R23 ACADEMIC REGULATIONS

COURSE STRUCTURE AND SYLLABI

of

I & II B.TECH. ELECRICAL AND ELECTRONICS ENGINEERING

FOR

B.TECH. REGULAR FOUR YEAR DEGREE PROGRAM

(For the batches admitted from 2023-24)

&

B.TECH. LATERAL ENTRY PROGRAM

(For the batches admitted from 2024-25)

CHOICE BASED CREDIT SYSTEM

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

SRI VENKATESWARA COLLEGE OF ENGINEERING

(AUTONOMOUS)

(Affiliated to J.N.T. University Anantapur, Ananthapuramu, Accredited by NBA & NAAC "A")

Karakambadi Road, Tirupati - 517 507

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

M 1: To impart high quality technical education by providing the state-of-the art infrastructure, core instruction.

M 2: Advanced research and technical consultancy services with qualified and senior faculty.

M 3: To prepare the students professionally deft and intellectually adept possessing excellent skill, knowledge and behavior with global competence.

Department of Electrical and Electronics Engineering

Vision

To prepare the learners globally competent, dynamic and multi-talented young leaders with skill set & knowledge in Electrical and Electronics Engineering field with a focus on higher education, professional practice, research and technical consultancy competence ethical concern.

Mission

M 1: To prepare the learners professionally deft and intellectually adept in the field of Electrical and Electronics Engineering with an excellent infrastructure, core values and qualified & experienced teaching faculty.

M 2: To inculcate skill, knowledge and behaviour to cater the dynamic requirements in the field of Electrical and Electronics Engineering.

M 3: To motivate and prepare the learners for career guidance, placements and higher education with a focus on MoUs with premier institutes and industries.

PROGRAM EDUCATIONAL OBJECTIVES

PEO1: Solve challenging technological issues in the field of Electrical and Electronics Engineering for the betterment of the living standards of the society as valuable and productive engineers.

PEO2: Improve the efficiency and effectiveness of the existing methodologies by adapting out-of-the-box rationalized thinking.

PEO3: Function ethically and communicate professionally as a team member within multidisciplinary teams.

PEO4: Continue the process of lifelong learning to cater the dynamically changing requirements in the field of Electrical and Electronics Engineering.

PROGRAM OUTCOMES

PO1: **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: **Problem Analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: **Design/Development of Solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

PO4: **Conduct Investigations of Complex Problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: **Modern Tool Usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: **The Engineer and Society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: **Environment and Sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: **Individual and Team Work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES

A graduate of the Electrical & Electronics Engineering Program will be able to:

PSO 1: Design and develop innovative projects using the domain knowledge of control systems, power electronics, electrical machines, microprocessors and microcontrollers.

PSO 2: Learn the constantly varying technological developments in their problem-solving process.

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.

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.

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 – R23" 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. 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. Six B. Tech. Programmes CSE, ECE, EEE, IT, ME & CE 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 Applicability
All the rules specified herein, approved by the Academic Council, shall be in force and applicable to students admitted from the academic year 2023 – 24 onwards. Any reference to "College" in these rules and regulations stands for Sri Venkateswara College of Engineering.

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 forthcoming meeting. As per the requirements of statutory bodies, Principal, **Sri Venkateswara College of Engineering** shall be the Chairman, Academic Council.

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.

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	Computer Science and Engineering
3	Computer Science and Engineering (Artificial Intelligence and Machine Learning)
4	Computer Science and Engineering (Cyber Security)
5	Computer Science and Engineering (Data Science)
6	Electronics and Communication Engineering
7	Electrical and Electronics Engineering
8	Information Technology
9	Mechanical Engineering

4. Award of the Degree

a) Award of the B.Tech. Degree / B.Tech. Degree with a Minor if he/she fulfils the following:
   (i) Pursues a course of study for not less than four academic years and not more than eight academic years. However, for the students availing Gap year facility this period shall be extended by two years at the most and these two years would in addition to the maximum period permitted for graduation (Eight years).
   (ii) Registers for 160 credits and secures all 160 credits.

