structures and Algorithms Made Easy by Narasimha Karumanchi, 2020, Career Monk Publications.

Course Outcomes:

- Demonstrate the concept of Recursion for solving a problem.(L4)
- Choose and implement linear data structure to solve problems.(L3)
- Develop programs for searching and sorting algorithms.(L3)
- Select and implement suitable non linear data structure for solving a problem. (L3)

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(EC20AES302) DIGITAL ELECTRONICS & MICROPROCESSORS LAB (EEE)

Course Objectives:

- To understand and analyze the concepts of Logic Gates and Boolean functions.
- To understand and analyze Combinational Logic and Sequential Logic Circuits .
- To understand and analyze the logic circuits using Programmable Logic Devices.
- Apply knowledge and demonstrate programming proficiency using various addressing modes and instruction sets of 8086 & 8051.

List of Experiments:

Note: Minimum of 12 experiments shall be conducted from both the sections:

Hardware: DIGITAL ELECTRONICS (Any 6 Experiments):

1. Realization of NOT, AND, OR, EX-OR gates with only Universal gates.
2. Karnaugh map Reduction and Logic Circuit Implementation.
3. Verification of DeMorgan's Laws.
4. Implementation of Half-Adder and Half-Subtractor.
5. Implementation of Full-Adder and Full-Subtractor.
6. Four Bit Binary Adder
7. Implementation of 4*1 Multiplexer and 8*1 Multiplexer.
8. Verification of state tables of D flip-flop, JK flip-flop, T flip-flop.

Software: MICROPROCESSORS & MICROCONTROLLERS (Any 6 Experiments)

1 .Programs using arithmetic and logical operations

2. Programs for code conversions.
3. ASCII Arithmetic Addition and Subtraction.
4. Searching for an element in an Array.
5. Sorting in Ascending and Descending Orders.
6. Finding Largest and Smallest elements from an array.
7. Reversing a string.

8. String Comparison
9. Block Move**.**
10. Arithmetic and logical operations using 8051,
11. Sorting in Ascending and Descending Orders using 8051,

Course Outcomes:

After Completion of this course, the student will be able to:

CO1: Analyze the concepts of Logic Gates and Boolean functions.

CO2: Analyze Combinational Logic and Sequential Logic Circuits.

CO3: Analyze the logic circuits using Programmable Logic Devices.

CO4: Apply knowledge and demonstrate programming proficiency using various addressing modes and instruction sets of 8086 & 8051.

Equipment Required:

1. Hardware kits.
2. TASM
3. 8051 kits.
4. Personal computer with necessary peripherals

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(EE20APC403) AC MACHINES LAB

Course outcomes:

By the end of the course, the student will be able to:

- Analyze and apply load test, no-load and blocked-rotor tests for construction of circle diagram and equivalent circuit determination in a single phase induction motor.
- Predetermine regulation of a three-phase alternator by synchronous impedance & m.m.f methods.
- Predetermine the regulation of Alternator by Zero Power Factor method X_d and X_q determination of salient pole synchronous machine.
- Evaluate and analyze V and inverted V curves of 3 phase synchronous motor

The following experiments are required to be conducted as compulsory experiments:

1. O.C. & S.C. Tests on Single phase Transformer.
2. Sumpner's Test on a Pair of identical Single Phase Transformers
3. Scott Connection of Transformers
4. Equivalent Circuit of Single Phase Induction Motor
5. Brake Test on Three Phase Induction Motor
6. No-Load & Blocked Rotor Tests on Three Phase Induction Motor
7. Regulation of Three –Phase Alternator by Synchronous Impedance & M.M.F Methods
8. V and Inverted V Curves of 3 Phase Synchronous Motor.
9. Load test on single phase Transformer
10. Load test on single phase induction motor
11. Separation of core loss of three phase induction motor

In addition to the above eight experiments, at least any two of the following experiments are required to be conducted:

1. Parallel Operation of Single Phase Transformers
2. Separation of Core Losses of Single Phase Transformer
3. Determination of X_d and X_q of Salient Pole Synchronous Machine
4. Regulation of Three-Phase Alternator by Z.P.F. and A.S.A Methods

Reference Book:

1. D. P.Kothari and B. S. Umre, “Laboratory Manual for Electrical Machines” I.KI International Publishing House Pvt. Ltd, 2017.

2. D.R. Kohli and S.K. Jain, “A Laboratory Course in Electrical Machines” NEM Chand & Bros.

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B.Tech IV Sem **L T P C**

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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 – I Communication Skills

Introduction, meaning, significance of soft skills – definition, significance, types of communication skills - Intra-personal & Inter-personal skills - Verbal and Non-verbal Communication

Activities:

Intrapersonal Skills- Narration about self- strengths and weaknesses- clarity of thought – self- expression – articulating with felicity

(The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes and literary sources)

Interpersonal Skills- Group Discussion – Debate – Team Tasks - Book and film Reviews by groups - Group leader presenting views (non- controversial and secular) on contemporary issues or on a given topic.

Verbal Communication- Oral Presentations- Extempore- brief addresses and speeches- convincing- negotiating- agreeing and disagreeing with professional grace.

Non-verbal communication – Public speaking – Mock interviews – presentations with an objective to identify non- verbal clues and remedy the lapses on observation

Learning Outcomes

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

- acquire attributes regarding communication skills
- enhance their intrapersonal and interpersonal skills
- improve LSRW Skills

UNIT – II Critical Thinking

Active Listening – Observation – Curiosity – Introspection – Analytical Thinking – Open-mindedness – Creative Thinking

Activities:

Gathering information and statistics on a topic - sequencing – assorting – reasoning – critiquing issues –facing the problem – finding the root cause - seeking viable solution – judging with rationale – evaluating the views of others - Case Study, Story Analysis

Learning Outcomes

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

- enhance their LSRW skills
- be able to get innovative and creative skills
- acquire logical and analytical thinking capability
- develop their cognitive level

UNIT III Problem Solving & Decision Making

Meaning & features of Problem Solving – Managing Conflict – Conflict resolution – Methods of decision making – Effective decision making in teams – Methods & Styles

Activities:

Facing problem which involves conflict of interests, choice and views – formulating the problem – exploring solutions by proper reasoning – Discussion on important professional, career and organizational decisions and initiate debate on the appropriateness of the decision.

Case Study & Group Discussion

Learning Outcomes

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

- solve the problems logically
- Make decisions effectively
- face the problems positively with confidence

UNIT – IV Emotional Intelligence & Stress Management

Managing Emotions – Thinking before Reacting – Empathy for Others – Self-awareness –SWOC analysis – Stress factors – Controlling Stress – Tips

Activities:

Providing situations for the participants to express emotions such as happiness, enthusiasm, gratitude, sympathy, and confidence, compassion in the form of written or oral presentations.

Providing opportunities for the participants to narrate certain crisis and stress – ridden situations caused by failure, anger, jealousy, resentment and frustration in the form of written and oral presentation, Organizing Debates

Learning Outcomes

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

- control their emotions and stress levels
- be emotionally balanced
- respond instead of reacting in their professional and academic life

UNIT – V Leadership Skills

Team-Building – Decision-Making – Accountability – Planning – Public Speaking – Motivation – Risk-Taking - Time Management

Activities:

Forming group with a consensus among the participants- choosing a leader- encouraging the group members to express views on leadership- democratic attitude- sense of sacrifice – sense of adjustment – vision – accommodating nature- eliciting views on successes and failures of leadership using the past knowledge and experience of the participants, Public Speaking, Activities on Time Management, Motivation, Decision Making, Group discussion etc.

Learning Outcomes

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

- learn the aspects of team building
- understand the characteristics of effective leadership skills
- improve spontaneous communication

Course Outcomes

By the end of the program students should be able to

- 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

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

B.Tech -IV SEM

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(BA20AHS201) UNIVERSAL HUMAN VALUES

Course Objectives:

The objective of the course is four fold:

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

Unit I:

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

- Purpose and motivation for the course, recapitulation from Universal Human Values-I.
- Self-Exploration–what is it? Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration.
- Continuous Happiness and Prosperity- A look at basic Human Aspirations.
- Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority.
- Understanding Happiness and Prosperity correctly-A critical appraisal of the current scenario.
- Methods to fulfil the above human aspirations: understanding and living in harmony at various levels.
- Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship,

harmony and co- existence) rather than as arbitrariness in choice based on liking-disliking.

Unit -II: Understanding Harmony in the Human Being - Harmony in Myself!

- Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
- Understanding the needs of Self ('I') and 'Body' - happiness and physical facility.
- Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer).
- Understanding the characteristics and activities of 'I' and harmony in 'I'.
- Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail.programs to ensure Sanyam and Health.
- Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease.

Unit III:

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

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

- Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios, elicit examples from students' lives.

Unit IV:

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

- Understanding the harmony in the Nature.
- Interconnectedness and mutual fulfilment among the four orders of nature recyclability and self-regulation in nature.
- Understanding Existence as Co-existence of mutually interacting units in all pervasive Space.
- Holistic perception of harmony at all levels of existence. Include practice sessions to discuss human being as cause of imbalance in nature (film"Home" can be used), pollution, depletion of resources and role of technology etc.

Unit V:

Implications of the above Holistic Understanding of Harmony on Professional Ethics

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

- At the level of society: as mutually enriching institutions and organizations

- Sum up: Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions
  E.g., To discuss the conduct as an engineer or scientist etc.

Text Books:

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

Reference Books:

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantak, 1999.
2. 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,

CO1: Understanding the value of education to become more aware of themselves, and their surroundings (family, society, nature). (L2)

CO2: Utilize the concepts of human being-harmony in myself become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind. (L3)

CO3: Understanding the concepts of society-harmony in human for better critical ability. (L2)

CO4: Understanding the human values, human relationship and human society to become sensitive to their commitment. (L2)

CO5: Apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction. (L3)

B.Tech-IV Sem

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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 – I

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

UNIT – II

Mean Value Theorems

Rolle�given 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
- Analyze the behavior of functions by using mean value theorems

UNIT – III

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
- Solve the linear differential equations with constant coefficients by appropriate method

UNIT – IV

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.
- Acquire the Knowledge maxima and minima of functions of several variable
- Utilize Jacobian of a coordinate transformation to deal with the problems in change of variables

UNIT – V

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
- Evaluate the rates of fluid flow along and across curves
- Apply Green‵s, Stokes and Divergence theorem in evaluation of double and triple integrals

Course Outcomes (CO):

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
- Utilize mean value theorems to real life problems
- Solve the differential equations related to various engineering fields
- Apply multiple integrals to find the area and volumes for different functions.
- Estimate the work done against a field, circulation and flux using vector calculus

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.

B. Tech III Year I Semester

Syllabus

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B.Tech – V Sem

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(EC20APC403) LINEAR & DIGITAL INTEGRATED CIRCUITS APPLICATIONS

Course Objectives:

- To introduce the basic building blocks of linear integrated circuits.
- To teach the linear and non-linear applications of operational amplifiers.
- To introduce the theory and applications of PLL.
- To introduce the concepts of waveform generation and introduce some special function ICs. Exposure to digital IC's
- To create combinational circuits &sequential circuits using HDLs.

Unit 1

OPERATIONAL AMPLIFIER: Introduction, Classification of IC's, basic information and features of Op-Amp IC741, the ideal Operational amplifier, Op-Amp internal circuit, characteristics - DC and AC.

LINEAR APPLICATIONS OF OP-AMP: Inverting and non-inverting amplifiers, adder, subtractor, Instrumentation amplifier, AC amplifier, V to I and I to V converters, Integrator and differentiator.

Unit 2

NON-LINEAR APPLICATIONS OF OP-AMP: Sample and Hold circuit, Log and Antilog amplifier, multiplier and divider, Comparators, Schmitt trigger, Multivibrators, Triangular and Square waveform generators, Oscillators

TIMER AND PHASE LOCKED LOOPS: Introduction to IC 555 timer, monostable and astable operations and applications, Schmitt trigger, PLL - introduction, basic principle, phase detector/comparator, voltage controlled oscillator (IC 566), applications of PLL.

UNIT 3

VOLTAGE REGULATOR: Introduction, Series Op-Amp regulator, IC Voltage Regulators, IC 723 general purpose regulators, Switching Regulator.

D to A & A to D CONVERTERS: Introduction, basic DAC techniques - weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, A to D converters - parallel comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC, DAC and ADC Specifications.

Unit 4

Hardware Description Language: Introduction to Verilog - structural Specification of logic circuits, behavioural specification of logic circuits, hierarchical Verilog Code, Verilog for combinational circuits - conditional operator, if-else statement, case statement, for loop; using storage elements with CAD tools-using Verilog constructs for storage elements, flip-flop with clear capability, using Verilog constructs for registers and counters.

Unit 5

COMBINATIONAL LOGIC CIRCUITS: Logic gates using 74XX ICs, Adders, Subtractors, Four-bit parallel adder, Comparator, Encoder, Priority Encoder, Decoder, BCD-to-7- segment decoder,Multiplexer, Demultiplexer. Verilog/VHDL models for the above standard building block ICs.

SEQUNTIAL CIRCUITS USING ICs: Latches, Flip Flops, Review of design of State machines; Standard building blockICs for Shift registers, parallel / serial conversion, shift register counters, Ring counters; Johnson counters, LFSR counter; Verilog/VHDL models for the above standard building block ICs.

Course Outcomes:

CO1: List out the characteristics of Linear and Digital ICs.

CO2: Discuss the various applications of linear & Digital ICs.

CO3: Solve the application based problems related to linear and digital ICs.

CO4: Analyze various applications based circuits of linear and digital ICs.

CO5: Design the circuits using either linear ICs or Digital ICs from the given specifications.

CO6: Develop digital circuits using HDL.

TEXT BOOKS:

1. D. Roy Choudhury, Shail B. Jain, "Linear Integrated Circuit", 4th edition (2012), New Age International Pvt.Ltd., New Delhi, India.
2. Ramakant A. Gayakwad, "OP-AMP and Linear Integrated Circuits", 4th edition (2012), Prentice Hall / Pearson Education, New Delhi.
3. John F.Wakerly,"Digital Design Principles and Practices" 4th edition, Pearson Education., 2009.

REFERENCE BOOKS:

1. Sergio Franco (1997), Design with operational amplifiers and analog integrated circuits, McGraw Hill, New Delhi.
2. Gray, Meyer (1995), Analysis and Design of Analog Integrated Circuits, Wiley International, New Delhi.
3. M.Morris Mano and Michael D. Cilleti., "Digital Logic Design" 4th edition Pearson Education., 2013
4. J. Bhasker, "A VHDL PRIMER" 3rd edition Eastern Economy Edition, PHI Learning, 2010.

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B.Tech- V Sem

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(EE20APC501) POWER ELECTRONICS

Course Objectives:

The student will be able to:

- Understand the differences between signal level and power level devices.
- Analyze controlled rectifier circuits.
- Analyze the operation of DC-DC choppers.
- Analyze the operation of voltage source inverters
- Analyze the operation of ACVC and Cycloconverter.

Unit -1: Power Switching Devices

Diode, BJT, MOSFET, IGBT, Thyristor: I-V Characteristics; Two Transistor Analogy, Firing circuit for thyristor; Voltage and current commutation of a Thyristor, GTO.

Unit -2: Thyristor Rectifiers

Single-phase half-wave and full-wave rectifiers, Single-phase full-bridge thyristor rectifier with R-load and highly inductive load; Three-phase full-bridge thyristor rectifier with R-load and highly inductive load; Derivation of Average Load Voltage and Current, Numerical problems.

Unit -3: DC-DC CONVERTERS

Elementary chopper with an active switch, concepts of duty ratio, control strategies, Power circuit of Buck, Boost and Buck- Boost Converters, analysis and waveforms at steady state, relation between duty ratio and average output voltage.

Unit -4: INVERTERS

Classification of Inverters- According to type of commutation, type of Source and type of connection; basic series inverter, single phase parallel inverter and bridge type inverters– basic principle of operation only; Voltage control techniques for inverters and Pulse width modulation techniques, Simple forced commutation circuits for bridge inverters – Mc Murray and Modified Mc Murray inverters; Three phase bridge inverters (VSI) – 180 degree mode – 120 degree mode of operation - Numerical problems.

Unit -5: AC VOLTAGE CONTROLLERS & CYCLO CONVERTERS:

AC voltage controllers – Principle of phase control – Principle of integral cycle control - Single phase two SCRs in anti-parallel – With R and RL loads – modes of operation of Triac – Triac with R and RL loads – RMS load voltage, current and power factor - wave forms – Numerical problems. Cyclo converters - Midpoint and Bridge connections - Single phase to single phase step-up and stepdown cyclo converters with Resistive and inductive load, Principle of operation, Waveforms, output voltage equation.

Course Outcomes:

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

CO-1: Understand the operation, characteristics and usage of basic Power Semiconductor Devices.

CO-2: Analyze different types of Rectifier circuits with different operating conditions.

CO-3: Illustrate DC-DC converters operation and analysis of their characteristics.

CO-4: Analyze the construction and operation of voltage source inverters, Voltage Controllers and Cyclo Converters.

CO-5: Apply all the above concepts to solve various numerical problem solving

Text Books:

1. M. H. Rashid, "Power Electronics: Circuits, Devices and Applications", 2nd edition, Prentice Hall of India, 1998
2. P.S.Bimbhra,"Power Electronics", 4th Edition, Khanna Publishers, 2010. 3. M. D. Singh & K. B. Kanchandhani, "Power Electronics", Tata Mc Graw Hill Publishing Company, 1998.

Reference Books:

1. Ned Mohan, "Power Electronics", Wiley, 2011.
2. Robert W. Erickson and Dragan Maksimovic, "Fundamentals of Power Electronics" 2nd Edition, Kluwer Academic Publishers, 2004.
3. Vedam Subramanyam, "Power Electronics", New Age International (P) Limited, 1996.
4. V.R.Murthy, "Power Electronics", 1st Edition, Oxford University Press, 2005. 5. P.C.Sen, "Power Electronics", Tata Mc Graw-Hill Education, 1987.
5. "Power Electronic Control of Alternating Current Motors" by J.M.D.Murphy

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(EE20APC502) POWER SYSTEM ARCHITECTURE

Course Objectives:

- Understand the concepts of concepts of conventional and nonconventional power generating systems.
- Understand the electrical design of the overhead lines.
- Understand the mechanical design of the overhead lines.
- Understand performance of the cables used in power transmission.
- Understand the concept of distribution system.

UNIT I POWER GENERATING SYSTEMS

Thermal Power: Block Diagram of Thermal Power Station (TPS), Brief Description of TPS Components

Hydro Power: Selection of Site, Classification, Layout, Description of Main Components.

Nuclear Power: Nuclear Fission and Chain Reaction-Principle of Operation of Nuclear Reactor.-Reactor Components: Radiation Hazards: Shielding and Safety Precautions.

Solar Power Generation: Role and Potential of Solar Energy Options, Principles of Solar Radiation, Solar Energy Collectors, PV Cell- V-I Characteristics.

Wind Power Generation: Role and potential of Wind Energy Options, Horizontal and Vertical Axis Windmills- Performance Characteristics-Pitch & Yaw Controls.

UNIT II Electrical Design of Overhead lines

Transmission line parameters: resistance, inductance and capacitance calculations

- single phase and three phase lines, double circuit line, effect of earth on transmission line capacitance.

Performance of transmission lines: representation of lines, classification of transmission lines, short transmission line, medium (Nominal-T, Nominal PI method) length transmission line, long transmission line, evaluation of ABCD parameters, surge impedance and SIL of long lines.

UNIT III Mechanical Design of Overhead Lines

Types Overhead Line Insulators: Types of Insulators, String Efficiency and Methods for Improvement, Capacitance Grading and Static Shielding.

Corona: Corona Phenomenon, Factors Affecting Corona, Critical Voltages and Power Loss, Radio Interference.

Sag and Tension Calculations: Sag and Tension Calculations with Equal and Unequal Heights of Towers, Effect of Wind and Ice on Weight of Conductor, Stringing Chart and Sag Template and Its Applications, Numerical Problems.

UNIT IV Underground Cables

Types of Cables, Construction, Types of Insulating Materials, Calculations of Insulation Resistance and Stress in Insulation, Numerical Problems. Capacitance of Single and 3-Core Belted Cables, Numerical Problems. Grading of Cables - Capacitance Grading, Inter-Sheath Grading, Numerical Problems.

Unit V: GENERAL ASPECTS OF DISTRIBUTION SYSTEMS

Classification of Distribution Systems - Comparison of DC & AC and Under-Ground & Over - Head Distribution Systems. Voltage Drop and power loss in D.C Distributors for the following cases: Radial D.C Distributors fed at one end and at ends (equal/unequal Voltages), Uniform loading and Ring Main Distributor, LVDC Distribution Network. Design Considerations of Distribution Feeders: Radial and loop types of primary feeders, feeder loading; basic design of secondary distribution. Voltage Drop and power loss in A.C. Distributors.

Course Outcomes:

CO1: Remember and understand the concepts of conventional and nonconventional power generating systems.
CO2: Analyze the transmission lines and obtain the transmission line parameters and constants Estimate the performance of a given transmission line
CO3: Estimate various factors related to mechanical design of the overhead lines.
CO4: Discuss the types of cables and their capacitance calculations
CO5: Analyze the working and performance of different distribution systems.

Textbooks:

1. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar and A.Chakraborti, DhanpatRai& Co. Pvt. Ltd., 1999.
2. Electric Power Generation Distribution and Utilization by C.L Wadhwa, New Age International (P) Ltd., 2005.
3. Non Conventional Energy Sources by G.D. Rai, Khanna Publishers, 2000.

Reference Books:

1. Renewable Energy Resources – John Twidell and Tony Weir, Second Edition, Taylor and Francis Group, 2006.
2. Electrical Power Generation, Transmission and Distribution by S.N.Singh., PHI, 2003.
3. Principles of Power Systems by V.K. Mehta and Rohit Mehta, S.CHAND&COMPANY LTD., New Delhi 2004.
4. Wind Electrical Systems by S. N. Bhadra, D. Kastha& S. Banerjee – Oxford University Press, 2013.

Online Learning Resources:

1.https://onlinecourses.nptel.ac.in/noc22_ee17/preview

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(EE20APE501) ADVANCED CONTROL SYSTEMS

(PROFESSIONAL ELECTIVE-I)

Course Objective: The objectives of the course are to make the students learn about:

- Concepts of state vector, State transition matrix and solution of state equations.
- Importance of controllability and observability concepts.
- Pole placement, state estimation using observers
- Lyapunov criterion for stability analysis
- Types of nonlinearities, their effect on system performance

UNIT – I

STATE VARIABLE DESCRIPTION AND SOLUTION OF STATE EQUATION

Concept of State – Derivation of State Space models for Linear Continuous time Systems from Schematic Models, Differential equations, Transfer functions and block diagrams – Non uniqueness of state model – State diagrams for continuous time state models – Solution of state equations – State transition matrix. Complete response of continuous time systems.

UNIT – II

CONTROLLABILITY & OBSEVABILITY

Tests for controllability and observability for continuous time systems – Time varying case, minimum energy control, time invariant case, Principle of Duality, Controllability and observability of state models in Jordan canonical form and other canonical forms. Effect of state feedback on controllability and observability.

UNIT – III STATE FEEDBACK CONTROLLERS AND OBSERVERS

Design of State Feedback Controllers through Pole placement. Full-order observer and reduced-order observer. State estimation through Kalman Filters.

UNIT – IV

ANALYSIS OF NONLINEAR SYSTEMS

Introduction to nonlinear systems, Types of nonlinearities, Concept of describing functions, Derivation of describing functions for Dead zone, Saturation, backlash, relay with dead zone and Hysteresis - Jump Resonance. Introduction to phase-plane analysis, Method of Isoclines for Constructing Trajectories, Singular points, Phase-plane analysis of nonlinear control systems.

UNIT- V STABILITY ANALYSIS

Stability in the sense of Lyapunov. Lyapunov's stability and Lypanov's instability theorems. Direct method of Lypanov for Linear and Nonlinear continuous time autonomous systems.

TEXT BOOKS:

1. Modern Control Engineering, Katsuhiko Ogata, Prentice Hall, 5th Edition, 2010.

2. Modern Control System Theory, M. Gopal, New Age International Publishers, Revised 2nd edition, 2005.

REFERENCE BOOKS:

1. Control Systems Engineering, I.J. Nagarath and M.Gopal, New Age International Publishers, 5th Edition, 2007, Reprint 2012.

2. Modern Control Engineering, D. Roy Choudhury, PHI Learning Private Limited, 9th Printing, January 2015.

Course Outcomes:

At the end of studying the course, the student should be able to:

- Model a given dynamic system in state space and obtain the solution for the state equation
- Test whether a given system is controllable and/or observable
- Design a state feedback controller for pole placement and observer for state estimation
- Analyze nonlinear systems
- Apply Lyapunov criterion and determine stability of a given system

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(EE20APE503) PROGRAMMABLE LOGIC CONTROLLERS

(PROFESSIONAL ELECTIVE-I)

Course Objectives:

The student will be able to:

- Understand the basic functions and types of PLCs, Easy Veep software, its applications
- Understand Classification of PLCs and applications
- Design PLC Programming for various applications
- Analyze PLC Troubleshooting aspects

UNIT I INTRODUCTION TO PLCs

Introduction: Basic functions of PLCs, Mechanical relays versus PLC, Different types of PLC's – Allen-Bradley – Micrologix: ML1000, ML1100, SLC500, Compact Logix, Mitsubishi FX series, HMI's, Processor and I/O cards

UNIT II PLC COMPUTATIONAL TOOL

Introduction to Easy Veep software, Link between mechanical, electrical and programming documentation, Logic diagrams, Flip-Flop Logic, M8000, M8001 internal bits interpretation, Binary code, data table, manipulation and search engine in Mitsubishi environment Communication between PC and PLC, Communication between PC and HMI, PLC and HMI Serial Local network, Introduction to SLC500

UNIT III PLC DEVELOPMENT

PLC software and applications, Boolean algebra – understanding binary code, ADD and SUB functions, UP and Down Counters, Introduction to k1Y0, MOV function, CPR and ZCP functions, SHWT and SHRD instructions, Introduction to Absolutely Drum Instruction.

Allen Bradley PLC: Introduction to Rockwell Software, Hardware focus, Hardware considerations (Field wiring, Master Control Relay, VFD), Basic programming and applications, Cascade control – subroutine, Different programs.

UNIT IV PLC PROGRAMMING

Programming instructions: Instructions and binary interpretation, Bit Instruction, Timers and counters, Comparison instructions, Programming Instructions - Math instructions, Move and Logical Instructions, Discussions of programming, communications for PLC-Robotic arm, Exercise of setup and monitoring.

UNIT V APPLICATIONS

Analog and Digital parameters by using SLC5/03-VFD-Panel Mate series 1700, Practical Troubleshooting, troubleshooting technique, Control system stability and tuning basics. Applications: Process to rewind, test, and integrate with extrusion process for wiring and fibre optic industries, Food industry – yeast, flour distribution and control. Process Medical equipment Industry – Gas analyzer, Leak tester (using CO_2), plastic wrapping machines etc.

Course Outcomes:

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

CO1: Understand different types of PLCs, Its classification and the usage of Easy Veep software

CO2: Analyze the Computation tool.

CO3: Illustrate the Boolean logic & basic PLC

CO4: Design PLC Programming for various applications

CO5: Apply PLC programming concepts in different fields of Science and Technology

Reference Books:

1. Programmable Logic Controllers by R. Bliesener, F Ebel, Festo. Didactic publishers, 2002.

2. Programmable Logic Controllers by W. Bolton, 4th Edition, Newnes, 2006.

3. Introduction to PLCs by Jay F. Hooper, 2nd Edition, Carolina Academic Press, 2006.

Online Learning Resources:

1. https://nptel.ac.in/courses/108105088

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(EE20APE504) SMART GRID & ELECTRIC VEHICLES

(PROFESSIONAL ELECTIVE-I)

COURSE OBJECTIVES

- To understand various aspects of smart grid.
- To Study about Smart Grid technologies, different smart meters and advanced metering infrastructure.
- To familiarize the power quality management issues in Smart Grid.
- To familiarize the high performance computing for Smart Grid applications.

UNIT 1 INTRODUCTION TO SMART GRID

Evolution of Electric Grid, Concept, Definitions and Need for Smart Grid, Smart grid drivers, functions, opportunities, challenges and benefits, Difference between conventional & Smart Grid, Concept of Resilient & Self Healing Grid, Present development & International policies in Smart Grid.

UNIT 2 SMART GRID TECHNOLOGIES AND SMART METERS

Components and Architecture of Smart Grid Design, Smart Grid Communication, Introduction to Smart Meters, Advanced Metering infrastructure (AMI) drivers and benefits, AMI protocols, standards and initiatives, AMI needs in the smart grid, Phasor Measurement Unit(PMU), Intelligent Electronic Devices(IED)

UNIT 3 POWER QUALITY MANAGEMENT IN SMART GRID

Power Quality & EMC in Smart Grid, Power Quality issues of Grid connected Renewable Energy Sources, Power Quality Conditioners for Smart Grid, Web based Power Quality monitoring, Power Quality Audit. Need of CLOUD Computing and Cyber Security for Smart Grid.

UNIT 4 Hybrid Electric Vehicles

Concepts of hybrid electric drive train, types, architecture of series and parallel hybrid electric drive train, merits and demerits, series and parallel hybrid electric drive train design.

UNIT 5 Energy Storages

Electrochemical batteries – lead acid batteries and lithium based batteries, Ultra capacitors, Flywheels. Basic principles of Fuel Cell and Solar Cell.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Illustrate the concepts of Smart Grid and its present developments.

CO2 - Analyze the various Smart Grid technologies.

CO3 - Realize the power quality management in Smart Grids.

CO4 - Analyze the concepts of Hybrid Electric Vehicles.

CO5 – Apply the Concepts of Energy Storage system technologies in Smart Grid.

TEXT BOOKS:

1. Stuart Borlase "Smart Grid: Infrastructure, Technology and Solutions", CRC Press 2012.
2. Janaka Ekanayake, Nick Jenkins, Kithsiri Liyanage, Jianzhong Wu, Akihiko Yokoyama, "Smart Grid: Technology and Applications", Wiley, 2012.
3. Larminie, J. and Lowry, J. (2012) Electric Vehicle Technology Explained, Second Edition.John Wiley & Sons, Chichester
4. Alfred Rufer, Energy Storage: Systems and Components, CRC Press, 2017

REFERENCE BOOKS:

1. Vehbi C. Güngör, Dilan Sahin, Taskin Kocak, Salih Ergüt, Concettina Buccella, Carlo Cecati, and Gerhard P. Hancke, "Smart Grid Technologies: Communication Technologies and Standards", IEEE Transactions On Industrial Informatics, Vol. 7, No. 4, November 2011.
2. Xi Fang, Satyajayant Misra, Guoliang Xue, and Dejun Yang "Smart Grid – The New and Improved Power Grid: A Survey", IEEE Transaction on Smart Grids,Vol.14, No.4, pp.944-980, 2012.
3. Denton, T. (2013) Automobile Electrical and Electronic Systems. Routledge, London.

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(CE20AOE502)PRINCIPLES OF WASTE MANAGEMENT

Course Objectives:

- Understanding of problems posed by various types of solid waste
- Categorize various solid and hazardous waste
- Obtain knowledge about various techniques adopted in field to treat solid and hazardous waste
- Become aware of various methods of disposal of solid and hazardous waste
- Understand engineering, financial and technical options for waste management.

UNIT –I

Introduction to Solid Waste

Waste-Types and classification, Waste sources and generation rates, Traditional methods of waste collection and disposal, Factors influencing waste generation and health hazards, Waste composition, Waste collection and Characterization of wastes.

UNIT – II

Waste Processing

Waste processing: Size and volume reduction, Waste minimization, waste hierarchy and waste audit, Recycling of solid wastes,

Hazardous Waste

Definition, sources, classification, collection and segregation, Hazardous waste characterization, treatment and disposal, Radioactive waste

UNIT – III

Biomedical waste

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

Composting

Definition- Vermicomposting and Biogas production from solid waste

UNIT –IV

Thermal treatment and Solid waste disposal

Thermal treatment of solid waste – Incineration, Thermal treatment of solid waste – Pyrolysis and gasification, Solid waste disposal – Sanitary landfilling, Landfill leachate and gas management, Landfill bioreactors, Fly ash- Generation and management

UNIT – V

Solid waste management rules and Swachh Bharat Abhiyan

Fly ash management Solid waste management rules, 2016, Hazardous and other waste amendment rules, 2016, Plastic waste management rules, 2016, e-waste management rules, 2016, Swachh Bharat Abhiyan and Recent advances in solid waste management

Course Outcomes (CO):

After studying this course, students will be able to:

- **CO1:** Understand various types of solid waste, sources and their collection methods.
- **CO2:** Identify various waste processing techniques and characteristics of hazardouswaste
- **CO3:** Understand the process of management of biomedical waste and composting
- **CO4:** Apply various solid waste disposal techniques according to situation
- **CO5:** Obtain awareness on various solid waste management rules and Swachh Bharat Abhiyan

Textbooks:

1. ArcadioSincero and GregoriaSincero "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 Publication2010
4. Tchobanoglous G, Theisen H and Vigil SA 'Integrated Solid Waste Management, Engineering Principles and Management Issues' McGraw-Hill, 1993.
5. Vesilind PA, Worrell W and Reinhart D, 'Solid Waste Engineering' Brooks/Cole Thomson Learning Inc., 2002.

Reference Books:

1. Peavy, H.S, Rowe, D.R., and G. Tchobanoglous, 'Environmental Engineering', McGraw Hill Inc., New York, 1985.
2. Qian X, Koerner RM and Gray DH, 'Geotechnical Aspects of Landfill Design and Construction' Prentice Hall, 2002

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(AM20AOE503) SOFT COMPUTING TECHNIQUES

(OPEN ELECTIVE-I)

Course Objective:

The objectives of the course are to make the students learn about:

- Importance of AI techniques in engineering applications
- Artificial Neural network and Biological Neural Network concepts
- ANN approach in various Engineering problems
- Fuzzy Logic and Its use in various Engineering Applications

UNIT – I

INTRODUCTION TO ARTIFICIAL INTILLEGENCE

Introduction and motivation – Approaches to AI – Architectures of AI – Symbolic Reasoning System – Rule based Systems – Knowledge Representation – Expert Systems.

UNIT – II

ARTIFICIAL NEURAL NETWORKS

Basics of ANN - Comparison between Artificial and Biological Neural Networks – Basic Building Blocks of ANN – Artificial Neural Network Terminologies – McCulloch Pitts Neuron Model – Learning Rules – ADALINE and MADALINE Models – Perceptron Networks – Back Propagation Neural Networks – Associative Memories.

UNIT – III

ANN APPLICATIONS

ANN approach to Pattern Recognition: System Identification, Forecasting Problem – ANN role in controlling systems.

UNIT – IV

FUZZY LOGIC

Classical Sets – Fuzzy Sets – Fuzzy Properties and Operations – Fuzzy Logic System – Fuzzification – Defuzzification – Membership Functions – Fuzzy Rule base – Fuzzy Logic Controller Design.

UNIT – V

FUZZY LOGIC APPLICATIONS

Fuzzy Logic Implementation for various Controlling systems in different domains,– Fuzzy Automatic control approach- Fuzzy Logic Controller in optimal allocation.

Course Outcomes:

The students should acquire awareness about:

CO1: Approaches and architectures of Artificial Intelligence
CO2: Artificial Neural Networks terminologies and techniques
CO3: Application of ANN to Forecasting problem, Control system problem & System Identification and Pattern recognition
CO4: Development of Fuzzy Logic concept
CO5: Application of Fuzzy Logic for controlling and optimization

Text Books:

1. S. N. Sivanandam, S. Sumathi and S. N. Deepa, "Introduction to Neural Networks using MATLAB", McGraw Hill Edition, 2006.

2. Timothy J. Ross, "Fuzzy Logic with Engineering Applications", Third Edition, WILEY India Edition, 2012.

References:

1. S. N. Sivanandam, S. Sumathi and S. N. Deepa, "Introduction to Fuzzy Logic using MATLAB", Springer International Edition, 2013.

2. Yung C. Shin and Chengying Xu, "Intelligent System – Modeling, Optimization & Control, CRC Press, 2009.

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(CS20AOE501) Computer Applications using programming Tools

Course Objectives:

- Able to know about "The necessity of Software & their applications in Food Industries"
- Able to Implement the Programs in 'C' to perform various operations that are related to Food Industries.

UNIT – I

Computerization, Importance of Computerization in food industry and IT applications in food industries. Computer operating environments and information system for various types of food industries. Introduction to Bar charts and Pie charts & the procedure to develop bar charts and pie charts on given Data.

UNIT – II

Introduction to Software & Programming Languages, Properties, Differences of an Algorithm and Flowcharts, Advantages and disadvantages of Flowcharts & Algorithms. Introduction, Fundamentals & advantages of 'C'. Steps in learning 'C' (Character set, Identifiers, Keywords) Steps in learning 'C' (Data types, Constants, Variables, Escape sequences).

UNIT – III

Steps in learning 'C' (Operators, Statements) Steps in learning 'C' (Header Files, Input & Output functions: Formatted I/O functions, Unformatted I/O functions). Basic Structure of a simple 'C' program. Decision Making/Control Statements. Branching, Concept of Looping & Looping statements.

UNIT – IV

Concept of Functions (Defining a function & Function Prototypes, Types of functions: Library functions & User defined functions. Concept of various types of User Defined Functions (i.e., About 4 types). Concept of Arrays & Types of Arrays

(Single, Double and Multi-Dimensional Arrays). Concept of a StringLibrary Functions.

UNIT – V

Concept of Pointers, Structures & Unions. Introduction to Data Structures, Types of Data Structures (Primary & Secondary Data Structures) Concept of Linked Lists, Types of Linked Lists & Basic operations on linked Lists. Concept of Stacks & Operations on Stacks (PUSH & POP Operations) Concept of Queues and types of Queues Operations on a Queue (ENQUEUE & DEQUEUE Operations)

TEXT BOOKS

1. Yeswanth Kanethkar, Letus 'C'
2. Balaguruswamy E., "Computer Programmingin 'C'"
3. Mark Allen Waise, "Data Structures"

REFERENCES

1. M.S Excel2000,Microsoft Corporation
2. M.S. Office–Microsoft Corporation
3. Verton M.V. "Computer concepts for Agri Business", AVI Pub.Corp., WestPort, USA.

COURSE OUTCOMES:

- CO1: Apply computerization in food industry with IT applications, including data visualization.
- CO2: Analyze software fundamentals and programming concepts, comparing algorithms and flowcharts.
- CO3: Demonstrate understanding of 'C' programming basics, including data handling.
- CO4: Evaluate decision-making structures and function types in 'C', utilizing arrays and strings.
- CO5: Create solutions using pointers, structures, and basic data structures like linked lists and stacks.

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(EC20AOE501) BASIC VLSI DESIGN

(OPEN ELECTIVE-I)

Course Objectives:

1. Learn about the various processing steps involved in the fabrication of a nMOS, pMOS and CMOS transistors.
2. Learn about the various Design rules and Layout of MOS transistors.
3. Enable the students to learn about the Scaling Models and Scaling factors of MOS transistors.
4. Study the various examples of structured design.
5. Learn about the Testing concepts in VLSI Chip design.

Unit I

Review of Microelectronics and Introduction to MOS technology:

The IC era, Basic MOS transistors- Enhancement mode and Depletion mode transistor action, nMOS fabrication, CMOS fabrication-P-Well, N-Well and Twin-tub process, Drain-to-Source Current versus Voltage VDS relationships, MOS trans-conductance, output conductance and Figure of Merit.

Unit II

MOS circuits and Design process:

The Pass transistor, nMOS inverter, Pull-up to Pull-down ratio of different cases, CMOS inverter and Latch-up in CMOS circuits, MOS layers, Stick diagrams-nMOS and CMOS design styles, Design rules and Layout- Lambda-based design rules, Contact cuts.

Unit III

Circuit Concepts and Scaling of MOS circuits:

Sheet resistance concept, Area Capacitance of layers and calculations, The Delay unit, Inverter delay, Driving large capacitance loads, Propagation delays and Wiring capacitances, Scaling Models and Scaling factors, Scaling factors for various device parameters and its summary.

Unit IV

Subsystem Design:

Architectural issues, Switch logic, Gate restoring logic-The inverter, Two-input nMOS, CMOS and BiCMOS NAND and NOR gates and Other forms of CMOS logic.

Unit V

Test and Testability:

System partitioning, Layout and Testability, Reset/Initialization, Design for Testability, Testing Combinational Logic and Sequential Logic, Practical Design for Test guidelines, Scan Design Techniques and Built-In-Self-Test (BIST).

Text Books:

1. K.Eshraghian, D.A. Pucknell and S.Eshraghian, "Essentials of VLSI Circuits and Systems", Third Edition, PHI Learning Pvt. Ltd., 2019.
2. W.Wolf "Modern VLSI Design IP based design" Fourth edition, PHI Learning Pvt. Ltd., 2020.

References:

1. Mead, C.A and Conway, L.A., "Introduction to VLSI Systems", Addison – Wesley, USA, 1980.
2. Neil H. E. Weste & D.M.Harris, "CMOS VLSI Design-A Circuits and Systems Perspective", Fourth edition, Pearson Edition, 2020.

Course Outcomes:

CO1: Outline the processing steps in the fabrication of a nMOS, pMOS and CMOS structure.

CO2: Illustrate the Layout procedure of simple MOS circuit using Lambda based design rules.

CO3: Summarize the scaling effects of various key parameters of MOSFET devices.

CO4: Design various MOS based logic circuits.

CO5: Develop algorithms for automatic test generation for combinational and sequential circuits.

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(EC20APC405) LINEAR & DIGITAL IC APPLICATIONS LAB

Course Objectives:

The objective of the course is to learn design, testing and characterizing of circuit behaviour with digital and analog ICs.