b) Award of B.Tech. degree with Honors if he/she fulfils the following:
   (i) Student secures additional 15 credits fulfilling all the requisites of a B.Tech. program i.e., 160 credits.
   (ii) Registering for Honors is optional.
   (iii) Honors is to be completed simultaneously with B.Tech. programme.

c) Students, who fail to fulfill all the academic requirements for the award of the degree within eight academic years from the year of their admission, shall forfeit their seat in B.Tech. course and their admission stands cancelled. This clause shall be read along with **clause 4 a) i)**.

5. Admissions:

Admission to the B. Tech Program shall be made subject to the eligibility, qualifications and specialization prescribed by the A.P. State Government/University from time to time. Admissions shall be made either based on the merit rank obtained by the student in the common entrance examination conducted by the A.P. Government/University or any other order of merit approved by the A.P. Government/University, subject to reservations as prescribed by the Government/University from time to time.

6. Program related terms

Credit: A unit by which the course work is measured. It determines the number of hours of instruction required per week. One credit is equivalent to one hour of teaching (Lecture/Tutorial) or two hours of practical work/field work per week.

Credit Definition:

1 Hr. Lecture (L) per week	1 credit
1 Hr. Tutorial (T) per week	1 credit
1 Hr. Practical (P) per week	0.5 credit
2 Hrs. Practical (Lab) per week	1 credit

a) Academic Year: Two consecutive (one odd + one even) semesters constitute one academic year.

b) Choice Based Credit System (CBCS): The CBCS provides a choice for students to select from the prescribed courses.

7. Semester/Credits:

i. A semester comprises 90 working days and an academic year is divided into two semesters.

ii. The summer term is for eight weeks during summer vacation. Internship/ apprenticeship / work-based vocational education and training can be carried out during the summer term, especially by students who wish to exit after two semesters or four semesters of study.

iii. Regular courses may also be completed well in advance through MOOCs satisfying prerequisites.

8. Structure of the Undergraduate Programme

All courses offered for the undergraduate program (B. Tech.) are broadly classified as follows:

S.No	Category	Breakup of Credits (Total 160)	Percentage of Total Credits	AICTE Recommendations
1	Humanities and Social Science including Management (HS)	13	8%	8-9%
2	Basic Sciences (BS)	20	13%	12-16%
3	Engineering Sciences (ES)	23.5	14%	10-18%
4	Professional Core (PC)	54.5	34%	30-36%
5	Electives – Professional (PE) & Open (OE); Domain Specific Skill Enhancement Courses (SEC)	33	21%	19-23%
6	Internships & Project work (PR)	16	10%	8-11%
7	Mandatory Courses (MC)	Non-Credit	Non-Credit	-

9. Course Classification:

All subjects/ courses offered for the undergraduate programme in Engineering & Technology (B.Tech. degree programmes) are broadly Classified as follows:

S. No.	Broad Course Classification	Course Category	Description
1	Foundation Course	Foundation courses	Includes Mathematics, Physics and Chemistry; fundamental engineering courses; humanities, social sciences and management courses
2	Core Courses	Professional Core Courses (PC)	Includes subjects related to the parent discipline/ department/ branch of Engineering
3	Elective Courses	Professional Elective Courses (PE)	Includes elective subjects related to the parent discipline/department/ branch of Engineering
		Open Elective Courses (OE)	Elective subjects which include interdisciplinary subjects or subjects in an area outside the parent discipline/ department/ branch of Engineering

S. No.	Broad Course Classification	Course Category	Description
		Domain specific skill enhancement courses (SEC)	interdisciplinary/job-oriented/domain courses which are relevant to the industry
4	Project & Internships	Internships	Summer Internships – Community based and Industry Internships; Industry
5	Audit Courses	Mandatory non-credit courses	Covering subjects of developing desired attitude among the learners