List of Experiments:

Part 1: Hardware

Linear IC Experiments:*(any 6 experiments can be performed)*

1. OP AMP Applications – Adder, Subtractor, Comparators.
2. Integrator and Differentiator Circuits using IC 741.
3. IC 741 Waveform Generators – Sine, Square wave and Triangular waves.
4. IC 555 Timer – Monostable and Astable Multivibrator Circuits.
5. Data converters
   i. DAC circuits – R-2R and ladder type.
   ii. Successive approximation type ADC.
6. Schmitt Trigger Circuits – using IC 741
7. IC 565 – PLL Applications.
8. Voltage Regulator using IC 723, Three Terminal Voltage Regulators – 7805, 7809, 7912.

PART 2: Software

Digital IC Applications: *(any 6 experiments can be performed)*

1. 3-8 line decoder.
2. 4-bit comparator.
3. 8x1 Multiplexer and 2 to 4 Demultiplexer.
4. BCD to 7-segment decoder.
5. D Flip Flop, JK Flip Flops.
6. Decade counter.
7. Up/Down Counter.
8. Universal shift registers.

Equipment required for Laboratory

Software:

1. Xilinx ISE
2. Computer Systems with required specifications

Hardware:

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators
4. Digital Multimeters
5. Decade Resistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)
9. Active & Passive Electronic Components
10. Bread Boards
11. Connecting Wires
12. CRO Probes

Course Outcomes:

CO1: Understand the pin configuration of each linear/ digital IC and its functional diagram.

CO2: Conduct the experiment and obtain the expected results.

CO3: Analyze the given circuit/designed circuit and verify the practical observations with the analyzed results.

CO4: Design the circuits for the given specifications using linear and digital ICs.

CO5: Acquaintance with lab equipment about the operation and its use.

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(EE20APC503) POWER ELECTRONICS & SIMULATION LAB

Course Objectives:

- Understand and analyze various characteristics of power electronic devices with gate firing circuits and forced commutation techniques.
- Analyze the operation of single-phase half &fully-controlled converters and inverters with different types of loads.
- Analyze the operation of DC-DC converters, single-phase AC Voltage controllers, Cyclo converters with different loads.
- Create and analyze various power electronic converters using MATLAB software.

Experiments:

1. Study of Characteristics of SCR, MOSFET & IGBT
2. Gate firing circuits for SCR's: (a) R triggering (b) R-C triggering
3. Single Phase AC Voltage Controller with R and RL Loads
4. Single Phase fully controlled bridge converter with R and RL loads
5. Forced Commutation circuits (Class A, Class B, Class C, Class D & Class E)
6. DC Jones chopper with R and RL Loads
7. Single Phase Parallel inverter with R and RL loads
8. Single Phase Cycloconverter with R and RL loads
9. Single Phase Half controlled converter with R and RL load
10. Single Phase Fully controlled converter with R and RL load
11. Three Phase half controlled bridge converter with R, RL-load
12. Three Phase fully controlled bridge converter with R, RL-load
13. Single Phase series inverter with R and RL loads
14. Single Phase Bridge inverter with R and RL loads
15. Single Phase dual converter with RL loads

MATLAB Simulation Experiments:

1. Single Phase half wave rectifier with R load.
2. Single Phase Semi controlled bridge converter with R and RL loads.
3. Single Phase fully controlled bridge converter with R and RL loads.
4. Three Phase semi controlled bridge converter with R and RL loads.
5. Three Phase fully controlled bridge converter with R and RL loads.
6. Buck, Boost and Buck-Boost Converter with R and RL loads.
7. Single Phase series Inverter with R and RL loads
8. Single Phase parallel Inverter with R and RL loads
9. Single Phase Bridge Inverter with R and RL loads
10. Single Phase AC Voltage Controller with R and RL Loads
11. Single Phase Cycloconverter with R and RL Loads.

Note: **Minimum Five Experiments to be performed in each section.**

References:

1. O.P. Arora, "Power Electronics Laboratory: Theory, Practice and Organization (Narosa series in Power and Energy Systems)", Alpha Science International Ltd., 2007.
2. M. H. Rashid, "Power Electronics: Circuits, Devices and Applications", 2nd edition, Prentice Hall of India, 1998
3. MATLAB and its Tool Books user's manual and – Math works, USA.

Course Outcomes:

By the end of the course the student will be able to:

- Understand and analyze various characteristics of power electronic devices with gate firing circuits and forced commutation techniques.
- Analyze the operation of single-phase half &fully-controlled converters and inverters with different types of loads.
- Analyze the operation of DC-DC converters, single-phase AC Voltage controllers, cyclo converters with different loads.
- Create and analyze various power electronic converters using MATLAB software.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech- V Sem

L	T	P	C
1	0	2	2

(EE20ASC501) SOFTWARE TOOLS FOR ELECTRICAL APPLICATIONS DEVELOPMENT

(Skill Oriented Courses -III)

Course Objectives:

The objectives of the course are to make the students learn about:

- Create awareness about MATLAB software and basic mathematical function and MATRIX operations representation
- Learn the fundamental of M-file script and Simulink writing concepts and Plot function
- Understand the basics of SCILAB Software with programming
- Develop the Input and Output Functions with graphic applications using SCILAB

Part-A : Introduction to MATLAB software

Simulink- Introduction, Block setting, Model annotation, solver, sinks library, sources, math operations library, program controls in Simulink. Simulink libraries, Applications – Modelling of a simple PID controller using SIMULINK, Plotting the response of different electrical systems using MATLAB .

MATLAB Applications to electrical engineering:

Task-1:

i) Find the roots of the equations $\mathbf{6x^5 -41x^4 +97x^3 -97x^2 +41x-6}$

ii) Find the values of x,y,z of the equations

$\mathbf{x+y+z=3, x+2y+3z=4, x+4y+9z=6}$

Task-2: Verify Thevinins & Norton's theorem using MATLAB SIMULINK and determine current in Load resistor.

Task-3: Design Simulink model for studying transient analysis of RLC, RL and RC circuits for step inputs

Task-4: obtain the plot of frequency vs. XL, frequency vs. XC , frequency vs. impedance and frequency vs. current for the given series RLC circuit and determine the resonant frequency and check by theoretical calculations.

R = 15 Ω , C = 10 μ F, L = 0.1 H, V = 50V vary frequency in steps of 1 Hz using Matlab

Task-5: observe the effect P,PD,PI and PID controllers using MATLAB programming

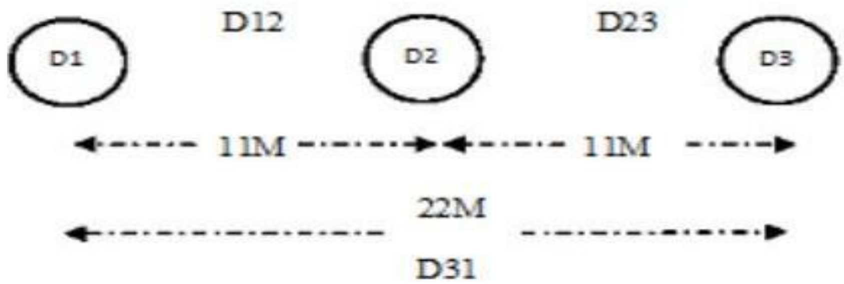
Task-6: obtain the root locus of the system whose transfer function is defined by

$$G(S)= \frac{(S+5)}{S^2+7S+25}$$

Task-7: A three phase transposed line has its conductors placed at a distance of 11M, 11 M & 22M. The conductors have a diameter of 3.625cm Calculate the inductance and capacitance of the transposed conductors.

(a) Determine the inductance per phase per kilometer of the above three lines.

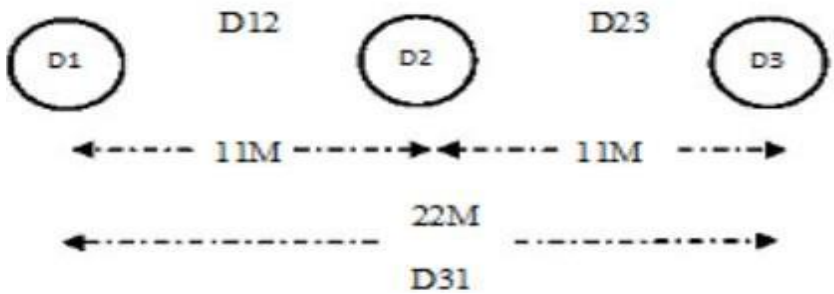
(b) Verify the results using the MATLAB program.



Task-8: A three phase transposed line has its conductors placed at a distance of 11M, 11 M & 22M. The conductors have a diameter of 3.625cm Calculate the inductance and capacitance of the transposed conductors.

(a) Determine the capacitance per phase per kilo meter of the above three lines.

(b) Verify the results using the MATLAB program.



Task-9: Simulate Half wave rectifier using MATLAB SIMULINK.

Task-10: Simulate Single phase Full Wave Bridge Controlled Rectifier using MATLAB SIMULINK.

Part-B: Introduction to SCILAB software- Scilab Objects -Matrix Construction and Manipulation, Strings, Boolean Matrices, Polynomial Matrices, Scilab Functions.

Display of Variables, Formatted Input and Output, Input Output in Binary Mode SCILAB Graphics- Basic Graphing, Graphics Objects. Find the solution of Ordinary differential equations using SCILAB.

SCILAB Applications to electrical engineering:

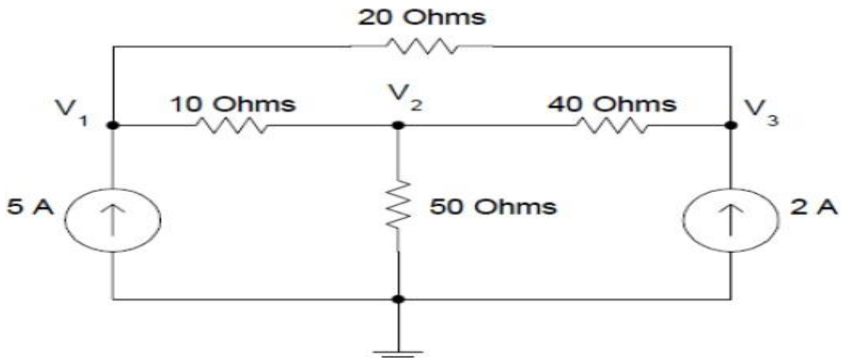
Task-1: Perform Matrix Bitwise operations, Relational Operations and Logical Operations for the matrix [1 2 3;4 5 6;7 8 9]

Task-2: Draw the 2D plots to display frequency and Pie Charts

Task-3: Write program to determine whether a number is +ve or –ve or zero.

Task-4: Develop a program that finds out whether a tank is overflowing or not wrt the shape of the tank, its dimensions and rate of flow.

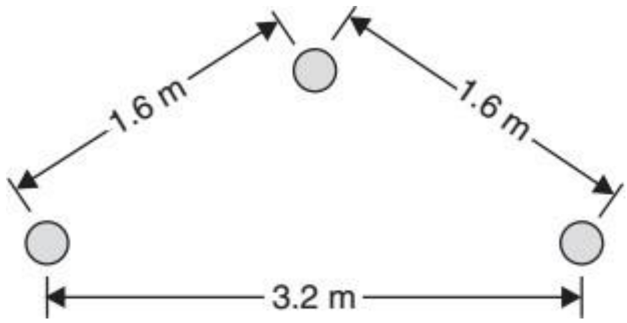
Task-5: Write a scilab program to find the nodal voltages V1, V2 and V3 for the circuit shown below.



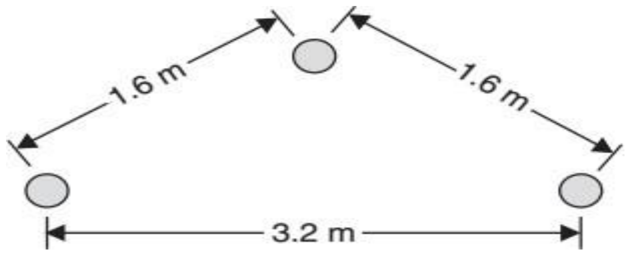
Task-6: Comparative Bode, Nyquist and Root locus methods with respect to Stability using SCILAB.

Task-7: Find the Power if V = 50V & Q = 120 C/min.

Task-8: Determine the inductance of a 3-phase line operating at 50 Hz and conductors arranged as follows. The conductor diameter is 0.8 cm.



Task-9: Determine the capacitance and the charging current per km when the transmission line of example 2.2 is operating at 132 kV



Task-10: Determine the maximum voltage that the string of the suspension insulators in Fig. E.8.1 can withstand if the maximum voltage per unit is 17.5 kV

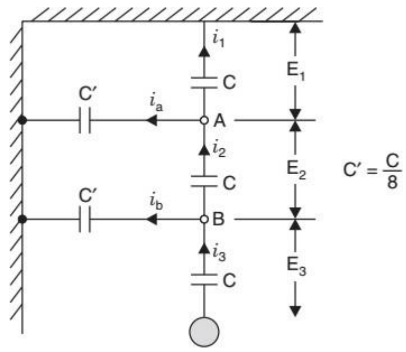


Fig. E.8.1

Textbooks:

1. Agam Kumar Tyagi, "MATLAB and Simulink for Engineers", OXFORD Higher Education.
2. Stephen L. Campbell, Jean-Philippe Chancelier and Ramine Nikoukha "Modeling and Simulation in Scilab/Scicos, Springer, second edition ,2010.
3. S. Nagar, "Introduction to Scilab For Engineers and Scientists", 1st Edition, Apress, 2017.

Reference Books:

1. Hawna Lockhart, Eric Tilleson, Introduction to Programming with MATLAB, SDC publications, 2019.
2. Introduction to Scilab, consortium Scilab.

Course Outcomes:

The student should be able to:

CO1: Explain awareness about MATLAB SIMULINK software and basic mathematical function.

CO2: Develop modelling and design of engineering systems using Simulink

CO3: Develop modelling and design of engineering systems using SCILAB

CO4: Solve and analyze the problems with the Input and Output Functions with graphic Applications using SCILAB

CO5: Develop Applications using SCILAB

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B.Tech- V Sem

L	T	P	C
2	0	0	0

(BA20AMC501) CONSTITUTION OF INDIA

Course Objectives:

- To enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and Election Commission of India.
- Tounderstandthecentral-staterelationinfinancialandadministrativecontrol

UNIT-I

Introduction to Indian Constitution – Constitution -Meaning of the term - Indian Constitution- Sources and constitutional history - Features– Citizenship – Preamble - Fundamental Rights and Duties-Directive Principles of State Policy.

UNIT-II

Union Government and its Administration Structure of the Indian Union-Federalism - Centre- State relationship–President's Role, power and position-PM and Council of ministers - Cabinet and Central Secretariat–Lok Sabha – Rajya Sabha - The Supreme Court and High Court-Powers

UNIT-III

State Government and its Administration - Governor - Role and Position -CM and Council of ministers –State Secretariat-Organization Structure and Functions

UNIT-IV

Local Administration-District's Administration Head-Role and Importance-Municipalities -Mayor and role of Elected Representatives -CEO of Municipal Corporation Pachayati Raj - Functions– PRI –Zilla Parishath - Elected officials and their roles – CEO, Zilla Parishath –Block level Organizational Hierarchy-(Different departments)-Village level –Role of Elected and Appointed officials-Importance of grass root democracy

UNIT-V

Election Commission-Election Commission-Role of Chief Election Commissioner and Election Commissionerate -State Election Commission -Functions of Commissions for the welfare of SC/ST/OBC and Women

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

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B.Tech-V Sem

L	T	P	C
2	0	0	0

(IT20AMC501) Problem Solving and Programming

(Lateral Entry Students Only)

Course Objectives:

The objective of this course is

- 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 – I

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
- Develop basic flowcharts for performing input and output and computations
- Solve Numerical Problems using Flowgorithm.
- Use C basic concepts to write simple C programs

UNIT – II

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
- Implement C program using Iterative statements

UNIT – III

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
- Apply arrays concepts on real time applications

UNIT – IV

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
- Understand the concepts of preprocessors.
- Apply Dynamic Memory Allocation concepts on real time applications

UNIT – V

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.
- Apply various operations on Files

Course Outcomes (CO):

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

- Solve computational problems.

- Select the features of C language appropriate for solving a problem
- Design computer programs for real world problems
- Organize the data which is more appropriated for solving a problem

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

B. Tech III Year II Semester

Syllabus

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech- VI Sem

L	T	P	C
3	0	0	3

(EE20APC601) ELECTRICAL MEASUREMENTS & SENSORS

Course Objectives:

The student has to acquire knowledge about:

- The basic principles of different types of electrical instruments for the measurement of voltage, current, power factor, power and energy.
- The measurements of RLC parameters using bridge principles.
- The principles of magnetic measurements
- The principle of working of CRO and its applications

UNIT- I

MEASURING INSTRUMENTS

Fundamentals of electrical measurements, Classification – Ammeters and Voltmeters – PMMC, Dynamometer, Moving Iron Types – Expression for the Deflecting Torque and Control Torque – Errors and their Compensation, Extension of range – Numerical examples

UNIT – II

MEASUREMENT OF POWER, POWER FACTOR AND ENERGY

Single Phase Dynamometer Wattmeter, LPF and UPF, Double Element and Three Elements, Expression for Deflecting and Control Torques; P.F. Meters: Dynamometer and Moving Iron Type – 1-ph and 3-ph Power factor Meters. Single Phase Induction Type Energy Meter – Driving and Braking Torques – Errors and their Compensation, Three Phase Energy Meter – Numerical examples

UNIT – III

INSTRUMENT TRANSFORMERS, & POTENTIOMETERS,

Current Transformers and Potential Transformers – Ratio and Phase Angle Errors – Methods for Reduction of Errors-Design Considerations.

DC Potentiometers: Principle and Operation of D.C. Crompton's Potentiometer – Standardization – Measurement of unknown Resistance, Currents and Voltages.

A.C. Potentiometers: Polar and Coordinate types- Standardization – Applications.

UNIT – IV

D.C & A.C BRIDGES

Method of Measuring Low, Medium and High Resistances – Sensitivity of Wheatstone's Bridge – Kelvin's Double Bridge for Measuring Low Resistance, Measurement of High Resistance – Loss of Charge Method. Measurement of Inductance - Maxwell's Bridge, Anderson's Bridge. Measurement of Capacitance and Loss Angle – DeSauty Bridge. Wien's Bridge – Schering Bridge – Numerical Examples

UNIT – V

CRO AND DIGITAL METERS

Cathode Ray Oscilloscope- Cathode Ray Tube-Time Base Generator-Horizontal and Vertical Amplifiers – Applications of CRO – Measurement of Phase, Frequency, Current and Voltage- Lissajous Patterns. Digital Voltmeters-Successive Approximation, Ramp, and Integrating Type-Digital Frequency Meter-Digital Multimeter-Digital Tachometer.

Course Outcomes:

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

- CO1: Understand electrical measurement fundamentals and instrument classification.
- CO2: Analyze power, power factor, and energy measurement techniques and error compensation.
- CO3: Evaluate instrument transformers, potentiometers, and their applications.
- CO4: Examine DC and AC bridges for resistance, inductance, and capacitance measurement.
- CO5: Understand cathode ray oscilloscope (CRO) principles and digital meter applications.

TEXT BOOKS:

1. A.K.Sawhney "Electrical & Electronic Measurement & Instruments" DhanpatRai& Co. Publications, 2007.

2. E.W. Golding and F.C. Widdis, "Electrical Measurements and measuring Instruments",5th Edition, Reem Publications, 2011.

REFERENCE BOOKS:

1. H. S. Kalsi, "Electronic Instrumentation", 3rd Edition, Tata Mcgrawhill, 2011.

2. Reissland, "Electrical Measurements: Fundamentals, Concepts, Applications" – M.U, New Age International (P) Limited, 2010.

3. R. K. Rajput, "Electrical & Electronic Measurement & Instrumentation", 2nd Edition, S. Chand & Co., 2nd Edition, 2013.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech- VI Sem

L	T	P	C
3	1	0	3

(EE20APC602) POWER SYSTEM ANALYSIS

Course Objectives:

To make the students learn about:

- The use of per unit values and graph theory concepts, solving a problem using computer.
- Formation of Ybus and Zbus of a Power System network, power flow studies by various methods.
- Different types of faults and power system analysis for symmetrical and also unsymmetrical faults.
- Analysis of power system for steady state and transient stability and also methods to improve stability.

UNIT – I: P.U. Unit System and Y_{bus} Formation

Per-Unit representation of Power system elements - Per-Unit equivalent reactance network of a three phase Power System - Graph Theory: Definitions, Bus Incidence Matrix, YBus formation by Direct and Singular Transformation Methods, Numerical Problems.

UNIT – II: FORMATION OF Z_{bus}

Formation of ZBus: Partial network, Algorithm for the Modification of ZBus Matrix for addition element for the following cases: Addition of element from a new bus to reference, Addition of element from a new bus to an old bus, Addition of element between an old bus to reference and Addition of element between two old busses - Modification of Zbus for the changes in network (Problems).

UNIT – III: POWER FLOW ANALYSIS

Static load flow equations – Load flow solutions using Gauss Seidel Method: Algorithm and Flowchart. Acceleration Factor, Load flow Solution for Simple Power Systems (Max. 3-Buses): Newton Raphson Method in Polar Co-Ordinates Form:

Load Flow Solution- Jacobian Elements, Algorithm and Flowchart. Decoupled and Fast Decoupled Methods - Comparison of Different Methods

UNIT – IV: SHORT CIRCUIT ANALYSIS

Short Circuit Current and MVA Calculations, Fault levels, Application of Series Reactors. Symmetrical Component Theory: Positive, Negative and Zero sequence components, Positive, Negative and Zero sequence Networks. Symmetrical Fault Analysis: LLLG faults with and without fault impedance, Unsymmetrical Fault Analysis: LG, LL and LLG faults with and without fault impedance, Numerical Problems.

UNIT – V: STABILITY ANALYSIS

Elementary concepts of Steady State, Dynamic and Transient Stabilities. Derivation of Swing Equation, Power Angle Curve and Determination of Steady State Stability. Determination of Transient Stability by Equal Area Criterion, Application of Equal Area Criterion, Critical Clearing Angle Calculation. Numerical methods for solution of swing equation - Methods to improve Stability - Application of Auto Reclosing and Fast Operating Circuit Breakers.

Text Books:

1. Computer Methods in Power System Analysis by G.W.Stagg and A.H.El-Abiad, Mc Graw-Hill, 2006.
2. Modern Power system Analysis by I.J.Nagrath & D.P.Kothari, Tata McGraw-Hill Publishing Company, 4th Edition, 2011.

Reference Books:

1. Power System Analysis by Grainger and Stevenson, McGraw Hill, 1994.
2. Power System Analysis by Hadi Saadat, McGraw Hill, 1998.
3. Power System Analysis and Design by B.R.Gupta, S. Chand & Company, 2005.

Course Outcomes:

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

CO1: Analyze the concepts of per unit system, determine the Ybus of a given power system network.

CO2: Evaluate the Zbus of a given power system network.

CO3: Illustrate the load flow studies on a given power system network using GS, NR and FDLF methods.

CO4: Demonstrate the concepts fault analysis, symmetrical component theory and application of series reactor.

CO5: Analyze the concept of steady state stability and transient stability of Power System Network.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech - VI Sem

L	T	P	C
3	0	0	3

(EE20APC603) POWER SYSTEM PROTECTION

Course Objectives:

To make the students learn about:

- The technical aspects involved in the operation of circuit breakers.
- The different types of Electromagnetic Relays and Microprocessor Based Relays.
- The protection of Generators and Transformers.
- The protection of feeders, lines and bus bars from abnormal conditions.
- Generation of over voltages and protection from them.

UNIT – I

CIRCUIT BREAKERS

Elementary Principles of Arc Interruption, Restriking Voltage and Recovery voltage - Restriking Phenomenon, Average and Max. RRRV, Current Chopping and Resistance Switching - CB ratings and Specifications: Types and Numerical Problems – Auto Reclosures. Description and Operation of - Minimum Oil Circuit breakers, Air Blast Circuit Breakers, Vacuum and SF_6 circuit breakers.

UNIT-II

ELECTROMAGNETIC, STATIC AND NUMERICAL RELAYS

Basic Requirements of Relays – Primary and Backup protection - Construction details of – Attracted Armature, Balanced Beam, Inductor Type and Differential Relays – Universal Torque equation – Characteristics of Over Current, Direction and Distance Relays. Static Relays – Advantages and Disadvantages – Definite Time, Inverse and IDMT. Static Relays – Comparators – Amplitude and Phase comparators. Microprocessor based relays – Advantages and Disadvantages – Block diagram for Over Current (Definite, Inverse and IDMT) and Distance Relays and their Flow Charts.

UNIT– III

PROTECTION OF GENERATORS AND TRANSFORMERS

Protection of Generators against Stator faults, Rotor faults and Abnormal Conditions. Restricted Earth fault and Inter-Turn fault Protection. Numerical Problems on Percentage Winding Unprotected. Protection of Transformers: Percentage Differential Protection, Numerical Problem on Design of CT Ratio, Buchholtz relay Protection.

UNIT– IV

PROTECTION OF FEEDERS, TRANSMISSION LINES AND BUSBARS

Protection of Feeders (Radial & Ring main) using Over Current Relays. Protection of Transmission lines – 3 Zone protection using Distance Relays. Carrier Current Protection. Protection of Bus bars -Differential protection.

UNIT– V

PROTECTION AGAINST OVER VOLTAGES

Generation of Over Voltages in Power Systems.-Protection against Lightning Over Voltages - Valve type and Zinc-Oxide Lighting Arresters - Insulation Coordination – BIL.

Course Outcomes:

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

- **CO1:** Evaluate numerical problems concerning the arc interruption and recovery in circuit breakers and to understand the operation of different circuit breakers.
- **CO2:** Analyze the concepts of various types of electromagnetic relays, Static relays and Microprocessor based relays which are used in real time power system operation.
- **CO3:** Analyze to determine unprotected percentage of generator winding under fault and to determine design calculation of CT ratio for transformer protection.
- **CO4:** Understanding various types of the relays in protecting feeders, lines and bus bars
- **CO5:** Demonstrate the protection of a power system from over voltages.

Text Books:

1. Switchgear and Protection – by Sunil S Rao, Khanna Publishers.
2. Power System Protection and Switchgear by Badari Ram, D.N Viswakarma, TMH Publications.
3. Power System Protection- P. M. Anderson, Wiley Publishers.

Reference Books:

1. Protective Relaying Principles and Applications – J Lewis Blackburn, CRC Press.
2. Numerical Protective Relays, Final Report 2004 – 1009704 EPRI, USA.
3. Protective Relaying Theory and Applications - Walter A Elmore, Marcel Dekker.
4. Transmission network Protection by Y.G. Paithankar, Taylor and Francis, 2009.

Online Learning Resources:

1. https://onlinecourses.nptel.ac.in/noc22_ee101/preview

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B.Tech- VI Sem

L	T	P	C
3	0	0	3

(EE20APE601)APPLICATIONS OF POWER ELECTRONICS TO RENEWABLE ENERGY SOURCES

(PROFESSIONAL ELECTIVE-II)

Course Objectives:

- To introduce certain areas for applications of Power Electronics in Renewable energy sources
- To understand about Power Quality issues and converters to be used in Renewable energy sources
- To introduce the concept of AC link Universal power converters
- To introduce high power electronic applications to Wind turbines
- To introduce the concept of electric air craft

UNIT-I:

Introduction of certain Applications

Introduction, Impact of power electronics in energy systems, challenges in power electronics to renewable energy systems, power electronics in energy, solar energy utilization, power electronics in wind energy utilization, power electronics for electric aircraft, power electronics in high power drive systems, high power electronic motor stand drives

UNIT-II:

Power Quality and Converters

AC-DC-AC Converters for Distributed Power Generation Systems & Power Quality problems:- Overview of Power Electronics Converters, Bidirectional AC-DC-AC Topologies, Filters, PWM for AC-DC-AC topologies, Control of converters, selection and sizing of the Converters, Matrix converter, and Multilevel Converters, Power Quality and Electromagnetic conservation, Power Quality Issues, Matting Methods and EMC related Phenomena in Electrical Power systems.

UNIT-III:

AC link Universal Power Converters

Introduction, hard switching AC link universal power converter, soft switching AC link universal power converter, principle of operation of the soft switching AC link universal power converter, design procedure, analysis and applications

UNIT-IV:

High Power Electronics for Wind Turbines

Power converters for wind turbines, power semiconductors for wind power converter, Power converters for Grid connected Wind Energy Conversion System and Grid connected Solar Energy Converter systems, Hybrid Systems, Types of Cogeneration processes.

UNIT-V:

Power Electronics for More Electric Aircraft

Introduction, electric aircraft, electric engine, electric power generation strategies, power electronics and power conversion, power distribution

Course Outcomes:

- CO1:Understand specific applications of Power Electronics in certain alternate sources
- CO2: Analyze about Power Quality problems as applied to Power Systems and the converters to be used of UPC and its design and application
- CO3: To be able to understand designing of high power drives for wind turbines
- CO4: To get exposed to principle of electric aircraft and applications of power converters to it

TEXT BOOKS:

1. Kamal Al-Haddad, Mariusz Malinowski, Haitham Abu-Rub "Power Electronics for Renewable Energy Systems, Transportation and Industrial Applications", Wiley Publishers, 2014.

REFERENCE BOOKS:

1. Ewald F. Fuchs, Mohammad A.S. Masoum, "Power Conversion of Renewable Energy Systems", Springer, 2012
2. Mukund R. Patel, "Wind and Solar Power Systems: Design, Analysis, and Operation", 2nd edition, Taylor & Francis, 2006

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B.Tech- VI Sem

L	T	P	C
3	0	0	3

(EE20APE602) BATTERY TECHNOLOGIES

(PROFESSIONAL ELECTIVE-II)

Course Objectives

- To provide a foundation for understanding the general principles and fundamentals of Li-Ion battery technology design and operation.
- To understand the expectancy of the hydrogen as a fuel and energy vector in the context of the renewable energy without CO_2.
- To learn basic electrochemical principles of the hydrogen fuel cells, basic fuel cell design concepts, fuel cell systems concepts.

UNIT: 1

Battery technology Overview: Battery definitions, terms and terminology, Battery types and their properties. Introduction to lithium ion battery, Components, functions, advantages and disadvantages of lithium-ion batteries, Growth & development of Li-Ion batteries, charging procedures, Safety of lithium-ion batteries, Lifetime.

UNIT: 2

Types of lithium ion battery: Lithium Cobalt Oxide (LCO), Lithium Iron Phosphate Battery (LFP), Lithium Manganese Oxide (LMO), Lithium Nickel Cobalt Aluminium Oxide (LNCA), Lithium Nickel Manganese Cobalt Oxide (LNMC), Lithium Polymer Battery, Lithium Polymer Battery technology, Difference between the lithium ion and lithium polymer.

UNIT: 3

Applications of Li-ion battery: Battery Requirements- Electrical Requirements, Thermal Requirements, Mechanical Requirements. ii. Automotive Applications- Drive Cycles, SLI (starting, lighting and ignition) batteries, Start-Stop (Micro) Hybrids, Power Assist Hybrids, Plug-In Hybrids, BEVs.

UNIT: 4

Fuel Cells: Introduction to fuel cells, components of fuel cells, Types of fuel cells: Alkaline fuel cells, proton exchange membrane fuel cell, phosphoric acid fuel cell, molten carbonate fuel cell. Solid oxide fuel cell, Types of solid oxide fuel cells: High temperature, intermediate temperature Single chamber solid oxide fuel cells.

UNIT: 5

Working Principle and Application of fuel cells: working principle of fuel cell, performance characteristics of fuel cells, efficiency of fuel cell, fuel cell stack, description of some commercially available fuel cell stacks, fuel cell cars and buses, overview on research activities.

Course Outcomes

After successful completion of this course, students will be able to:

- State the various parts of the battery and their functions.
- Describe discharging and charging process of a lithium ion battery.
- Describe the components of a fuel cell and explain the purpose of each one.
- Explain and analyse dynamic fuel cell behaviour.
- Understand - how fuel cells are used for every day purposes: road, water and air transport vehicles, portable and stationary use.

Text Books:

1. Lithium-Ion Batteries Basics and Applications by Reiner Korthauer, Springer.
2. Lithium-Ion Batteries Science and Technologies by Ralph J. Brodd (auth.), Masaki Yoshio, Ralph J. Brodd, Akiya Kozawa (eds.), Springer.
3. Lithium-ion Batteries Fundamentals and Applications. by Wu, Yuping, CRC Press, Taylor and Francis.

Reference Books:

1. Handbook of lithium-ion battery pack design chemistry, components, types and terminology by Warner, John T, Elsevier.
2. Fundamentals and Application of Lithium-ion Battery Management in Electric Drive Vehicles by San Ping Jiang, Wiley.
3. Lithium ion rechargeable batteries by edited by Kazunori Ozawa, Wiley.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech- VI Sem

L	T	P	C
3	0	0	3

(EE20APE603) ENERGY AUDITING & ENERGY CONSERVATION
(PROFESSIONAL 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 –I 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 II ELECTRICAL SYSTEMS

Components Of EB Billing – HT And LT Supply, Transformers, Cable Sizing, Concept Of Capacitors, Power Factor Improvement, Harmonics, Electric Motors – Motor Efficiency Computation, Energy Efficient Motors. Motor Energy Audit. Power Factor – Methods of Improvement, Power factor With Non Linear Loads

UNIT –III 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 IV 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 V 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

Course Outcomes:

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

CO1: Conduct energy auditing and evaluate energy audit results .

CO2: Analyze performance of Energy Efficient Motors and power factor improvement.

CO3: Illustrate the different types of energy instruments and lighting systems.

CO4: Examine energy conservation methods in thermal systems.

CO5: Apply energy conservation in major utilities and practices.

TEXT BOOKS:

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

REFERENCES:

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.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech- VI Sem

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3	0	0	3

(CS20AOE601) DATA ANALYSIS USING R
(OPEN ELECTIVE-II)

Course Objectives:

- Understand the R Programming Language.
- Exposure on Solving of data science problems.
- Understand The Regression Model

Unit 1: INTRODUCTION TO COMPUTING

Installation of R , The basics of R syntax, workspace , Matrices and lists, Subsetting, System-defined functions; the help system, Errors and warnings; coherence of the workspace, Viewing and manipulating Data, Viewing and manipulating Data, Plotting data, Reading the data from console, file (.csv) local disk and web, Working with larger datasets

Unit 2: SHAPE OF DATA AND DESCRIBING RELATIONSHIPS

Tables, charts and plots, Univariate data, measures of central tendency, frequency distributions, variation, and Shape Multivariate data, relationships between a categorical and a continuous variable, Relationship between two continuous variables – covariance, correlation coefficients, comparing multiple correlations, Visualization methods – categorical and continuous variables, two categorical variables, two continuous variables.

Unit 3: PROBABILITY DISTRIBUTIONS

Sampling from distributions – Binomial distribution, normal distribution, tTest, zTest, Chi Square test, . Density functions, Data Visualization using ggplot – Box plot, histograms, scatter plotter, line chart, bar chart, heat maps.

EXPLORATORY DATA ANALYSIS Demonstrate the range, summary, mean, variance, median, standard deviation, histogram, box plot, scatter plot using population dataset.

Unit 4: TESTING HYPOTHESES

Null hypothesis significance testing, Testing the mean of one sample, Testing two means, Linear models, Simple linear regression, Multiple regression, Bias-variance trade-off – cross-validation

Unit 5:CORRELATION

How to calculate the correlation between two variables, How to make scatter plots, Use the scatter plot to investigate the relationship between two variables, Perform tests of hypotheses about the mean when the variance is known, Compute the p-value, . Explore the connection between the critical region, the test statistic, and the p-value, Least Squares Estimates, The R Function lm, scrutinizing the Residuals

Course Outcomes:

- Install and use R for simple programming tasks (L3).
- Extract data from files and other sources and perform various data manipulation tasks on them (L3).
- Explore statistical functions in R (L4).
- Use R Graphics and Tables to visualize results of various statistical operations on data (L3).
- Apply the knowledge of R gained to data Analytics for real-life applications (L3).

Text Books:

1. SandipRakshit, "Statistics with R Programming", McGraw Hill Education, 2018.
2. Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, "AN Introduction to Statistical Learning: with Applications in R", Springer Texts in Statistics, 2017.
3. Joseph Schmuller, "Statistical Analysis with R for Dummies", Wiley, 2017.
4. K G Srinivasa, G M Siddesh, ChetanShetty, Sowmya B J, "Statistical Programming in R", Oxford Higher Education, 2017

Web References:

- http://www.r-bloggers.com/how-to-perform-a-logistic-regression-in-r/
- http://www.ats.ucla.edu/stat/r/dae/rreg.htm
- http://www.coastal.edu/kingw/statistics/R-tutorials/logistic.html
- http://www.ats.ucla.edu/stat/r/data/binary.csv

SOFTWARE REQUIREMENTS:

SOFTWARE: R Software, R Studio Software

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B.Tech – VI Sem	**3**	**0**	**0**	**3**

(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 –I

Introduction:

Hazards, Disasters, Disaster Management, Disaster Management cycle – Five priorities for action.

Natural Hazards and Disaster Management:

Floods, droughts, Earthquakes, global warming, cyclones & Tsunamis, landslides, Post Tsunami hazards along the Indian coast, landslides.

Learning outcomes:

At the end of unit, students will be able to

- Gain the basic knowledge about hazards and disasters.
- Know about the natural hazards and its management.
- Understand about the global warming, cyclones and tsunamis

UNIT II

Man-Made Disaster and Management:

Case study methods of the following: Fire hazards, transport hazards, biological hazards, waste management, post disaster, bio terrorism -threat in mega cities.

Learning outcomes:

At the end of unit, students will be able to

- Know about the fire hazards and solid waste management.
- Gain knowledge about transport and biological hazards.

UNIT – III

Risk and Vulnerability:

Building codes and land use planning, social vulnerability, environmental vulnerability, and sustainable development, climate change risk rendition, financial management of disaster – related losses.

Learning outcomes:

At the end of unit, students will be able to

- Know about the regulations of building codes and land use planning related to risk and vulnerability.
- Understand about the financial management of disaster and related losses

UNIT – IV

Role of Technology in Disaster Managements:

Disaster management for infra structures, taxonomy of infra-structure – treatment plants and process facilities-electrical substations- roads and bridges- mitigation programme for earth quakes –multimedia technology in disaster risk management and knowledge in disaster reduction.

Learning outcomes:

At the end of unit, students will be able to

- Know about the technological aspects of disaster management.
- Understand the multimedia technology in disaster risk management.
- Get knowledge about the factors for disaster reduction.

UNIT –V

Emerging approaches in Disaster Management

- Pre- disaster stage (preparedness)
- Emergency Stage
- Post Disaster stage-Rehabilitation.

Learning outcomes:

At the end of unit, students will be able to

- Gets knowledge about three planning strategies useful in mitigation?
- Understand about preparedness and rehabilitation stage.

Course Outcomes (CO):

On completion of the course the students will able to

- Know the different types of disasters and their effects on environment.
- Have the knowledge about Causes of disasters.
- Gain knowledge about disaster management through engineering applications.
- Explain the process of risk management
- Distinguish between the different approaches needed to manage pre- during and post disaster periods

Textbooks:

1. Rajib shah & R R Krishnamurthy “Disaster Management” – Global Challenges and Local Solutions’ Universities press. (2009).
2. Tushar Bhattacharya, “Disaster Science & Management” Tata McGraw Hill EducationPvt. Ltd., New Delhi.
3. Jagbir Singh “Disaster Management” – Future Challenges and Opportunities’ I K International Publishing House Pvt. Ltd. (2007).

Reference Books:

1. Harsh. K .Gupta “Disaster Management edited”, Universities press, 2003
2. Donald Hyndman & David Hyndman “Natural Hazards & Disasters” – Cengage Learning

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B.Tech -VI Sem

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(CS20AOE602) JAVA PROGRAMMING

(OPEN ELECTIVE-II)

Course Objectives:

- To understand object-oriented concepts and problem-solving techniques
- To obtain knowledge about the principles of inheritance and polymorphism
- To implement the concept of packages, interfaces, exception handling and concurrency mechanism.
- To design the GUIs using applets and swing controls.

UNIT - I

Introduction to OOP: OOP principles, Java Buzzwords, Implementing Java program, JVM, Data Types, Variables, Type conversions and Casting, Operators, Control statements, Arrays. Classes, Objects, Methods, Constructors, this keyword, static keyword, Overloading Methods and Constructors, Argument passing, Exploring String class.

UNIT – II

Inheritance: Basics, Using Super, Creating Multilevel hierarchy, Method overriding, Dynamic Method Dispatch, Using Abstract classes, Using final with inheritance

Interfaces: Definition, Implementing Interfaces, Extending Interfaces, Nested Interfaces, Applying Interfaces, Variables in Interfaces.

Packages: Basics, finding packages and CLASSPATH, Access Protection, Importing packages.

UNIT – III

Exception handling - Fundamentals, Exception types, uncaught exceptions, using try and catch, Multiple catch clauses, nested try statements, throw, throws and finally, built- in exceptions, creating own exception sub classes.

I/O and Other Topics: – I/O basics, Reading Console input, Writing console Output, The PrintWriter class, Reading and writing files, Automatically closing a file, enumerations, type wrappers.

UNIT - IV

Multithreading: The Java thread model, Creating threads, Thread priorities, Synchronizing threads, Inter thread communication.

The Collections Framework (java.util): Collections overview, Collection Interfaces, The Collection classes- Array List, Linked List, Hash Set, Hash table, Properties, Stack, Vector, String Tokenizer, Date, Calendar, Random, Scanner.

Applets- Definition, Life Cycle and Execution.

UNIT – V

Event Handling-Delegation Event Model, Event Sources, Event Classes, Event Listener Interfaces, Handling Mouse and Keyboard Events, Adapter classes.

AWT AND Swings: AWT: AWT Hierarchy, AWT controls, Layout Managers: FlowLayout, BorderLayout, GridLayout, CardLayout, and Limitations of AWT. SWINGS: JFrame, JPanel, JComponent- JLabel and ImageIcon, JTextField,JTabbedPane , Swing Buttons, JScrollPane, JComboBox, JTable.

Learning Outcomes:

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

- Understand the GUI programming (L1).