10. Programme Pattern:

i. Total duration of the of B. Tech (Regular) Programme is four academic years.
ii. Each academic year of study is divided into two semesters.
iii. Minimum number of instruction days in each semester is 90 days.
iv. There shall be mandatory student induction program for fresher's, with a three-week duration before the commencement of first semester. Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, visits to local Areas, Familiarization to Dept./Branch & Innovations etc., are included as per the guidelines issued by AICTE.
v. Health/wellness/yoga/sports and NSS /NSS /Scouts & Guides / Community service activities are made mandatory as credit courses for all the under graduate students.
vi. Courses like Environmental Sciences, Indian Constitution, Technical Paper Writing & IPR are offered as non-credit mandatory courses for all the undergraduate students.
vii. Design Thinking for Innovation & Tinkering Labs are made mandatory as credit courses for all the undergraduate students.
viii. Increased flexibility for students through an increase in the elective component of the curriculum, with 05 Professional Elective courses and 04 Open Elective courses.
ix. Professional Elective Courses, include the elective courses relevant to the chosen specialization/branch. Proper choice of professional elective courses can lead to students specializing in emerging areas within the chosen field of study.
x. A total of 04 Open Electives are offered in the curriculum. A student can complete the requirement for B.Tech. Degree with a Minor within the 160 credits by opting for the courses offered through various verticals/tracks under Open Electives.
xi. While choosing the electives, students shall ensure that they do not opt for the courses with syllabus contents similar to courses already pursued.
xii. A pool of interdisciplinary/job-oriented/domain skill courses which are relevant to the industry are integrated into the curriculum of all disciplines. There shall be 05 skill-oriented courses offered during III to VII semesters. Among the five skill courses, four courses shall focus on the basic and advanced skills related to the domain/interdisciplinary courses and the other shall be a soft skills course.
xiii. Students shall undergo mandatory summer internships, for a minimum of eight weeks' duration at the end of second and third year of the programme. The internship at the end of second year shall be community oriented and industry internship at the end of third year.
xiv. There shall also be mandatory full internship in the final semester of the programme along with the project work.
xv. Undergraduate degree with Honors is introduced by the college for the students having good academic record.
xvi. Each college shall take measures to implement Virtual Labs (https://www.vlab.co.in) which provide remote access to labs in various disciplines of Engineering and will help student in learning basic and advanced concept through remote experimentation. Student shall be made to work on virtual lab experiments during the regular labs.

xvii. Each college shall assign a faculty advisor/mentor after admission to a group of students from same department to provide guidance in courses registration/career growth/placements/opportunities for higher studies/GATE/other competitive exams etc.

xviii. Preferably 25% of course work for the theory courses in every semester shall be conducted in the blended mode of learning.

11. Evaluation Process: -

i. 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. Summer Internships shall be evaluated for 50 marks, Full Internship & Project work in final semester shall be evaluated for 200 marks, mandatory courses with no credits shall be evaluated for 30 mid semester marks.

ii. A student has to secure not less than 35% 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 for the theory, practical, design, drawing subject or project etc. In case of a mandatory course, he/she should secure 40% of the total marks.

11.1 Theory Courses:

Assessment Method	**Marks**
Continuous Internal Assessment	30
Semester End Examination	70
Total	**100**

i. For theory subject, the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End-Examination.

ii. For practical subject, the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End- Examination.

iii. If any course contains two different branch subjects, the syllabus shall be written in two parts with 3 units each (Part-A and Part-B) and external examination question paper shall be set with two parts each for 35 marks.

a) Continuous Internal Evaluation

i. For theory subjects, during the semester, there shall be two midterm examinations. Each midterm examination shall be evaluated for 30 marks of which 10 marks for objective paper (20 minutes duration), 15 marks for subjective paper (90 minutes duration) and 5 marks for assignment.