Course Outcomes:

After completion of the course the student will be able

- To solve real world problems using OOP techniques (L3).
- To apply code reusability through inheritance, packages and interfaces(L3)
- To solve problems using java collection framework and I/O classes (L3).
- To develop applications by using parallel streams for better performance (L4).
- To build GUIs and handle events generated by user interactions (L4).

Text Books:

1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill Education (India) Pvt. Ltd.

2. Java How to Program, 10th Edition, Paul Dietel, Harvey Dietel, Pearson Education.

Reference Books:

1. T. Budd "Understanding Object-Oriented Programming with Java", updated edition, Pearson Education.

2. Cay S. Horstmann "Core Java Volume – 1 Fundamentals",Pearson Education.

3. Sagayaraj, Dennis, Karthik and Gajalakshmi "Java Programming for core and advanced learners, University Press.

4. Y. Daniel Liang, "Introduction to Java programming", Pearson Education.

5. P. Radha Krishna "Object Oriented Programming through Java", University Press.

6. S. Malhotra, S. Chudhary, "Programming in Java", 2nd edition, Oxford Univ. Press.

7. R.A. Johnson, "Java Programming and Object-oriented Application Development", Cengage Learning.

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B. Tech- VI Sem **L T P C**

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(EC20AOE602) SIGNAL PROCESSING
(OPEN ELECTIVE-II)

Course Objectives:

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

UNIT I

SIGNALS & SYSTEMS:

Definition and classification of Signal and Systems (Continuous time and Discrete time), Elementary signals such as Dirac delta, unit step, ramp, sinusoidal and exponential and operations on signals. Analogy between vectors and signals-orthogonality-Mean Square error-Fourier series: Trigonometric & Exponential and concept of discrete spectrum

UNIT II

CONTINUOUS TIME FOURIER TRANSFORM:

Definition, Computation and properties of Fourier Transform for different types of signals. Statement and proof of sampling theorem of low pass signals.

UNIT III

SIGNAL TRANSMISSION THROUGH LINEAR SYSTEMS:

Linear system, impulse response, Response of a linear system, linear time-invariant (LTI) system, linear time variant (LTV) system, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, Relationship between bandwidth and rise time. Energy and Power Spectral Densities

UNIT IV

DISCRETE TIME FOURIER TRANSFORM:

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

UNIT V

LAPLACE TRANSFORM:

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

The Z–TRANSFORM: Derivation and definition-ROC-Properties- Inverse Z-Transform-System analysis-Transfer function-BIBO stability-System.

TEXT BOOKS:

1. B. P. Lathi, "Linear Systems and Signals", Second Edition, Oxford University press.
2. A.V. Oppenheim, A.S. Willsky and S.H. Nawab, "Signals and Systems", Pearson, 2nd Edition.
3. A. Ramakrishna Rao, "Signals and Systems", 2008, TMH.

REFERENCES:

1. Simon Haykin and Van Veen, "Signals & Systems", Wiley, 2nd Edition.
2. B.P. Lathi, "Signals, Systems & Communications", 2009,BS Publications.

Course Outcomes:

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

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

CO3: Analyze the frequency spectra of various continuous-time signals using different transform methods.

CO4: Analyze the systems based on their properties and determine the response of them.

CO5: Analyze the frequency spectra of various discrete-time signals using different transform methods.

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B.Tech - VI Sem **L T P C**

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(ME20AOE502) SOLAR AND WIND ENERGY SYSTEMS

Prerequisites: Power Plant Engineering

Course Objectives:

- Familiarize with basics of solar radiation, available solar energy and its measurement.
- Familiarize with solar collectors, construction and operation of solar collectors.
- Understand solar energy conversion systems, applications and power generation.
- Familiarize the wind energy sources assessment
- Explain basics of designing aerofoil

UNIT – 1:

Solar radiation and collectors: Solar angles – Sun path diagrams – Radiation - extra terrestrial characteristics - measurement and estimation on horizontal and tilted surfaces - flat plate collector thermal analysis - testing methods-evacuated tubular collectors - concentrator collectors – classification - design and performance parameters - tracking systems - compound parabolic concentrators - parabolic trough concentrators - concentrators with point focus - Heliostats – performance of the collectors.

Solar thermal technologies: Principle of working, types, design and operation of - Solar heating and cooling systems - Thermal Energy storage systems – Solar Desalination – Solar cooker : domestic, community – Solar pond – Solar drying.

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.

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.

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.

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.

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

- **CO1:** Understand solar radiation, collectors, and solar thermal technologies, including design and operation of solar heating, cooling, desalination, and cooking systems.
- **CO2:** Analyze solar photovoltaic (PV) fundamentals, including semiconductor properties, solar cell characteristics, and system design for standalone, hybrid, and grid-connected PV systems.
- **CO3:** Evaluate wind energy basics, including wind resource assessment, turbine types, operation, and electrical aspects.
- **CO4:** Design wind farms considering site selection, grid integration, feasibility studies, and health monitoring of turbines.
- **CO5:** Examine small wind turbine applications, offshore wind energy, and future developments in wind energy technology.

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(EE20APC604) ELECTRICAL MEASUREMENTS AND SENSORS LAB

Course Objectives:

This laboratory deals with the practical exercises for:

- Calibration of various electrical measuring instruments
- Accurate determination of inductance and capacitance using AC Bridges
- Measurement of coefficient of coupling between two coupled coils
- Measurement of resistance for different range of resistors using bridges

List of Experiments:

1. Calibration and Testing of single phase energy Meter
2. Calibration of dynamometer power factor meter
3. Crompton D.C. Potentiometer – Calibration of PMMC ammeter and voltmeter
4. Kelvin's double Bridge – Measurement of low resistance – Determination of Tolerance
5. Determination of Coefficient of coupling between two mutually coupled coils
6. Determination of Capacitance using Schering Bridge
7. Determination of Inductance using Anderson bridge
8. Measurement of 3-phase reactive power with single-phase wattmeter
9. Measurement of parameters of a choke coil using 3-voltmeter and 3-ammeter methods
10. Determination of Inductance using Maxwell's bridge

11. Determination of Capacitance using DeSauty Bridge

12. Calibration of LPF wattmeter – by Phantom loading

13. Wheatstone bridge – measurement of medium resistances

14. LVDT and capacitance pickup – characteristics and Calibration

15. Resistance strain gauge – strain measurement and Calibration

16. Transformer turns ratio measurement using AC Bridge

17. AC Potentiometer – Calibration of AC Voltmeter, Parameters of Choke coil

References:

Online Learning Resources/Virtual Labs:

1. http://vlabs.iitkgp.ernet.in/asnm/#

Course Outcomes:

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

- Calibrate various electrical measuring instruments
- Accurately determine the values of inductance and capacitance using AC bridges
- Compute the coefficient of coupling between two coupled coils
- Accurately determine the values of very low resistances

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B.Tech- VI Sem	**L**	**T**	**P**	**C**
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(EE20APC605) POWER SYSTEMS & PROTECTION LAB

COURSE OBJECTIVES:

The student will be able to learn about:

- Fault analysis
- Characteristics of relays
- Different losses
- Various tests on motors and transformers List of Experiments:

1. Fault Analysis-I
   i) LG Fault
   ii) LL Fault
2. Fault Analysis-II
   i) LLG Fault
   ii) LLLG Fault
3. Equivalent Circuit of a Three Winding Transformer
4. Separation of No Load losses of a Three Phase Squirrel Cage Induction Motor
5. Power Angle Characteristics of a Salient Pole Synchronous Machine
6. 3-phase to 2-phase conversion using Scott connection
7. Characteristics of IDMT Over Current Relay (Electro Magnetic Type)
8. Characteristics of Static Negative Sequence Relay
9. Characteristics of Over Voltage Relay
   i) Electromagnetic Type
   ii) Microprocessor Type
10. Characteristics of Percentage Biased Differential Relay
    i) Electromagnetic Type
    ii) Static Type

COURSE OUTCOMES:

After completion of the course, student will be able to understand:

- Fault analysis
- Characteristics of relays
- Different losses
- Various tests on motors and transformers

- **CO1:** Understand fault analysis and relay characteristics.
- **CO2:** Perform tests on motors and transformers, including fault analysis experiments.
- **CO3:** Analyze the equivalent circuit of a three-winding transformer and separate no-load losses of a motor.
- **CO4:** Investigate power angle characteristics and perform 3-phase to 2-phase conversion.
- **CO5:** Evaluate characteristics of various relays, including overcurrent, negative sequence, overvoltage and differential relays.

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B.Tech -VI Sem

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(EE20APC606) POWER SYSTEMS SIMULATION LAB

Course Objectives:

- To evaluate the performance of transmission lines.
- To develop the PID controller.
- To develop the MATLAB program for formation of Y and Z buses. To develop the MATLAB programs for Gauss-Seidel and fast decoupled load flow studies.
- To develop the SIMULINK model for single area load frequency problem.

Any Ten of the following experiments are to be conducted:

1. YBus formation using Soft Tools
2. ZBus formation using Soft Tools
3. Gauss-Seidel load flow analysis using Soft Tools
4. Newton-Raphson load flow analysis using Soft Tools
5. Fast decoupled load flow analysis using Soft Tools
6. Load Flow Analysis Using Neural Networks
7. Solve the Swing equation and Plot the swing curve
8. Develop a model for a uncontrolled single area load frequency control problem and simulate the same using Soft Tools.
9. Design of PID controller
10. Performance of Transmission Lines
11. Economic Load Dispatch by Using Lambda iterative method
12. Symmetrical component Transformation vice versa

Course Outcomes:

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

- Evaluate the performance of transmission lines (L5)
- Determine response of PID controller. (L3)

- Demonstrate the MATLAB program for formation of Y and Z buses. (L3)
- Evaluate the Load flow studies with the help of MATLAB programs by using Gauss-Seidel and Fast Decouple Load Flow studies. (L5)
- Create SIMULINK model for single area load frequency problem. (L6)

Online Learning Resources/Virtual Labs:

1. **https://www.ee.iitb.ac.in/~vlabsync/template/vlab/index.html#**

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B. Tech- VI Sem

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(EC20ASC601)GRAPHICAL SYSTEM DESIGN USING LabVIEW

Course Objectives:

1. To acquire familiarity with the LabVIEW Programming language and to know what ismeant by 'Graphical Programming Language'.
2. To be able to write LabVIEW programs incorporating pre-written and new code.
3. To build graphical user interfaces (GUIs) for laboratory instrumentation.

Unit I

NAVIGATING LabVIEW:

Introducing LabVIEW environment, Comparison with Text Based Programming, Creating and using LabVIEW projects, Parts of VI-Front Panel-Block Diagram-Icon And Connector Panel-Controls Pallete-Functions Pallete.

LabVIEW ENVIRONMENT:

Indicators-Controls- wiring the controls and indicators- building VIs- run modes data, Types in labVIEW- development of GUIs- labVIEW help. Searching controls, VIs and functions- implementing a VI- basic arithmetics in LabVIEW, Understanding the dataflow programming model of LabVIEW, Recognizing different data types.

Unit II

LabVIEW FOUNDATION:

Arithmetic functions- Expression node- Formula node-Compound arithmetic-Comparison pallet, Boolean pallete, Arrays -Various functions of arrays-strings-various functions of strings-clusters -various functions of clusters.

Unit III

PROGRAMMING EXECUTION WITH STRUCTURES:

Case structure, For Loop - The While Loop - Placing Objects inside Objects - Counting the Loops - Shift Registers, Introduction to MyDAQ.

Practice Exercises: Any ten experiments are to be done

1. Verification of basic arithmetic operations.
2. Perform Boolean operations.
3. Verify even or odd of a given numbers.
4. Verify application using expression node, formula node.
5. Construct array maximum and minimum.
6. Verify applications of string functions.
7. Find the sum of 'n' numbers using loop.
8. Find the factorial of a give number using loop.
9. Verify applications of shift register.
10. Design traffic light control using case structure.
11. Design water level indicator (Nested loop).
12. Data acquisition using MyDAQ.

References:

1. https://www.ni.com/pdf/training/us/core-1-sample-course-manual
2. https://ptolemy.berkeley.edu/eecs20/labs/LabVIEW_Labs/Lab01/Lab01.pdf

Course Outcomes:

CO1: Able to develop and edit functional block diagrams and front panels.

CO2: Able to utilize composite data in the form of Arrays and Clusters.

CO3: Able to control program execution through structures such as 'For-While' loops and 'Case Structures'.

CO4: Able to utilize features which will reconfigure the general physical and software layouts of the LabVIEW programming environment.

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B.Tech- VI Sem

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(BA20AMC502) INTELLECTUAL PROPERTY RIGHTS AND PATENTS

Course Objectives:

This course introduces the student to the basics of Intellectual Property Rights, Copy Right Laws, Cyber Laws, Trade Marks and Issues related to Patents. The overall idea of the course is to help and encourage the student for startups and innovations

UNIT-I

Introduction to Intellectual Property Law – Evolutionary past – Intellectual Property Law Basics –Types of Intellectual Property – Innovations and Inventions of Trade related Intellectual Property Rights – Agencies Responsible for Intellectual Property Registration – Infringement – Regulatory –Overuse or Misuse of Intellectual Property Rights–Compliance and Liability Issues.

UNIT-II

Introduction to Copyrights–Principles of Copyright–Subject Matters of Copy right–Rights Afforded by Copyright Law –Copyright Ownership– Transfer and Duration – Right to Prepare Derivative Works–Rights of Distribution–Rights of performers–Copy right Formalities and Registration – Limitations – Infringement of Copyright – International Copyright Law- Semiconductor Chip Protection Act.

UNIT-III

Introduction to Patent Law–Rights and Limitations–Rights under Patent Law–Patent Requirements– Ownership and Transfer– Patent Application Process and Granting of Patent– Patent Infringement and Litigation–International Patent Law–Double Patenting–Patent Searching–Patent Cooperation Treaty – New developments in Patent Law- Invention Developers and Promoters.

UNIT-IV

Introduction to Trade Mark – Trade Mark Registration Process – Post registration procedures – Trade Mark maintenance – Transfer of rights – Inter parties Proceedings – Infringement – Dilution of Ownership of Trade Mark – Likelihood of confusion – Trade Mark claims – Trade Marks Litigation –International Trade Mark Law.

UNIT-V

Introduction to Trade Secrets – Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreement – Trade Secret Law – Unfair Competition – Trade Secret Litigation–Breach of Contract–Applying State Law. Introduction to Cyber Law–Information Technology Act – Cyber Crime and E-commerce – Data Security – Confidentiality –Privacy–International aspects of Computer and Online Crime.

Course Outcomes:

CO1: Understand basics of Intellectual Property (IP) Law, including types, registration, infringement, and compliance.

CO2: Analyze principles of Copyright Law, covering ownership, transfer, infringement, and international regulations.

CO3: Evaluate Patent Law principles, including application process, infringement, and international regulations.

CO4: Examine Trade Mark Law, including registration, infringement, and international regulations.

CO5: Understand Trade Secret Law, including protection methods, confidentiality, and basics of Cyber Law, covering cybercrime and data security.

Textbooks:

1. DeborahE.Bouchoux:"IntellectualProperty".Cengagelearning,NewDelhi
2. KompalBansal&ParishitBansal"FundamentalsofIPRforEngineers",BSPublications(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.

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	L	T	P	C
B.Tech-VI Sem	**2**	**0**	**0**	**0**

(AM20AMC601) AI Tools Techniques & Applications
(Lateral Entry Students Only)

UNIT – I

Artificial Intelligence: : Introduction, Definition of AI, Goals of AI, Turing Test, Applications of AI, AI Programming Languages; Introduction, Intelligent Systems, the Concept of rationality, types of Agents, Environments and its properties, PEAS.

Learning Outcomes:

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

- Classify various AI Applications.
- List the AI Languages.
- Explain various types of Agents

UNIT – II

Search Strategies: Introduction, Brute Force or Blind Search, Breadth-First Search, Depth-First Search, Hill Climbing, Best-First Search.

Machine Learning: Introduction, Machine Learning Process, Feature Engineering-Feature Extraction, Feature Selection, Feature Engineering Methods, Feature Engineering, Data Visualization Line Chart, Bar Chart, Pie Chart, Histograms, Scatter Plot, Seaborn-Distplot, joint plot

Learning Outcomes:

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

- Apply informed search techniques to problems.
- Interpret the features using feature engineering
- analyze the data using different visualization techniques

UNIT – III

Regression: Simple Regression, Multiple Regression, Model Assessment-Training Error, Generalized Error, Testing Error, Bias-Variance Tradeoff

Classification: Linear Classification, Logistic Regression, Decision Trees

Learning Outcomes:

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

- Analyze different classification models and make recommendations towards learning.
- Solve real world data using classification techniques.
- Understand different regression models and about its problems.

UNIT – IV

Clustering: K-Means Clustering.

Expert Systems: Introduction, Need and Justification of ES, Knowledge Representation, Knowledge Acquisition and Variation, Utilisation and Functionality, Basics of Prolog.

Learning Outcomes:

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

- Understand the concept of clustering over classification.
- Distinguish between expert systems and traditional systems.
- Identify different applications of expert systems.

UNIT – V

Artificial Neural Networks (ANNs): Biological Neuron, Types of ANN, Optimization Techniques, Vanishing Gradient Problem, Exploding Gradient Problem, Weight Initialization.

Convolution Neural Networks (CNNs): Introduction, Components of CNN Architecture Convolution Layer(with example), Pooling/Down sampling Layer, Flattening Layer, Fully Connected Layer; Rectified Linear Unit Layer, Exponential Linear Unit, Unique Properties of CNN, Architectures of CNNs, Applications of CNN.

Learning Outcomes:

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

- Understand the architecture of an artificial neuron.
- Illustrate different artificial neural network architecture.
- Analyze the effect of different activation functions of a CNN unit.

Course Outcomes (CO):

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.

Textbooks:

1. Dr.Nilakshi Jain, Artificial Intelligence, As per AICTE: Making 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:

3. https://keras.io/
4. https://ai.google/
5. https://www.coursera.org/learn/neural-networks-deep-learning#syllabus
6. https://swayam.gov.in/nd1_noc19_me71/preview

B. Tech IV Year I Semester

Syllabus

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B.Tech- VII Sem

L	T	P	C
3	0	0	3

(EE20APE701) POWER QUALITY

(PROFESSIONAL ELECTIVE-III)

Course Objectives:

To impart knowledge about the following topics:

- Causes & Mitigation techniques of various PQ events.
- Various Active & Passive power filters.

Unit -1: INTRODUCTION TO POWER QUALITY:

Terms and definitions & Sources – Overloading, under voltage, over voltage - Concepts of transients - Short duration variations such as interruption - Long duration variation such as sustained interruption - Sags and swells - Voltage sag - Voltage swell - Voltage imbalance – Voltage fluctuations - Power frequency variations - International standards of power quality – Computer Business Equipment Manufacturers Associations (CBEMA) curve

Unit -2: VOLTAGE SAG AND SWELL

Estimating voltage sag performance - Thevenin's equivalent source - Analysis and calculation of various faulted condition - Estimation of the sag severity - Mitigation of voltage sag, Static transfer switches and fast transfer switches. - Capacitor switching – Lightning - Ferro resonance - Mitigation of voltage swell.

Unit -3: HARMONICS

Harmonic sources from commercial and industrial loads - Locating harmonic sources – Power system response characteristics - Harmonics Vs transients. Effect of harmonics – Harmonic distortion - Voltage and current distortions - Harmonic indices - Inter harmonics – Resonance Harmonic distortion evaluation, IEEE and IEC standards.

Unit -4: PASSIVE POWER COMPENSATORS

Principle of Operation of Passive Shunt and Series Compensators, Analysis and Design of Passive Shunt Compensators Simulation and Performance of Passive Power Filters- Limitations of Passive Filters Parallel Resonance of Passive Filters with the Supply System and Its Mitigation. Fundamentals of load compensation – voltage regulation & power factor correction.

Unit -5: POWER QUALITY MONITORING & CUSTOM POWER DEVICES

Monitoring considerations - Monitoring and diagnostic techniques for various power quality problems - Quality measurement equipment - Harmonic / spectrum analyser - Flicker meters Disturbance analyser - Applications of expert systems for power quality monitoring. Principle& Working of DSTATCOM – DSTATCOM in Voltage control mode, current control mode, DVR Structure – Rectifier supported DVR – DC Capacitor supported DVR -Unified power quality conditioner.

Text Books:

1. Roger. C. Dugan, Mark. F. Mc Granagham, Surya Santoso, H.WayneBeaty, "Electrical Power Systems Quality", McGraw Hill,2003

2. J. Arrillaga, N.R. Watson, S. Chen, "Power System Quality Assessment", (New York : Wiley),2000.

3. Bhim Singh, Ambrish Chandra, Kamal Al-Haddad," Power Quality Problems & Mitigation Techniques" Wiley, 2015.

Reference Books:

1. G.T. Heydt, "Electric Power Quality", 2nd Edition. (West Lafayette, IN, Stars in a Circle Publications, 1994.

2. M.H.J Bollen, "Understanding Power Quality Problems: Voltage Sags and Interruptions", (New York: IEEE Press), 2000.

Course Outcomes:

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

- **CO1:** Understand power quality terms, sources, and standards, including transients, interruptions, sags, swells, and harmonics.
- **CO2:** Analyze voltage sag and swell issues, estimating severity and implementing mitigation techniques like static transfer switches and capacitor switching.
- **CO3:** Evaluate harmonics' effects and compliance with IEEE and IEC standards, including distortion analysis and resonance mitigation.
- **CO4:** Design passive power compensators and filters, considering shunt and series configurations and their limitations.
- **CO5:** Implement power quality monitoring and custom devices like DSTATCOM and DVRs, using diagnostic techniques and expert systems for monitoring and mitigation.

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(EE20APE702)POWER SYSTEM OPERATION AND CONTROL (PROFESSIONAL ELECTIVE-III)

Course Objectives:

The student will be able to:

- To know about economic load dispatch problems with and without losses in Power Systems
- To distinguish between hydro-electric and thermal plants and coordination between them. To understand about optimal power flow problems and solving using specified method
- To understand about Automatic Generation Control problems and solutions in Power Systems
- To understand necessity of reactive power control, compensation under no-load and load operation of transmission systems
- To understand about deregulation aspects in Power Systems

Unit -1: Economic Operation of Power Systems

Brief description about electrical power systems, introduction to power system operation and control, Characteristics of various steam units, combined cycle plants, cogeneration plants, Steam units economic dispatch problem with & without considering losses and its solutions, B Matrix loss formula – Numerical problems.

Unit -2: Hydro-Thermal Coordination and Optimal Power Flow

Hydro-thermal Coordination: Characteristics of various types of hydro-electric plants and their models, Introduction to hydro-thermal Coordination, Scheduling energy with hydro-thermal coordination, Short-term hydro-thermal scheduling – Numerical problems

Unit -3: Automatic Generation Control

Speed governing mechanism, modelling of speed governing mechanism, models of various types of thermal plants (first order), definitions of control area, Block diagram representation of an isolated power system, Automatic Load Frequency control of single area system with and without control, Steady state and dynamic responses of single area ALFC loop – Numerical examples

Unit -4: Reactive Power Control

Requirements in ac power transmission, factors affecting stability & voltage control, fundamental transmission line equation, surge impedance, Natural loading, uncompensated line on open circuit, uncompensated line under load, types of compensations on compensated transmission lines, passive and active compensators, uniformly distributed fixed and regulated shunt compensation, series compensation, compensation by sectioning – Numerical problems

Unit -5: Power Systems Deregulation

Principle of economics, utility functions, power exchanges, electricity market models, market power indices, ancillary services, transmission and distribution charges, principles of transmission charges, transmission pricing methods, demand-side management, regulatory framework – Numerical problems

Course Outcomes:

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

CO1: understand to deal with problems in Power System as Power System Engineer

CO2: Analyze AGC problems in Power System

CO3: Evaluate the problems in hydroelectric and hydro thermal problems

CO4: Illustrate the complexity of reactive power control problems and to deal with them

CO5: Analyze the necessity of deregulation aspects and demand side management Problems in the modern power system era.

Text Books:

1. Power Generation, Operation and Control, Allen J. Wood and Bruce F. Wollenberg, John Wiley & Sons, Inc., New York, 2^{nd} edition, 1996.
2. Power System Engineering, D P Kothari and I J Nagrath, McGraw Hill Education India Pvt. Limited, Chennai, 3e, 2019.

Reference Books:

1. Electric Energy Systems Theory: An Introduction, Olle I. Elgerd, TMH Publishing Company Ltd., New Delhi, 2^{nd} edition, 1983.
2. Reactive Power Control in Electric Systems, T J E Miller, John Wiley & Sons, New York, 1982.

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(EE20APE703)SWITCHED MODE POWER CONVERTERS
(PROFESSIONAL ELECTIVE-III)

Course Objectives:

- Understand basic concepts of DC-DC converters
- Understand the concepts of resonant converters and their classification, various types of multilevel inverters, power conditioners, UPS and filters.
- Apply various modulation and harmonic elimination techniques over the converters.
- Analyze the state space modelling of various types of converters.
- Design inductor and transformer for various power electronic applications

Unit -1: DC-DC CONVERTERS:

Principles of step-down and step-up converters – Analysis and state space modelling of Buck, Boost, Buck- Boost and Cuk converters – Numerical Examples

Unit -2: SWITCHING MODE POWER CONVERTERS

Analysis and state space modelling of flyback, Forward, Luo, Half bridge and full bridge converters- control circuits and PWM techniques – Numerical Examples

Unit -3: RESONANT CONVERTERS

Introduction- classification- basic concepts- Resonant switch- Load Resonant converters- ZVS, Clamped voltage topologies- DC link inverters with Zero Voltage Switching- Series and parallel Resonant inverters- Voltage control – Numerical Examples

Unit -4: DC-AC CONVERTERS

Single phase and three phase inverters, control using various (sine PWM, SVPWM and advanced modulation) techniques, various harmonic elimination techniques- Multilevel inverters- Concepts - Types: Diode clamped- Flying capacitor- Cascaded types- Applications.

Unit -5: POWER CONDITIONERS, UPS & FILTERS

Introduction- Power line disturbances- Power conditioners –UPS: offline UPS, Online UPS, Applications – Filters: Voltage filters, Series-parallel resonant filters, filter without series capacitors, filter for PWM VSI, current filter, DC filters – Design of inductor and transformer for PE applications – Selection of capacitors.

Text Books:

1. Power Electronics: Essentials and Applications by L. Umanand, Wiley, 2009

2. M.H. Rashid – Power Electronics handbook, Elsevier Publication, 2001.

3. Course material on Switched Mode Power Conversion by V Ramanarayanan, Dept. of Electrical Engg. IISc. Bangalore.

Reference Books:

1. Philip T. Krein, "Elements of Power Electronics", Oxford University Press, 2012

2. Ned Mohan, Tore.M.Undeland, William.P.Robbins, Power Electronics converters, Applications and design, 3rd Edition, John Wiley and Sons, 2006

3. M.H. Rashid, Power Electronics circuits, devices and applications, 3rd Edition Prentice Hall of India New Delhi, 2007.

Course Outcomes:

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

CO1: Understand the problems and to design of various DC-DC converters, advanced converters of SMPCs

CO2: Evaluate the performance of resonant converters.

CO4: Analyze the performance characteristics of 1-φ and 3-φ inverters with single/multi levels, power conditioners, UPS and filters

CO5: Design various applications of the above in Power Systems, EVE, Renewable Energy Systems, etc.

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(EE20APE704) DESIGN OF PHOTOVOLTAIC SYSTEMS
(PROFESSIONAL ELECTIVE-IV)

Course Objectives:

To get the student exposed to:

- Basics of PV Cell
- Energy Estimation and costing
- Maximum Power Point Tracking
- PV Interfacing

Unit-1: PV CELL

A historical perspective, PV cell characteristics and equivalent circuit, Model of PV cell, Short Circuit, Open Circuit and peak power parameters, Datasheet study, Cell efficiency, Effect of temperature, Temperature effect calculation example, Fill factor, PV cell simulation, Series and Parallel Interconnection.

Unit-2: ENERGY ESTIMATION AND SIZING PV

Energy from Sun, insolation and irradiance, insolation variation with time delay, Solar geometry, Insolation on a horizontal flat plate, Sunrise and sunset hour angles, Energy plots in octave, atmospheric effects, air mass, Clearness index Sizing PV for applications without batteries, Examples, Batteries: Introduction, Capacity, C-rate, efficiency, energy and power densities, Battery selection, other energy storage methods, PV system design.

Unit-3: MAXIMUM POWER POINT TRACKING

MPPT concept, Input impedance of DC-DC converters - Boost converter, Buck converter, BuckBoost converter, PV module in SPICE, Simulation - PV and DC-DC interface, Impedance control methods-voltage scaling, current scaling, Sampling method, Power slope method 1, Power slope method 2, Hill climbing method, Practical points - Housekeeping power supply, Gate driver, MPPT for non-resistive loads, Simulation.

Unit-4: PV-BATTERY INTERFACE

Direct PV-battery connection, Charge controller, Battery charger - Understanding current control, slope compensation, simulation of current control, Batteries in series

- charge equalisation, Batteries in parallel Peltier device – principle, Peltier element – datasheet, Peltier cooling, Thermal aspects- Conduction, Convection, A peltier refrigeration example, Radiation and mass transport, Demo of Peltier cooling, PV and Water pumping.

Unit-5: PV AND GRID INTERFACE

Grid connection principle, PV to grid topologies,3ph d-q controlled grid connection-introduction, dq-axis theory, AC to DC transformation, DC to AC transformation, Complete 3ph grid connection, 1ph d-q controlled grid connection, 3ph PV-Grid interface example, SVPWM - discrete implementation, analog implementation, Application of integrated magnetics, LIFE CYCLE COSTING Growth models, examples, Annual payment and present worth factor, Examples.

Course Outcomes:

CO1: Understand PV cell characteristics, modeling, and interconnection methods.

CO2: Estimate solar energy and size PV systems, considering insolation, atmospheric effects, and battery selection.

CO3: Implement MPPT techniques for optimizing PV system performance.

CO4: Design PV-battery interfaces and manage thermal aspects effectively.

CO5: Understand PV-grid interface principles and perform life cycle costing analysis for PV systems.

Textbooks:

1. Design of Photovoltaic Systems by L. Umanand

Online Learning Resources:

1. **https://nptel.ac.in/courses/117108141**

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(EE20APE705) POWER SEMICONDUCTOR DRIVES

(PROFESSIONAL ELECTIVE-IV)

Course Objectives:

The objectives of the course are to make the students learn about:

- The operation of electric motor drives controlled by power electronic converters.
- The stable steady-state operation and transient dynamics of a motor-load system.
- The operation of the chopper fed DC drive.
- The distinguishing features of synchronous motor drives and induction motor drives.

Unit-1: CONVERTER FED DC MOTORS

Classification of Electric Drives, Basic elements of Electric Drive, Dynamic Control of a Drive system, Stability analysis, Introduction to Thyristor Controlled Drives, Single Phase, Three Phase Semi and Fully Controlled Converters Connected to D.C Separately Excited and D.C Series Motors – Continuous Current Operation – Output Voltage and Current Waveforms – Speed and Torque Expressions – Speed – Torque Characteristics- Problems.

Unit-2: FOUR QUADRANT OPERATION OF DC DRIVES

Introduction to Four Quadrant Operation – Motoring Operations, Electric Braking – Plugging, Dynamic and Regenerative Braking Operations. Four Quadrant Operation of D.C Motors by Dual Converters – Closed Loop Operation of DC Motor (Block Diagram Only)

Unit-3: CHOPPER FED DC MOTORS

Single Quadrant, Two Quadrant and Four Quadrant Chopper Fed DC Separately Excited and Series Excited Motors – Continuous Current Operation – Output Voltage and Current Wave Forms – Speed Torque Expressions – Speed Torque Characteristics – Problems on Chopper Fed D.C Motors

Unit-4: CONTROL OF INDUCTION MOTOR

Induction Motor Stator Voltage Control and Characteristics. AC Voltage Controllers – Waveforms – Speed Torque Characteristics - Stator Frequency Control and Characteristics. Voltage Source and Current Source Inverter - PWM Control –

Comparison of VSI and CSI Operations – Speed Torque Characteristics – Numerical Problems on Induction Motor Drives – Closed Loop Operation of Induction Motor Drives (Block Diagram Only) – Principles of Vector Control

Static Rotor Resistance Control – Slip Power Recovery – V/f control of Induction Motor – Their Performance and Speed Torque Characteristics – Advantages- Applications – Problems.

Unit-5: CONTROL OF SYNCHRONOUS MOTORS

Separate Control & Self Control of Synchronous Motors – Operation of Self Controlled Synchronous Motors by VSI and CSI Cycloconverters. Load Commutated CSI Fed Synchronous Motor – Operation – Waveforms – Speed Torque Characteristics – Applications – Advantages and Numerical Problems – Closed Loop Control Operation of Synchronous Motor Drives (Block Diagram Only), Introduction to variable frequency control.

Course Outcomes:

The student should be able to:

CO1: Understand electric drive principles, including converter-fed DC motors and their dynamic control.

CO2: Analyze four-quadrant operation of DC drives, including motoring, braking, and closed-loop control.

CO3: Evaluate chopper-fed DC motors' performance in various quadrants and control techniques.

CO4: Explain induction motor control methods, including voltage and frequency control, and closed-loop operation.

CO5: Understand synchronous motor control principles, including self-control, load commutated inverter (LCI), and closed-loop control.

Textbooks:

1. Power semiconductor controlled drives, G K Dubey, Prentice Hall, 1995. 2. Modern Power Electronics and AC Drives, B.K.Bose, PHI, 2002.

Reference Books:

1. Power Electronics, MD Singh and K B Khanchandani, Tata McGraw-Hill Publishing company, 2008.
2. Power Electronic Circuits, Devices and applications, M.H.Rashid, PHI, 2005.
3. Electric drives Concepts and Applications, VedamSubramanyam, Tata McGrawHill Publications, 2nd Edition, 2011.

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B.Tech- VII Sem

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(EE20APE706) UTILIZATION OF ELECTRICAL ENERGY
(PROFESSIONAL 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.

Electrolysis - Faraday's Laws, Applications of Electrolysis, Power Supply for Electrolysis.

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 – Characteristics and Control of Locomotives and Motor Coaches for Track Electrification – 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, Capitalization of Losses, Choice of Voltage.

Course Outcomes:

Student should be able to:

CO1: Develop a lighting scheme for a given practical case.

CO2: Analyze the performance of Heating and Welding methods

CO3: Make all numerical calculations associated with electric traction.

CO4: Evaluate the Mechanics of Train and its parameters

CO5: Analyze the economic aspects in utilisation of electrical energy

TEXT BOOKS:

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.

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(EE20APE707) ELECTRICAL & ELECTRONICS INSTRUMENTATION (PROFESSIONAL ELECTIVE-V)

Course Objectives:

Student has to acquire knowledge about:

- Understand Measuring system, Common errors, Objectives of Measuring systems(L2)
- Applying Test signals and modulation phenomenon, Data acquisition system, various telemetry systems and various modulation systems(L3)
- Measuring various meters and analysers(L4)
- Analyse transducers and their usage in various measurements(L4)

UNIT–I: INSTRUMENT ERRORS

Measuring Systems, Objectives of Measuring Instruments, definition of terms-Spam & Range, Sensitivity, Threshold & Resolution, Accuracy, Precision & Reliability, Performance Characteristics - Static Characteristics, Dynamic Characteristics; Errors in Measurement – Gross Errors, Systematic Errors, Statistical evaluation of measuring data – Numerical Problems

UNIT–II: DATA TRANSMISSION AND TELEMETRY

Signals and Their Representation: Standard Test, Periodic, Aperiodic, Modulated Signal, Sampled Data, Pulse Modulation and Pulse Code Modulation. Methods of Data Transmission – General Telemetry System. Frequency Modulation System (FM), Pulse Modulation (PM), Pulse Amplitude Modulation (PAM), Pulse Code Modulation (PCM) Telemetry. Comparison of FM, PM, PAM and PCM. Analog and Digital Acquisition Systems – Components of Analog DAS – Types of Multiplexing Systems: Time Division and Frequency Division Multiplexing – Digital DAS – Block Diagram – Modern Digital DAS (Block Diagram)

UNIT–III: SIGNAL ANALYZERS

Wave Analyzers- Frequency Selective Analyzers, Heterodyne, Application of Wave Analyzers- Harmonic Analyzers, Total Harmonic Distortion, Spectrum Analyzers, Basic Spectrum Analyzers, Spectral Displays, Vector Impedance Meter, Q Meter. Peak Reading and RMS Voltmeters.

UNIT–IV: TRANSDUCERS

Definition of Transducers, Classification of Transducers, Advantages of Electrical Transducers, Characteristics and Choice of Transducers; Principle Operation of Resistor, Inductor and Capacitive Transducers; LVDT and its Applications, Strain Gauge and Its Principle of Operation, Gauge Factor, Thermistors, Thermocouples, Piezo Electric Transducers, Photo electric Transducers, Hall effect, Photo Diodes.

UNIT– V: MEASUREMENT OF NON-ELECTRICAL QUANTITIES

Measurement of strain, Gauge Sensitivity, Displacement, Velocity, Angular Velocity, Acceleration, Force, Torque, Temperature, Pressure, Vacuum, Flow, Liquid level.

Text Books:

1. Transducers and Instrumentation by D.V.S Murthy, Prentice Hall of India,2004.
2. A course in Electrical and Electronic Measurements and Instrumentation,
A.K.Sawhney, DhanpatRai& Co.,2012.

Reference Books:

3. Electronic Instrumentation-by H.S.Kalsi Tata MCGraw-Hill Edition, 3/e.,2010.
4. Modern Electronic Instrumentation and Measurement techniques – by A.DHelfrick and W.D.Cooper, Pearson/Prentice Hall of India.,1990.
5. Industrial Instrumentation – Principles and Design by T. R. Padmanabhan, Springer, 3rd re print, 2009.

Course Outcomes:

The student will be able to understand:

CO1: Understand measuring system principles, errors, and performance characteristics.

CO2: Analyze data transmission methods and telemetry systems.

CO3: Evaluate signal analyzers and their applications in signal analysis.

CO4: Explain transducer principles, characteristics, and applications.

CO5: Apply measurement techniques for electrical and non-electrical quantities in engineering applications.

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(EE20APE708) HVDC AND FACTS

(PROFESSIONAL ELECTIVE-V)

Course Objectives:

To get the student exposed to:

- High voltage DC transmission systems(L1)
- Flexible AC transmission systems(L3)
- Various configurations of the above, Principle of operation, Characteristics of various FACTS devices(L4)

UNIT – I: INTRODUCTION

Electrical Transmission Networks, Conventional Control Mechanisms-Automatic Generation Control, Excitation Control, Transformer Tap-Changer Control, Phase-Shifting Transformers; Advances in Power-Electronic Switching Devices, Principles and Applications of Semiconductor Switches; Limitations of Conventional Transmission Systems, Emerging

UNIT-II: HIGH VOLTAGE DC TRANSMISSION – I

Types of HVDC links - Monopolar, Homopolar, Bipolar and Back-to-Back, Advantages and disadvantages of HVDC Transmission, Analysis of Greatz circuit, Analysis of bridge circuit without overlap, Analysis of bridge with overlap less than 600, Rectifier and inverter characteristics, complete characteristics of rectifier and inverter, Equivalent circuit of HVDC Link.

UNIT– III: HIGH VOLTAGE DC TRANSMISSION – II

Desired features and means of control, control of the direct current transmission link, Constant current control, Constant ignition angle control, Constant extinction angle control, Converter firing-angle control-IPC and EPC, frequency control and Tap changer control, Starting, Stopping and Reversal of power flow in HVDC links.

UNIT– IV: FLEXIBLE AC TRANSMISSION SYSTEMS-I

Types of FACTS Controllers, brief description about various types of FACTS controllers, Operation of 6-pulse converter, Transformer Connections for 12-pulse, 24-pulse and 48-pulse operation, principle of operation of various types of Controllable shunt Var Generation, Principle of switching converter type shunt compensator, principles of operation of various types of Controllable Series Var Generation, Principle of Switching Converter type series compensator.

UNIT– V: FLEXIBLE AC TRANSMISSION SYSTEMS-II

Unified Power Flow Controller (UPFC) – Principle of operation, Transmission Control Capabilities, Independent Real and Reactive Power Flow Control; Interline Power Flow Controller (IPFC) – Principle of operation and Characteristics, UPFC and IPFC control structures (only block diagram description), objectives and approaches of voltage and phase angle regulators

Text Books:

1. Narain G. Hingorani and Laszlo Gyugyi, "Understanding FACTS: Concepts and Technology of Flexible AC Transmission Systems", IEEE Press, Wiley-Interscience, New Jersey, 2000.
2. E.W. Kimbark, "Direct current transmission, Vol. I", Wiley Interscience, New York, 1971.

Reference Books:

1. K R Padiyar, "FACTS Controllers in Power Transmission and Distribution", New Age International Publishers, New Delhi, 2007.
2. AnriqueAcha, Claudio R. Fuerte-Esquivel, Hugo Ambriz-Pérez and César Angeles-Camacho, "FACTS: Modelling and Simulation in Power Networks", John Wiley & Sons, West Sussex, 2004.
3. R Mohan Mathur and Rajiv K Varma, Thyristor-"Based FACTS Controllers for Electrical Transmission Systems", IEEE Press, Wiley-Interscience, New Jersey, 2002.

Course Outcomes:

The student will be able to understand:

CO1: The necessity of HVDC systems as emerging transmission networks

CO2: Power Electronic devices to understand the necessity of reactive power compensation devices

CO3: To obtain equivalent circuits of various HVDC system configurations

CO4: Design and analysis of various FACTS devices

CO5: Analyze Unified Power Quality Conditioners

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(EC20APE603) INTRODUCTION TO DIGITAL SIGNAL PROCESSING

(EEE)

Course Objectives:

1. To summarize and analyze the concepts of signals, systems in time and frequency domain.
2. To learn properties of DFT and its application to linear filtering.
3. To understand the designs of IIR filters.
4. To understand the design of FIR filters.
5. To outline need of Multi-rate DSP.

UNIT- I

Frequency analysis of Signals and Systems:

Review of Discrete time signals and systems, Discrete Fourier transform, Relationship of the DFT to other transforms, Properties of DFT, problems.