ii. Objective paper shall contain for 05 short answer questions with 2 marks each or maximum of 20 bits for 10 marks. Subjective paper shall contain 3 either or type questions (totally six questions from 1 to 6) of which student has to answer one from each either-or type of questions. Each question carries 10 marks. The marks obtained in the subjective paper are condensed to 15 marks.

iii. The internal evaluation for the course on **"Design Thinking and Innovation"** shall be activity based, in the form of presentations / reports as per the curriculum and shall be evaluated for 15 marks by the concerned teacher and 15 marks for internal tests. There shall be two internal tests. The internal test shall be of 20 marks for subjective paper and 10 marks for objective paper, total shall be condensed to 15 marks.

Note:

i. The objective paper shall be prepared in line with the quality of competitive examinations questions.

ii. The subjective paper shall contain 3 either or type questions of equal weight age of 10 marks. Any fraction shall be rounded off to the next higher mark.

iii. The objective paper shall be conducted by the respective institution on the day of subjective paper test.

iv. Assignments shall be in the form of problems, mini projects, design problems, slip tests, quizzes etc., depending on the course content. It should be continuous assessment throughout the semester and the average marks shall be considered.
v. 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.
vi. 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 with one either or type question from each unit.
vii. Final mid semester marks shall be arrived at by considering the marks secured by the student in both the mid examinations with 80% weight age given to the better mid exam and 20% to the other.

For Example:

Marks obtained in first mid: 25
Marks obtained in second mid: 20
Final mid semester Marks: (25x0.8) + (20x0.2) = 24

If the student is absent for any one midterm examination, the final mid semester marks shall be arrived at by considering 80% weight age to the marks secured by the student in the appeared examination and zero to the other. For Example:

Marks obtained in first mid: Absent
Marks obtained in second mid: 25
Final mid semester Marks: (25x0.8) + (0x0.2) =20

b) End Examination Evaluation:

End examination of theory subjects shall have the following pattern:

i. There shall be 6 questions and all questions are compulsory.
ii. Question I shall contain 10 compulsory short answer questions for a total of 20marks such that each question carries 2 marks.
iii. There shall be 2 short answer questions from each unit. In each of the questions from 2 to 6, there shall be either/or type questions of 10 marks each. Student shall answer any one of them.
iv. The questions from 2 to 6 shall be set by covering one unit of the syllabus for each question.
v. End examination of theory subjects consisting of two parts of different subjects, for Example: Basic Electrical & Electronics Engineering shall have the following pattern:
    a. Question paper shall be in two parts viz., Part A and Part B with equal weight age of 35 marks each.
    b. In each part, question 1 shall contain 5 compulsory short answer questions for a total of 5 marks such that each question carries 1mark.
    c. In each part, questions from 2 to 4, there shall be either/or type questions of 10 marks each. Student shall answer any one of them.
    d. The questions from 2 to 4 shall be set by covering one unit of the syllabus for each question.

11.2 Practical Courses

Assessment Method	Marks
Continuous Internal Assessment	30
Semester End Examination	70
Total	100

i. For practical courses, there shall be a continuous evaluation during the semester for 30 sessional marks and end examination shall be for 70 marks.

ii. Day-to-day work in the laboratory shall be evaluated for 15 marks by the concerned laboratory teacher based on the record/viva and 15 marks for the internal test.

iii. The end examination shall be evaluated for 70 marks, conducted by the concerned laboratory teacher and a senior expert in the subject from the same department.
- Procedure: 20 marks
- Experimental work & Results: 30 marks
- Viva voce: 20 marks.

In a practical subject consisting of two parts (Eg: Basic Electrical & Electronics Engineering Lab), the end examination shall be conducted for 70 marks as a single laboratory in 3 hours. Mid semester examination shall be evaluated as above for 30 marks in each part and final mid semester marks shall be arrived by considering the average of marks obtained in two parts.

iv. For the subject having design and/or drawing, such as Engineering Drawing, the distribution of marks shall be 30 for mid semester evaluation and 70 for end examination.

Day-to-day work shall be evaluated for 15 marks by the concerned subject teacher based on the reports/submissions prepared in the class. And there shall be two midterm examinations in a semester for duration of 2 hours each for 15 marks with weight age of 80% to better mid marks and 20% for the other. The subjective paper shall contain 3 either or type questions of equal weight age of 5 marks. There shall be no objective paper in mid semester examination. The sum of day- to-day evaluation and the mid semester marks will be the final sessional marks for the subject.

The end examination pattern for Engineering Graphics, shall consists of 5 questions, either/or type, of 14 marks each. There shall be no objective type questions in the end examination. However, the end examination pattern for other subjects related to design/drawing, multiple branches, etc is mentioned along with the syllabus.

v. There shall be no external examination for mandatory courses with zero credits. However, attendance 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 internal examinations. In case, the student fails, a re-examination shall be conducted for failed candidates for 30 marks satisfying the conditions mentioned in item 1 & 2 of the regulations.

vi. The laboratory records and mid semester test papers shall be preserved for a minimum of 3 years in the respective institutions as per the University norms and shall be produced to the Committees of the University as and when the same are asked for.

vii. Evaluation Guidelines for the courses like HEALTH AND WELLNESS, YOGA & SPORTS AND NSS/NCC/SCOUT & GUIDES/ COMMUNITY SERVICE is
- Evaluated for a total of 100 marks.
- A Student can select 6 activities of his/her choice with a minimum of 1 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totally to 90 marks.
- The student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.

12. Skill Oriented Courses.

i. There shall be five skill-oriented courses offered during III to VII semesters.

ii. Out of the five skill courses two shall be skill-oriented courses from the same domain. Of the remaining three skill courses, one shall be a soft skill course and the remaining two shall be skill-advanced courses from the same domain/Interdisciplinary/Job oriented.

iii. The course shall carry 100 marks and shall be evaluated through continuous assessments during the semester for 30 sessional marks and end examination shall be for 70 marks. Day-to-day work in the class / laboratory shall be evaluated for 30 marks by the concerned teacher based on the regularity/assignments/viva/mid semester test. The end examination similar to practical examination pattern shall be conducted by the concerned teacher and an expert in the subject nominated by the principal.

iv. The Head of the Department shall identify a faculty member as coordinator for the course. A committee consisting of the Head of the Department, coordinator and a senior Faculty member nominated by the Head of the Department shall monitor the evaluation process. The marks/grades shall be assigned to the students by the above committee based on their performance.
v. 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 industries/Professional bodies or any other accredited bodies. If a student chooses to take a Certificate Course offered by external agencies, the credits shall be awarded to the student upon producing the Course Completion Certificate from the agency. A committee shall be formed at the level of the college to evaluate the grades/marks given for a course by external agencies and convert to the equivalent marks/grades.
vi. The recommended courses offered by external agencies, conversions and appropriate grades/marks are to be approved by the College at the beginning of the semester.
vii. If a student prefers to take a certificate course offered by external agency, the department shall mark attendance of the student for the remaining courses in that semester excluding the skill course in all the calculations of mandatory attendance requirements upon producing a valid certificate as approved by the College.

13. Massive Open Online Courses (MOOCs):
A Student has to pursue and complete one course compulsorily through MOOCs approved by the College. A student can pursue courses other than core through MOOCs and it is mandatory to complete one course successfully through MOOCs for awarding the degree. A student is not permitted to register and pursue core courses through MOOCs.

A student shall register for the course (Minimum of either 8 weeks or 12 weeks) offered through MOOCs with the approval of Head of the Department. The Head of the Department shall appoint one mentor to monitor the student's progression. The student needs to earn a certificate by passing the exam. The student shall be awarded the credits assigned in the curriculum only by submission of the certificate. Examination fee, if any, will be borne by the student.