UNIT-II

Fast Fourier Transform (FFT): Efficient computation of DFT - Radix-2 - Decimation-in-time (DIT), Decimation-in-frequency (DIF) algorithms, Inverse FFT.

UNIT- III

Realization of IIR & FIR Systems: Structures for IIR system- Direct-Form-I, Direct-Form-II, Transposed form, Cascade-Form, and Parallel-Form Structures. Structures for FIR system–Direct-Form, Cascade-Form and Linear Phase Structure.

UNIT-IV

Infinite Impulse Response Filters:

Design of IIR filters from Analog filters –Approximation of derivatives, Impulse invariance method, and bilinear transformation, Illustrative Problems.

Finite Impulse Response Filters: Design of linear phase FIR filters using - windows (Rectangular, Hamming and Hanning window), Frequency sampling method, Illustrative Problems.

Unit -V

Multi-rate Digital Signal Processing:

Introduction, Decimation, and interpolation, sampling rate conversion by a rational factor, Implementation of sampling rate conversion, Multi-stage implementation of sampling rate conversion, sampling rate conversion of band-pass signals, Applications of multi-rate signal processing.

Text Books:

1. John G. Proakis & Dimitris G.Manolakis, Digital Signal Processing – Principles, Algorithms & Applications, 4th Edition, Pearson Education / Prentice Hall, 2007.
2. A.V. Oppenheim, R.W. Schafer and J.R. Buck, Discrete-Time Signal Processing, 8th Indian Reprint, Pearson, 2004.

References:

1. Emmanuel C. Ifeachor & Barrie. W. Jervis, Digital Signal Processing, 2nd Edition, Pearson Education / Prentice Hall, 2002.
2. P.Ramesh Babu, Digital Signal Processing, SCITECH, 7th Edition, 2019.
3. Sanjit K. Mitra, Digital Signal Processing – A Computer Based Approach, Tata Mc Graw Hill, 2007.

Course Outcomes:

CO1: Understand the concept of DFT and its properties.

CO2: Analyze DFT computation using fast algorithms.

CO3: Realization of different structures for IIR & FIR filters

CO4: Design of IIR & FIR filters using different

CO5: Analyse multi-rate signal processing techniques.

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(CE20AOE701) AIR POLLUTION AND QUALITY CONTROL

Course Objectives:

After studying this course, students will be able to:

- The objectives of the course are to understand the Air pollution Concepts
- Identify the source of air pollution
- To know about Air pollution Control devices and distinguish the Air quality monitoring devices

UNIT –I

Introduction to Air Pollution

Introduction: Sources, effects on ecosystems, classification and characterization of air pollutants, Air Pollution Episodes of environmental importance. Indoor air pollution – sources, Effects.

UNIT II

Effects of Air Pollution

Effects of Air pollutants on man, material and vegetation: Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holes etc.

UNIT – III

Plume Behavior

Meteorology and plume Dispersion; properties of atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity, Influence of Meteorological phenomena on Air Quality-wind rose diagram.

UNIT – IV

Control Techniques

Particulate matter and gaseous pollutants- settling chambers, cyclone separators, scrubbers, filters & ESP.

UNIT –V

Noise Pollution

Noise pollution–Sources, Measurements, effects and control, noise standards. Environmental issues, global episodes, laws, acts, protocols.

Course Outcomes (CO):

After studying this course, students will be able to:

- Identify the major sources of air pollution
- Understand their effects on health and environment.
- Evaluate the dispersion of air pollutants in the atmosphere and to develop air quality models.
- Choose and design control techniques for particulate and gaseous emissions.
- Understand the noise pollution and control methods.

Textbooks:

1. Noel De Nevers, "Air Pollution Control Engineering" , Waveland PrInc 2016
2. Anjaneyulu Y, "Text book of Air Pollution and Control Technologies", Allied Publishers
3. M.N. Rao and HVN Rao, Air Pollution, Tata McGraw Hill Publishers 2017

Reference Books:

1. Nevers, "Air Pollution Control Engineering", McGraw-Hill, Inc., 2000.
2. Dr. B.S.N. Raju, "Fundamentals of Air Pollution" Oxford & I.B.H.
3. T. Holgate, Hillel S. Koren, Jonathan M. Samet, Robert L. "Air Pollution and Health" Maynard publisher Academic Press.

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(AM20AOE702) INTRODUCTION OF COMPUTER NETWORKS

(OPEN ELECTIVE-III)

Course Objectives:

- Understand the basic concepts of Computer Networks.
- Introduce the layered approach for design of computer networks
- Familiarize with the applications of Internet
- Explore the network protocols used in Internet environment
- Explain the format of headers of IP, TCP and UDP
- Elucidate the design issues for a computer network

Unit – 1: Computer Networks and the Internet

What is the Internet ?, The Network Edge, The Network Core, Delay, Loss, and Throughput in Packet- Switched Networks, Protocol Layers and their Service Models, Networks under attack, History of Computer Networking and the Internet

Unit – 2: Application Layer

Principles of Network Applications, The web and HTTP, File transfer: FTP, Electronic mail in the internet, DNS-The Internet's Directory Service, Peer-to-Peer Applications

Unit – 3 : Transport Layer

Introduction and Transport-Layer Services, Multiplexing and De-multiplexing, Connectionless Transport: UDP, Principles of Reliable Data transfer, Connection-Oriented Transport: TCP, Principles of Congestion Control, TCP Congestion Control

Unit – 4 :The Network Layer

Introduction, Virtual Circuit and Datagram Networks, The Internet Protocol(IP): Forwarding and Addressing in the Internet, Routing Algorithms, Routing in the Internet, Broadcast and Multicast Routing

Unit – 5 :The Layer: Links, Access Networks, and LANs

Introduction to the Link Layer, Error-Detection and Correction Techniques, Multiple Access Links and Protocols, Switched Local Area Networks, Link Virtualization: A Network as a Link Layer, Data Center Networking, Retrospective: A Day in the Life of a Web Page Request

Course Outcomes:

Upon completion of the course, the students should be able to:

1. Identify the software and hardware components of a Computer network (L3)
2. Develop new routing, and congestion control algorithms (L3)
3. Assess critically the existing routing protocols (L5)
4. Explain the functionality of each layer of a computer network (L2)
5. Choose the appropriate transport protocol based on the application requirements(L3)

Text Books:

1. James F. Kurose, Keith W. Ross, "Computer Networking: A Top-Down Approach", 6th edition, Pearson, 2019.

References:

1. Forouzan, "Datacommunications and Networking", 5th Edition, McGraw Hill Publication.
2. Andrew S.Tanenbaum, David j.wetherall, "Computer Networks", 5th Edition, PEARSON.
3. Youlu Zheng, Shakil Akthar, "Networks for Computer Scientists and Engineers", Oxford Publishers, 2016.

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(CS20AOE701) MOBILE APPLICATION DEVELOPMENT USING ANDROID(OPEN ELECTIVE-III)

COURSE OBJECTIVES:

This course is designed to:

- Facilitate students to understand android SDK
- Help students to gain a basic understanding of Android application development
- Inculcate working knowledge of Android Studio development tool

UNIT-I: Introduction to Android:

The Android Platform, Android SDK, Eclipse Installation,Android Installation, Building you First Android application, Understanding Anatomy of Android Application, Android Manifest file.

UNIT-II: Android Application Design Essentials:

Anatomy of an Android applications, Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter, Permissions

UNIT-III: Android User Interface Design Essentials:

User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation.

UNIT-IV:

Testing Android applications, Publishing Android application, Using Android preferences, Managing Application resources in a hierarchy, working with different types of resources.

UNIT V:

Using Common Android APIs: Using Android Data and Storage APIs, Managing data using Sqlite, Sharing Data between Applications with Content Providers, Using Android Networking APIs, Using Android Web APIs, Using Android Telephony APIs, Deploying Android Application to the World.

Course Outcomes

Upon completion of the course, the students should be able to:

- Identify various concepts of mobile programming that make it unique from programming For other platforms (L3)
- Evaluate mobile applications on their design pros and cons. (L5)
- Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces. (L3)
- Develop mobile applications for the Android operating system that use basic andadvanced phone features. (L6)
- Demonstrate the deployment of applications to the Android marketplace fordistribution. (L2)

TEXT BOOKS:

1. Lauren Darcey and Shane Conder, “Android Wireless Application Development”, Pearson Education, 2nd ed. (2011)

REFERENCE BOOKS:

1. Reto Meier, “Professional Android 2 Application Development”, Wiley India Pvt Ltd
2. Mark L Murphy, “Beginning Android”, Wiley India Pvt Ltd
3. Android Application Development All in one for Dummies by Barry Burd, Edition: I

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(EC20AOE702) PRINCIPLES OF COMMUNICATION ENGINEERING
(OPEN ELECTIVE-III)

Course Objectives:

1. To understand the concept of various modulation schemes and multiplexing.
2. To apply the concept of various modulation schemes to solve engineering problems.
3. To analyze various modulation schemes.
4. To evaluate various modulation scheme in real time applications.

UNIT I

Amplitude Modulation

Introduction, An overview of Electronic Communication Systems**.** Need for Frequency Translation, classification of modulation schemes, Amplitude Modulation: DSB-FC, DSB-SC, SSB-SC and VSB, Modulators and demodulators. The Superheterodyne Receiver.

UNIT II

Angle Modulation

Basic definitions, Frequency Modulation: Narrow Band FM, Wide Band FM, Transmission bandwidth of FM Signals, Generation of FM Signals, Demodulation of FM Signals, FM Stereo Multiplexing, Phase modulation, AM vs PM.

UNIT III

Pulse Modulation

Sampling Theorem, Quantization, Pulse Amplitude Modulation, Pulse Width Modulation, Pulse position modulation, Pulse code modulation. Concept of Time Division Multiplexing, Frequency Division Multiplexing.

UNIT IV

Digital Modulation

Digital Representation of Analog Signals. Phase shift keying-Binary Amplitude Shift Keying, Binary Phase Shift Keying ,Differential phase shift keying, and Quadrature Phase Shift Keying, Frequency Shift Keying— Comparison.

UNIT V

MULTI-USER RADIO COMMUNICATION

Global System for Mobile Communications (GSM),Mobile &Cellular communication Concept – Overview of Multiple Access Schemes – Code division multiple access (CDMA) ,Frequency division multiple access (FDMA),Satellite Communication – Bluetooth.(Block diagram approach only).

Note: The main emphasis is on qualitative treatment. Complex mathematical treatment may be avoided.

Textbooks:

1. Herbert Taub, Donald L Schilling and Goutam Saha, "Principles of Communication Systems", 3rdEdition, Tata McGraw-Hill Publishing Company Ltd., 2008.
2. Simon Haykin, "Communication Systems", 4th Edition, John Wiley & Sons, 2004

References:

1. B. P. Lathi, Zhi Ding and Hari M. Gupta, "Modern Digital and Analog Communication Systems", 4th Edition, Oxford University Press, 2017.
2. K. Sam Shanmugam "Digital and Analog Communication Systems", WileyIndia Edition, 2008.
3. Martin S.Roden, "Analog and Digital Communication System", 3rd Edition, Prentice Hall of India, 2002.

Course Outcomes:

CO1. Analyze and design of various continuous wave modulation and demodulation techniques.

CO2. Attain the knowledge about angle modulation and FM Transmitters and Receivers.

CO3. Analyze and design the various Pulse Modulation Techniques.

CO4. Understand the concepts of Digital Modulation Techniques and Baseband transmission.

CO5. Comprehend the principles of radio communication systems like GSM.CDMA, Bluetooth, Mobile and satellite communications etc.,

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(ME20AOE602) POWER GENERATION TECHNOLOGIES

Pre-requisite: Thermal Engineering& Basic Mechanical Engineering

Course Objectives:

- Familiarize the sources of energy, power plant economics and environmental aspects.
- Outline the working components of different power plant.
- Explain renewable energy sources; characteristics, working principle, classify types, layouts, and plant operations.
- Impart types of nuclear power plants, and outline working principle and advantages and hazards.

UNIT – 1:

Introduction to the Sources of Energy Resources and Development of Power in India. Layouts of Steam, Hydel, MHD, and Nuclear Power Plants - Selection.

Power Plant Economics and Environmental Considerations: Capital Cost, Investment of Fixed Charges, Operating Costs, General Arrangement of Power Distribution, Definitions of Connected Load, Load Factor, Diversity Factor - Pollution Standards - Methods of Pollution Control.

Learning Outcomes:

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

- Outline sources of energy, compare and selectionof power plants. (L2)
- Explain cost factors, load and power distribution factors. (L2)
- Select tariff based on load and demand factors. (L3)
- Summarize the impact of power plant on the environment, pollution mitigation and regulations. (L2)

UNIT – 2:

Steam Power Plant: Introduction to Boilers- Modern High Pressure and Supercritical Boilers - Waste Heat Recovery, Fluidized Bed Boilers., Fuel and Handling Equipments, Types of Coals, Coal Handling, Choice of Handling Equipment, Coal Storage, Ash Handling Systems.

Combustion Process: Properties of Coal - Overfeed and Under Feed Fuel Beds, Types of Stokers, Pulverized Fuel Burning System and Its Components, Combustion

Needs and Draught System, Cyclone Furnace, Design and Construction, Dust Collectors, Cooling Towers And Heat Rejection.

Learning Outcomes:

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

- Demonstrate latest high-pressure boilers, power plant cycles and their improvements. (l2)
- Explain various types of coals, coal handling operations (L2)
- Outline and compare types of feeders, stokers, combustion systems. (L2)
- Illustrate draught, dust collector, furnace, cooling tower and heat rejection systems. (L2)
- Evaluate pollution levels from power plants, pollution control methods, and application of pollution recorders. (L4)

UNIT – 3:

Diesel Power Plant: Diesel Power Plant, Construction, Plant lay out with auxiliaries, fuel storage.

Gas Turbine Plant: Introduction - Classification - Construction - Layout with Auxiliaries - Principles of Working Closed and Open Cycle Gas Turbines. Advantages And Disadvantages Combined Cycle Power Plants.

Learning Outcomes:

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

- Explain working principle and compare types of diesel power plant. (L2)
- Outline the diesel power plant layout with its supporting equipment. (L2)
- Illustrate the working principle of open cycle and closed cycle gas turbine. (L2)
- Demonstrate combined cycle power plants with benefits and shortcomings. (L2)

UNIT – 4:

Hydro Electric Power Plant: Waterpower - Hydrological Cycle / Flow Measurement - Drainage Area Characteristics - Hydrographs - Storage and Pondage - Classification of Dams and Spill Ways.

Hydro Projects And Plant: Classification - Typical Layouts - Plant Auxiliaries - Plant Operation Pumped Storage Plants.

Learning Outcomes:

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

- Explain hydrological cycle, infer flow measurements from hydrographs. (L2)
- Summarize working principle of hydroelectric power plant. (L2)
- Illustrate typical layout of hydroelectric power plant, and its auxiliary

equipment’s. (L2)

UNIT – 5:

Power from Non-Conventional Sources: Utilization of Solar Collectors- Working Principle, Wind Energy - Types of Turbines -Tidal Energy. MHD power Generation.

Nuclear Reactors : Nuclear Fuel - Nuclear Fission- Types of Nuclear reactors - Radiation Hazards and Shielding - Radioactive Waste Disposal.

Learning Outcomes

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

- Familiarize the source of Renewablel sources in India (L2)
- rinciple of nuclear power plants, nuclear fuels, and reactor operations. (L2)
- Outline the various types of nuclear reactors, their applications, and limitations. (L2)
- Summarize the hazards of nuclear reactors and significance of nuclear waste disposal. (L2)

Textbooks:

1. P.K. Nag, “Power Plant Engineering”, 3rd edition, TMH, 2013.
2. Wakil, “Power plant technology”, M.M.EI TMH Publications.

Reference Books:

1. Rajput, “A Text Book of Power Plant Engineering: 4th edition, Laxmi Publications, 2012.
3. Ramalingam, “Power plant Engineering”, Scietech Publishers, 2013
4. P.C. Sharma, “Power Plant Engineering”, S.K. Kataria Publications, 2012.
5. Arora and S.Domakundwar, “A course in Power Plant Engineering”, Dhanpat Rai & Co (p).

Course Outcomes:

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

- **Outline** sources of energy, power plant economics, and environmental aspects. (L2)
- **Explain** power plant economics and environmental considerations. (L2)
- **Describe** working components of a steam power plant. (L2)
- **Illustrate** the working mechanism of gas turbine power plants. (L2)
- **Summarize** types of renewable energy sources and their working principle. (L2)
- **Demonstrate the working principle of nuclear power plants. (L4)**

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(AM20AOE701) CYBER SECURITY TECHNIQUES
(OPEN ELECTIVE-IV)

Course Objectives:

This course is designed to:

- Understand essential building blocks and basic concepts of cyber security
- Explore Web security and Network security
- Explain the measures for securing the networks and cloud
- Understand privacy principles and policies
- Describe the legal issues and ethics in computer security

UNIT I

Introduction: Introduction to Computer Security, Threats, Harm, Vulnerabilities, Controls, Authentication, Access Control, and Cryptography, Authentication, Access Control, Cryptography.

Programs and Programming: Unintentional (Non-malicious) Programming Oversights, Malicious Code—Malware, Countermeasures.

UNIT II

Web Security: User Side, Browser Attacks, Web Attacks Targeting Users, Obtaining User or Website Data, Email Attacks. Operating Systems Security: Security in Operating Systems, Security in the Design of Operating Systems, Rootkit.

UNIT III

Network Security: Network Concepts, Threats to Network Communications, Wireless Network Security, Denial of Service, Distributed Denial-of-Service Strategic Defenses: Security Countermeasures, Cryptography in Network Security, Firewalls, Intrusion Detection and Prevention Systems, Network Management .Cloud Computing and Security: Cloud Computing Concepts, Moving to the Cloud, Cloud Security Tools and Techniques, Cloud Identity Management, Securing IaaS.

UNIT IV

Privacy: Privacy Concepts, Privacy Principles and Policies, Authentication and Privacy, Data Mining, Privacy on the Web, Email Security, Privacy Impacts of

Emerging Technologies, Where the Field Is Headed.

Management and Incidents: Security Planning, Business Continuity Planning, Handling Incidents, Risk Analysis, Dealing with Disaster.

UNIT V

Legal Issues and Ethics: Protecting Programs and Data, Information and the Law, Rights of Employees and Employers, Redress for Software Failures, Computer Crime, Ethical Issues in Computer Security, Incident Analysis with Ethics, Emerging Topics: The Internet of Things, Economics, Computerized Elections, Cyber Warfare.

Course Outcomes:

Upon completion of the course, the students should be able to:

- Illustrate the broad set of technical, social & political aspects of Cyber Security andsecurity management methods to maintain security protection (L2)
- Assess the vulnerabilities and threats posed by criminals, terrorist and nation states to national infrastructure (L5)
- Identify the nature of secure software development and operating systems (L3)
- Demonstrate the role security management in cyber security defense (l2)
- Adapt the legal and social issues at play in developing solutions.(L6)

Text Books:

1. Pfleeger, C.P., Security in Computing, Prentice Hall, 2010, 5th edition.
2. Schneier, Bruce. Applied Cryptography, Second Edition, John Wiley & Sons, 1996

Reference Books:

3. Rhodes-Ousley, Mark. Information Security: The Complete Reference, Second Edition, Information Security Management: Concepts and Practice, McGraw-Hill, 2013.
4. Whitman, Michael E. and Herbert J. Mattord. Roadmap to Information Security for IT andInfosec Managers. Boston, MA: Course Technology, 2011.

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(CE20AOE704) ENVIRONMENTAL IMPACT ANALYSIS & MANAGEMENT
(OPEN ELECTIVE-IV)

Course Objectives:

- To impart knowledge on different concepts of Environmental Impact Assessment.
- To teach procedures of risk assessment.
- To teach the EIA methodologies and the criterion for selection of EIA methods.
- To teach the procedures for environmental clearances and audit.
- To know the impact quantification of various projects on the environment.

UNIT –I

Concepts and methodologies of EIA

Initial environmental Examination, Elements of EIA, - Factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters- Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods.

UNIT II

Impact of Developmental Activities and Land Use

Introduction and Methodology for the assessment of soil and ground water, EIA in surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Air pollution sources, Generalized approach for assessment of Air pollution Impact

UNIT – III

Assessment of Impact on Vegetation& Wildlife

Introduction - Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation.

UNIT – IV

Environmental Audit

Introduction - Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocol, stages of Environmental Audit, onsite activities, evaluation of Audit data.

UNIT –V

Environmental Acts and Notifications

The Environmental protection Act, The water preservation Act, The Air (Prevention & Control of pollution Act), Wild life Act - Provisions in the EIA notification, procedure for environmental clearance, procedure for conducting environmental impact assessment report- Evaluation of EIA report. Concept of ISO and ISO 14000.