Students who have qualified in the proctored examinations conducted through MOOCs platform can apply for credit transfer as specified and are exempted from appearing internal as well as external examination (for the specified equivalent credit course only) conducted by the College.

Necessary amendments in rules and regulations regarding adoption of MOOC courses would be proposed from time to time.

14. Credit Transfer Policy:
Adoption of MOOCs is mandatory, to enable Blended model of teaching-learning as also envisaged in the NEP 2020. As per University Grants Commission (Credit Framework for Online Learning Courses through SWAYAM) Regulation, 2016, the College shall allow up to a maximum of 20% of the total courses being offered in a particular programme i.e., maximum of **32** credits through MOOCs platform.

i. The College shall offer credit mobility for MOOCs and give the equivalent credit weight age to the students for the credits earned through online learning courses.
ii. Student registration for the MOOCs shall be only through the respective department of the institution, it is mandatory for the student to share necessary information with the department.
iii. Credit transfer policy will be applicable to the Professional & Open Elective courses only.
iv. The concerned department shall identify the courses permitted for credit transfer.
v. The College/institution shall notify at the beginning of semester the list of the online learning courses eligible for credit transfer.
vi. The institution shall designate a faculty member as a Mentor for each course to guide the students from registration till completion of the credit course.

vii. The College shall ensure no overlap of MOOC exams with that of the College examination schedule. In case of delay in results, the College will re-issue the marks sheet for such students.
viii. Student pursuing courses under MOOCs shall acquire the required credits only after successful completion of the course and submitting a certificate issued by the competent authority along with the percentage of marks and grades.
ix. The departments shall submit the following to the examination section of the College:
    a) List of students who have passed MOOC courses in the current semester along with the certificate of completion.
    b) Undertaking form filled by the students for credit transfer.
x. The College shall resolve any issues that may arise in the implementation of this policy from time to time and shall review its credit transfer policy in the light of periodic changes brought by UGC, SWAYAM, NPTEL and state government.

Note: Students shall be permitted to register for MOOCs offered through online platforms approved by the College from time to time.

15. Academic Bank of Credits (ABC):

The College has implemented Academic Bank of Credits (ABC) to promote flexibility in curriculum as per NEP 2020 to

i. Provide option of mobility for learners across the universities of their choice.
ii. Provide option to gain the credits through MOOCs from approved digital platforms.
iii. Facilitate award of certificate/diploma/degree in line with the accumulated credits in ABC.
iv. Execute Multiple Entry and Exit system with credit count, credit transfer and credit acceptance from students' account.

16. Mandatory Internships:

16.1 Summer Internships: Two summer internships either onsite or virtual each with a minimum of 08 weeks' duration, done at the end of second and third years, respectively are mandatory. It shall be completed in collaboration with local industries, Govt. Organizations, construction agencies, Power projects, software MNCs or any industries in the areas of concerned specialization of the Undergraduate program. One of the two summer internships at the end of second year (Community Service Project) shall be society oriented and shall be completed in collaboration with government organizations/NGOs & others. The other internship at the end of third year is Industry Internship and shall be completed in collaboration with Industries. The student shall register for the internship as per course structure after commencement of academic year. The guidelines issued by the APSCHE / College shall be followed for carrying out and evaluation of Community Service Project and Industry Internship. Evaluation of the summer internships shall be through the departmental committee. A student will be required to submit a summer internship report to the concerned department and appear for an oral presentation before the departmental committee comprising of Head of the Department, supervisor of the internship and a senior faculty member of the department. A Certificate of successful completion from industry shall be included in the report. The report and the oral presentation shall carry 50% weight age each. It shall be evaluated for 50 external marks. There shall be no internal marks for Summer Internship. A student shall secure minimum 40% of marks for successful completion. In case, if a student fails, he/she shall reappear as and when semester supplementary examinations are conducted by the College.

16.2 Full Semester Internship and Project work: In the final semester, the student should mandatorily register and undergo internship (onsite/virtual) and in parallel he/she should work on a project with well-defined objectives. At the end of the semester the candidate shall submit an internship completion certificate and a project report. A student shall also be permitted to submit project report on the work carried out during the internship.

The project report shall be evaluated with an external examiner. The total marks for project work 200 marks and distribution shall be 60 marks for internal and 140 marks for external

evaluation. The supervisor assesses the student for 30 marks (Report: 15 marks, Seminar: 15 marks). At the end of the semester, all projects shall be showcased at the department for the benefit of all students and staff and the same is to be evaluated by the departmental Project Review Committee consisting of supervisor, a senior faculty and HOD for 30 marks. The external evaluation of Project Work is a Viva-Voce Examination conducted in the presence of internal examiner and external examiner appointed by the College and is evaluated for 140 marks. The college shall facilitate and monitor the student internship programs. Completion of internships is mandatory, if any student fails to complete internship, he/she will not be eligible for the award of degree. In such cases, the student shall repeat and complete the internship.

17. Guidelines for offering a Minor:

To promote interdisciplinary knowledge among the students, the students admitted into B.Tech. in a major stream/branch are eligible to obtain degree in Minor in another stream.

The Minor program requires the completion of 18 credits in Minor stream chosen.

05 theory courses of 3 credits each, 2 practical courses of 1.5 credits each or a Project for 3 credits, for Minor Program.

Specialization tracks are available for Minor Program.

18. Guidelines for offering Honors

The objective of introducing B.Tech. (Hons.) is to facilitate the students to choose additionally the specialized courses of their choice and build their competence in a specialized area in the UG level. The programme is a best choice for academically excellent students having good academic record and interest towards higher studies and research.

i. Honors is introduced in the curriculum of all B. Tech. programs offering a major degree and is applicable to all B. Tech (Regular and Lateral Entry) students admitted in Engineering & Technology.
ii. A student shall earn additional 18 credits for award of B.Tech. (Honors) degree from same branch/department/discipline registered for major degree. This is in addition to the credits essential for obtaining the Undergraduate degree in Major Discipline (i.e., 160 credits).
    05 theory courses of 3 credits each, 2 practical courses of 1.5 credits each or a Project for 3 credits, for Honors Program.
    Specialization tracks are available for Honors Program.
iii. A student is permitted to register for Honors in IV semester after the results of III Semester are declared and students may be allowed to take maximum two subjects per semester pertaining to the Honors from V Semester onwards.
iv. The concerned Principal of the college shall arrange separate class work and timetable of the courses offered under Honors program.
v. Courses that are used to fulfil the student's primary major may not be double counted towards the Honors. Courses with content substantially equivalent to courses in the student's primary Major may not be counted towards the Honors.
vi. Students can complete the courses offered under Honors either in the college or in online platforms like SWAYAM with a minimum duration of 12 weeks for a 3-credit course and 8 weeks' duration for a 2-credit course satisfying the criteria for credit mobility. If the courses under Honors are offered in conventional mode, then the teaching and evaluation procedure shall be similar to regular B. Tech courses.
vii. The attendance for the registered courses under Honors and regular courses offered for Major degree in a semester are to be considered separately.
viii. A student shall maintain an attendance of 75% in all registered courses under Honors to be eligible for attending semester end examinations.
ix. A student registered for Honors shall pass in all subjects that constitute the requirement for the Honors degree program. No class/division (i.e., second class, first class and distinction, etc.) shall be awarded for Honors degree programme.
x. If a student drops or is terminated from the Honors program, the additional credits so

far earned cannot be converted into open or core electives; they will remain extra. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.

xi. The Honors will be mentioned in the degree certificate as Bachelor of Technology (Honors) in XYZ. For example, B.Tech. (Honors) in Mechanical Engineering.