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

Textbooks:

1. Canter Larry W., “Environmental Impact Assessment”, McGraw-Hill education Edi (1996)
2. Y. Anjaneyulu, “Environmental Impact Assessment Methodologies”, B. S. Publication, Hyderabad 2nd edition 2011

Reference Books:

1. Peavy, H. S, Rowe, “Environmental Engineering”, D. R, Tchobanoglous, G.Mc-Graw Hill International Editions, New York 1985
2. J. Glynn and Gary W. Hein Ke, “Environmental Science and Engineering”, Prentice Hall Publishers 1988
3. Suresh K. Dhaneja, S.K., “Environmental Science and Engineering”, Katania& Sons Publication, ND

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(EC20AOE704) INTERNET OF THINGS

(OPEN ELECTIVE-IV)

Course Objectives:

1. Understand IOT design requirements.
2. Understand various technologies and protocols.
3. Understand storage and intelligent analytics.
4. Analyze security requirements along with threat model.
5. Create and Design various applications.

UNIT 1

Introduction to IoT: Architectural overview, Design principles and needed capabilities, IoT Applications, Sensing, Actuation, Basics of Networking, M2M and IoT Technology Fundamentals- Devices and gateways, Data management, Business processes in IoT, Role of cloud in IoT.

UNIT II

Elements of IoT: Hardware components – computing (Arduino, Raspberry Pi), communication, Sensing, Actuation, I/O interfaces Software Components- Programming APIs (Using Python/Arduino) for communication protocols-MQTT, Zigbee, Bluetooth, CoAP, UDP and TCP.

UNIT III

Sensing and Actuation: Definition of Sensor, Sensor features, Resolution, Classes, Different types of sensors, Actuator, Different types of Actuators, purpose of Sensors and Actuators in IoT.

UNIT IV

IoT Application Development: Solution frame work for IoT Applications- Implementation of Device integration, Data acquisition and Integration, Device data storage on cloud/local server, Authentication, authorization of Devices.

UNIT V

IoT Case Studies: IoT Case studies and mini projects based on industrial Automation, Transportation, Agriculture, Healthcare and Home Automation.

Textbooks:

1. Vijay Madisetti, Arshdeep Bahga, "Internet of Things a Hands-On- Approach",2014.
2. Dr SRN Reddy, Rachit Thukral and Manasi Mishra ," Introduction to Internet of Things": A practical Approach" ETI Labs

References:

1. Raj Kamal, "Internet of Things: Architecture and Design", McGraw Hill Education.
2. Adrian McEwen, "Designing the Internet of Things", Wiley Publishers, 2013.

Course Outcomes:

CO1: Understand the concepts of Internet of Things.

CO2: Identify hardware and software components of Internet of Things.

CO3: Analyze basic communication protocols.

CO4: Discuss various techniques related to authorization of Devices.

CO5: Design IoT applications in different domain and be able to analyze their performance.

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(ME20AOE703) INTRODUCTION TO INDUSTRIAL ENGINEERING (OPEN ELECTIVE-IV)

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.

UNIT – 2:

Plant Location: Definition, Factors affecting the Plant Location, Comparison of Rural and Urban sites, Selection of Plant Location, Plant Layout: Definition, Objectives, Types of Plant Layout.

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.

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

UNIT – 5:

Inspection & Quality Control: Statistical Quality Control- Techniques-Variables and Attributes- Control Charts: X and R Charts; P Charts and C Charts. Introduction to TQM- Quality circles-BIS & ISO Standards-Importance.

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 fundamental principles and theories in management, including different schools of thought and organizational structures.
- Analyze factors influencing plant location decisions and design effective plant layouts.
- Apply work study techniques for optimizing work processes and measuring performance in organizations.
- Implement inventory models and control systems to effectively manage inventory levels and meet operational requirements.
- Evaluate quality control techniques such as statistical quality control and Total Quality Management (TQM) principles to ensure product and service quality meets standards and requirements.

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(CS20AOE702) MOBILE COMPUTING TECHNIQUES
(OPEN ELECTIVE-IV)

Course Objectives:

- Understand mobile ad hoc networks, design and implementation issues, and available solutions.
- Acquire knowledge of sensor networks and their characteristics.

UNIT-I:

Wireless LANS and PANS: Introduction, Fundamentals of WLANS, IEEE 802.11 Standards, HIPERLAN Standard, Bluetooth, Home RF.

Wireless Internet: Wireless Internet, Mobile IP, TCP in Wireless Domain, WAP, Optimizing Web over Wireless.

UNIT-II:

AD HOC Wireless Networks: Introduction, Issues in Ad Hoc Wireless Networks, AD Hoc Wireless Internet.

MAC Protocols for Ad Hoc Wireless Networks: Introduction, Issues in Designing a MAC protocol for Ad Hoc Wireless Networks, Design goals of a MAC Protocol for Ad Hoc Wireless Networks, Classifications of MAC Protocols, Contention - Based Protocols, Contention - Based Protocols with reservation Mechanisms, Contention – Based MAC Protocols with Scheduling Mechanisms, MAC Protocols that use Directional Antennas, Other MAC Protocols.

UNIT -III:

Routing Protocols: Introduction, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classification of Routing Protocols, Table –Driven Routing Protocols, On – Demand Routing Protocols, Hybrid Routing Protocols, Routing Protocols with Efficient Flooding Mechanisms, Hierarchical Routing Protocols, Power – Aware Routing Protocols.

Transport Layer and Security Protocols: Introduction, Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer Solutions, TCP Over Ad Hoc Wireless Networks, Other Transport Layer Protocol for Ad Hoc

Wireless Networks, Security in Ad Hoc Wireless Networks, Network Security. Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management, Secure Routing in Ad Hoc Wireless Networks.

UNIT–IV:

Quality of Service: Introduction, Issues and Challenges in Providing QoS in Ad Hoc Wireless Networks, Classification of QoS Solutions, MAC Layer Solutions, Network Layer Solutions, QoS Frameworks for Ad Hoc Wireless Networks.

Energy Management: Introduction, Need for Energy Management in Ad Hoc Wireless Networks, Classification of Ad Hoc Wireless Networks, Battery Management Schemes, Transmission Power Management Schemes, System Power Management Schemes.

UNIT–V:

Wireless Sensor Networks: Introduction, Sensor Network Architecture, Data Dissemination, Data Gathering, MAC Protocols for Sensor Networks, Location Discovery, Quality of a Sensor Network, Evolving Standards, Other Issues.

Course Outcomes:

- Understand wireless communication tech & standards.
- Analyze protocols for wireless networks.
- Evaluate network performance & optimization.
- Design solutions for wireless network challenges.
- Apply advanced concepts to evolving wireless tech.

TEXTBOOKS:

1. Ad Hoc Wireless Networks: Architectures and Protocols - C. Siva Ram Murthy and B.S.Manoj, PHI, 2004.
2. Wireless Ad- hoc and Sensor Networks: Protocols, Performance and Control - Jagannathan Sarangapani, CRC Press

REFERENCEBOOKS:

1. Ad hoc Mobile Wireless Networks – Subir Kumar sarkar, T G Basvaraju, C Puttamadappa, Auerbach Publications,2012.
2. Wireless Sensor Networks - C. S. Raghavendra, Krishna M. Sivalingam, 2004, Springer.
3. Ad- Hoc Mobile Wireless Networks: Protocols & Systems, C.K. Toh , Pearson Education.

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(AM20AOE601) MACHINE LEARNING TOOLS & TECHNIQUES

(OPEN ELECTIVE-IV)

UNIT I

Introduction: Introduction to Machine Learning: Introduction. Different types of learning, Hypothesis space and inductive bias, Evaluation. Training and test sets, cross validation, Concept of over fitting, under fitting, Bias and Variance.

Linear Regression: Introduction, Linear regression, Simple and Multiple Linear regression, evaluating regression fit.

UNIT II

Decision tree learning: Introduction, Decision tree representation, appropriate problems for decision tree learning, the basic decision tree algorithm, hypothesis space search in decision tree learning, inductive bias in decision tree learning, issues in decision tree learning, Python exercise on Decision Tree.

(Principal Component Analysis) ,Python exercise on kNN and PCA.

UNIT III

Instance based Learning: K nearest neighbor, the Curse of Dimensionality, **Feature Selection:** forward search, backward search, univariate , multivariate feature selection approach, Feature reduction.

Probability and Bayes Learning (Move to Data Mining): Bayesian Learning, Naïve Bayes, Python exercise on Naïve Bayes, Logistic Regression.

UNIT IV

Support Vector Machine: Introduction, the Dual formulation, Maximum margin with noise, nonlinear SVM and Kernel function, solution to dual problem.

Artificial Neural Networks: Introduction, Biological motivation, ANN representation, appropriate, problem for ANN learning, Perceptron, multilayer networks and the back propagation algorithm;

UNIT V

Ensembles: Introduction, Bagging and boosting, Random forest, Clustering: Introduction, K-mean clustering, agglomerative hierarchical clustering, Python exercise on k-mean clustering.

Course Outcomes:

- Define machine learning types (supervised, unsupervised, and reinforcement learning) and distinguish between them.
- Explain hypothesis space and inductive bias in machine learning models, analyzing their impact on model performance and generalization.
- Evaluate machine learning models using techniques like training and test sets, cross-validation, and mitigate issues like overfitting and underfitting.
- Apply linear regression techniques (simple and multiple) to real-world datasets and assess regression model fit.
- Interpret machine learning model results effectively, understanding concepts like bias-variance trade-off, and make informed decisions about model selection and improvement strategies.

TEXTBOOKS

1.Machine Learning. Tom Mitchell. First Edition, McGraw- Hill, 1997.

2.Alpaydin, Ethem. Introduction to machine learning. MIT press, 2020.

REFERENCES

1.Kevin P. Murphy, "Machine Learning: A Probabilistic Perspective", MIT Press,

2012

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(BA20AHS702) E-BUSINESS

(HUMANITIES ELECTIVE-II)

Course Objectives:

- To provide knowledge on emerging concept on E-Business related aspect.
- To understand various electronic markets models which are trending in India
- To give detailed information about electronic payment systems net banking.
- To exact awareness on internet advertising, market research strategies and supply chain management.
- To understand about various internet protocols –security related concept.

UNIT-I

Electronic Business: Definition of Electronic Business - Functions of Electronic Commerce (EC) Advantages of E-Commerce – E-Commerce and E-Business Internet Services Online Shopping-Commerce Opportunities for Industries.

UNIT-II

Electronic Markets and Business Models: E-Shops-E-Malls E-Groceries - Portals – Vertical Portals –Horizontal Portals-Advantages of Portals-Business Models-Business to Business (B2B)- Business to Customers (B2C)-Business to Government (B2G)-Auctions-B2B Portals in India

UNIT-III

Electronic Payment Systems: Digital Payment Requirements-Designing E-payment System- Electronic Fund Transfer (EFT)-Electronic Data Interchange (EDT)-Credit Cards-Debit Cards-E- Cash-Electronic Cheques- Smart Cards-Net Banking-Digital Signature.

UNIT-IV

E-Security: Internet Protocols - Security on the Internet –Network and Website Security -Firewalls –Encryption–Access Control–Secure Electronic transactions.

UNIT-V

E-Marketing: Online Marketing–Advantages of Online Marketing–Internet Advertisement – Advertisement Methods – Conducting Online Market Research–Data mining and Marketing Research Marketing Strategy On the Web– E-Customer Relationship Management (e-CRM) –E- Supply Chain Management. (e-SCM) –New Trends in Supply Chain Management

Course Outcomes:

- They will be able to identify the priority of E-Commerce in the present globalized world.
- Will be able to understand E-market-Models which are practicing by the Organization
- Will be able to recognize various E-payment systems & importance of net Banking.
- By knowing E-advertisement, market research strategies, they can identify the Importance of customer role
- By understanding about E-security, they can ensure better access control to Secure the information.

Textbooks:

1. C.S.VMurthy "E-Commerce", Himalaya publication house, 2002.
2. P.T.SJoseph, "E-Commerce", 4thEdition, PrenticeHallofIndia2011

References:

1. Kamalesh KBajaj, Debjani Na, "E- ommerce",2ndEditionTataMcGrwHills2005
2. Dave Chaffey–"E-Commerce E-Management", 2ndEdition, Pearson, 2012.
3. Henry Chan, "E-Commerce Fundamentals and Application", Raymond Lee, Tharm WileyIndia2007
4. S.Jaiswall "E-Commerce", Galgotia Publication PvtLtd2003.

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(BA20AHS703) ENTREPRENEURSHIP & INCUBATION

(HUMANITIES ELECTIVE-II)

Course Objectives:

- To make the student understand about Entrepreneurship
- To enable the student in knowing various sources of generating new ideas in setting up of new enterprise
- To facilitate the student in knowing various sources of finance in starting up of a business
- To impart knowledge about various government sources which provide financial assistance to entrepreneurs/women entrepreneurs?
- To encourage the student in creating and designing business plans

UNIT-I

Entrepreneurship-Concept, knowledge and skills requirement - Characteristics of successful entrepreneurs - Entrepreneurship process - Factors impacting emergence of entrepreneurship - Differences between Entrepreneur and Intrapreneur - Understanding individual entrepreneurial mindset and personality-Recent trends in Entrepreneurship.

UNIT-II

Starting the New Venture - Generating business idea – Sources of new ideas & methods of generating ideas-Opportunity Recognition-Feasibility study-Market feasibility, technical/operational feasibility - Financial feasibility - Drawing business plan – Preparing project report-Presenting business plant investors.

UNIT-III

Sources of finance - Various sources of Finance available - Long term sources - Short term sources - Institutional Finance – Commercial Banks, SFC's in India -

NBFC's in India – their wayof financing in India for small and medium business - Entrepreneurship development programs in India-The entrepreneurial journey-Institutions in aid of entrepreneurship development

UNIT-IV

Women Entrepreneurship - Entrepreneurship Development and Government - Role of Central Government and State Government in promoting women Entrepreneurship - Introduction to various incentives, subsidies and grants – Export- oriented Units - Fiscal and Tax concessions available-Women entrepreneurship-Role and importance-Growth of women entrepreneurship in India –Issues & Challenges –Entrepreneurial motivations.

UNIT-V

Fundamentals of Business Incubation - Principles and good practices of business incubation- Process of business incubation and the business incubator and how they operate and influence the Type/benefits of incubators - Corporate/educational / institutional incubators – Broader business incubation environment - Pre-Incubation and Post - Incubation process - Idea lab, Business plan structure –Value proposition

Course Outcomes:

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

CO1: Understand the concept of Entrepreneurship and challenges in the world ofCompetition.
CO2: Apply the Knowledge in generating ideas for New Ventures.
CO3: Analyze various sources of finance and subsidies to entrepreneur/womenEntrepreneurs.
CO4: Evaluate the role of central government and state government inpromoting Entrepreneurship.
CO5: Create and design business plan structure through incubations.

Textbooks:

1. D F Kuratko and T V Rao, "Entrepreneurship" - A South-Asian Perspective – Cengage Learning, 2012. (For PPT, Case Solutions Faculty may visit:login.cengage.com)
2. Nandan H, "Fundamentals of Entrepreneurship",PHI,2013

References:

1. Vasant Desai, "Small Scale Industries and Entrepreneurship", Himalaya Publishing 2012.
2. Rajeev Roy "Entrepreneurship", 2nd Edition, Oxford, 2012.
3. B. Janakiram and M. Rizwana "Entrepreneurship Development: Text & Cases", ExcelBooks, 2011.
4. Stuart Read, Effectual "Entrepreneurship", Rout ledge, 2013.

E-RESOURCES

1. Entrepreneurship-Through-the-Lens-of-Venture Capital
2. http://www.onlinevideolecture.com/?course=mba-programs&subject=entrepreneurship
3. http://nptel.ac.in/courses/122106032/Pdf/7_4.pd

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(BA20AHS705) MANAGEMENT SCIENCE

(HUMANITIES ELECTIVE-II)

Course Objectives:

1. To provide fundamental knowledge on Management, Administration, Organization & its concepts.
2. To make the students understand the role of management in Production
3. To impart the concept of HR Min order to have an idea on Recruitment, Selection,
4. Training & Development, job evaluation and Merit rating concepts
5. To create awareness on identify Strategic Management areas & the PERT/CPM for better Project Management
6. To make the students aware of the contemporary issues in management

UNIT-I

INTRODUCTION TO MANAGEMENT: Management-Concept and meaning-Nature-Functions-Management as a Science and Art and both. Schools of Management Thought - Taylor's Scientific Theory-Henry Fayol's principles – 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-II

OPERATIONS MANAGEMENT– Principles and Types of Plant Layout - Methods of Production (Job, batch and Mass Production),Work Study - Statistical Quality Control-Deming's contribution to Quality. Material Management -Objectives - Inventory-Functions - Types, Inventory Techniques - EOQ-ABC Analysis – Purchase Procedure and Stores Management-Marketing Management-Concept-Meaning-Nature-Functions of Marketing - Marketing Mix- Channels of Distribution –Advertisement and Sales Promotion-Marketing Strategies based on Product Life Cycle.

UNIT-III

HUMAN RESOURCES MANAGEMENT(HRM)– HRM - Definition and Meaning – Nature - Managerial and Operative functions - Evolution of HRM -Job Analysis - Human Resource Planning (HRP) - Employee Recruitment-Sources of Recruitment –Employee Selection-Process and Tests in Employee Selection-Employee Training and Development-On-the-job & Off-the-job training methods-Performance Appraisal Concept-Methods of Performance Appraisal–Placement-Employee Induction-Wage and Salary Administration

UNIT-IV

STRATEGIC & PROJECT MANAGEMENT: Differences between Leader & Manager - Leadership – Leadership styles Leadership theories – Managerial Grid – Transactional Vs Transformational Leadership – Qualities of a good leader- Women Leadership in India.

UNIT-V

CONTEMPORARY ISSUES IN MANAGEMENT – The concept of Management Information System(MIS) - Materials Requirement Planning (MRP) -Customer Relations Management(CRM) - Total Quality Management (TQM) - Six Sigma Concept –Supply Chain Management(SCM)-Enterprise Resource Planning(ERP)-Performance Management- Business Process Outsourcing (BPO) - Business Process Re-engineering and Bench Marking –Balanced Score Card -Knowledge Management.

Course Outcomes:

CO1: Understand the concepts & principles of management and designs of organization in a practical world

CO2: Apply the knowledge of Work-study principles & Quality Control techniques in industry

CO3: Analyze the concepts of HR Min Recruitment, Selection and Training & Development.

CO4: Evaluate PERT/CPM Techniques for projects of an enterprise and estimate time & cost of project & to analyze the business through SWOT.

CO5: Create Modern technology in management science.

Textbooks:

1. A.R. Aryasri,"Management Science", TMH,2013
2. Stoner, Freeman, Gilbert, Management, Pearson Education, NewDelhi,2012.

References:

1. Koontz & Weihrich, "Essentials of Management", 6thedition, TMH, 2005.
2. Thomas N. Duening & John M.Ivancevich, "Management Principles and Guidelines",
3. Biztantra.
4. Kanishka Bedi, "Production and Operations Management", Oxford University Press, 2004.
5. Samuel C.Certo , "Modern Management", 9thedition,PHI,2005

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(EE20ASC701) ENERGY CONSERVATION AND AUDIT

(Skill Oriented Course – V)

Course Objectives:

The following industry relevant skills of the competency 'Undertake energy conservation and energy audit' are expected to be developed in the students by undertaking

- Identification of energy losses and opportunities of energy conservation.
- Implementation of energy conservation technique.
- Apply energy conservation techniques in electrical installations.
- Use Co-generation and relevant tariff for reducing losses in facilities.
- Carryout energy audit for electrical system.

List of Experiments:

Theory:

Different types of Electrical apparatus, ratings, units, Loads, efficiency calculations, power consumption calculations, improvement of p.f., lightening, fans, electricity tariff, need for energy saving, energy audit questionnaire

List of Experiments:

1. Analyze star labeled electrical apparatus and compare the data sheet (Pamphlet) of various star ratings.
2. Determine the '% loading' and the related efficiency of given Induction motor at different loading
3. Determine the reduction in power consumption in star mode operation of Induction motor compared to delta mode at no load/ light loads.
4. Use APFC / PFC unit for improvement of p. f. of electrical load.
5. Compare power consumption of (Fluorescent and LED) lighting
6. Determine Net Energy Saving by Lamp replacements.
7. Determine Energy conservation in Fan by using Electronic Regulator
8. Analysis of electric bill based on tariff of Industrial consumer to reduce energy usage and electric bill

9. To analyze the energy bill of a commercial consumer and to suggest (if needed) suitable tariff to achieve energy conservation and reduction in energy bill

10. To interpret the energy bill of a residential consumer, suggest suitable tariff to achieve energy conservation and reduction in energy bill.

11. Estimate energy saving by improving power factor and load factor for given cases.

12. Prepare a sample energy audit questionnaire for the given industrial facility.

13. Prepare an energy audit report

14. Determination of rating of Inverter capacity for household applications

References:

1. Guide Books no. 1 and 3 for National Certification Examination for Energy Managers and Energy Auditors
2. Energy Management and Conservation By Sharma, K. V., Venkataseshaiah P

Online Learning Resources/Virtual Labs:

1. https://nptel.ac.in/courses/108106022

Course Outcomes:

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

CO1: Understand energy conservation policies in India.

CO2: Design energy conservation techniques in electrical machines.

CO3: Apply energy conservation techniques in electrical installations, Co-generation and relevant tariff for reducing losses in facilities.

CO4: Design and analyze energy audit for electrical system.