19. Enrolment into Honors:

i. Students of a Department/Discipline are eligible to opt for Honors program offered by the same Department/Discipline.

ii. The enrolment of student into Honors is based on the CGPA obtained in the major degree program. CGPA shall be taken up to III semester in case of regular entry students and only III semester in case of lateral entry students. Students having 7 CGPA without any backlog subjects will be permitted to register for Honors.

iii. If a student is detained due to lack of attendance either in Major or in Honors, registration shall be cancelled.

iv. Transfer of credits from Honors to regular B. Tech degree and vice-versa shall not be permitted.

v. Honors are to be completed simultaneously with a Major degree program.

20. Registration for Honors:

i. The eligible and interested students shall apply through the HOD of his/her parent department. The whole process should be completed within one week before the start of every semester. Selected students shall be permitted to register the courses under Honors.

ii. The selected students shall submit their willingness to the principal through his/her parent department offering Honors. The parent department shall maintain the record of student pursuing the Honors.

iii. The students enrolled in the Honors courses will be monitored continuously. An advisor/mentor from parent department shall be assigned to a group of students to monitor the progress.

iv. There is no fee for registration of subjects for Honors program offered in offline at the respective institutions.

21. Attendance Requirements:

i. A student shall be eligible to appear for the College external examinations if he/she acquires a minimum of 40% attendance in each subject and 75% of attendance in aggregate of all the subjects. b) Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee.

ii. Shortage of Attendance below 65% in aggregate shall in NO CASE be condoned.

iii. A stipulated fee shall be payable towards Condonation of shortage of attendance to the College.

iv. Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that class and their registration shall stand cancelled.

v. A student will not be promoted to the next semester unless he satisfies the attendance requirements of the present semester. They may seek readmission for that semester from the date of commencement of class work.

vi. If any candidate fulfils the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.

vii. If the learning is carried out in blended mode (both offline & online), then the total attendance of the student shall be calculated considering the offline and online attendance of the student.

viii. For induction programme attendance shall be maintained as per AICTE norms.

22. Promotion Rules:
The following academic requirements must be satisfied in addition to the attendance requirements mentioned in **section 18**.

i. A student shall be promoted from first year to second year if he/she fulfils the minimum attendance requirement as per College norms.
ii. A student will be promoted from II to III year if he/she fulfils the academic requirement of securing 40% of the credits (any ***decimal*** fraction should be ***rounded off*** to ***lower*** digit) up to in the subjects that have been studied up to III semester
iii. A student shall be promoted from III year to IV year if he/she fulfils the academic requirements of securing 40% of the credits (any ***decimal*** fraction should be ***rounded off*** to ***lower*** digit) in the subjects that have been studied up to V semester. And in case a student is detained for want of credits for a particular academic year by ii) & iii) above, the student may make up the credits through supplementary examinations and only after securing the required credits he/she shall be permitted to join in the V semester or VII semester respectively as the case may be.
iv. When a student is detained due to lack of credits/shortage of attendance he/she may be re-admitted when the semester is offered after fulfillment of academic regulations. In such case, he/she shall be in the academic regulations into which he/she is readmitted.

23. Grading:
As a measure of the student's performance, a 10-point Absolute Grading System using the following Letter Grades and corresponding percentage of marks shall be followed:

After each course is evaluated for 100 marks, the marks obtained in each course 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	Grade	Grade points Assigned
90 & above	S(Superior)	10
80 - 89	A(Excellent)	9
70 - 79	B(Very Good)	8
60 - 69	C (Good)	7
50 - 59	D (Average)	6
40 - 49	E (Pass)	5
< 40	F (Fail)	0
Absent	Ab (Absent)	0

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.

For non-credit audit courses, "Satisfactory" or "Unsatisfactory" shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA/Percentage.

Computation of 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 point scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.,

$$SGPA = \sum_{i=1}^{n}(C_i \times G_i) \Big/ \sum_{i=1}^{n} C_i$$

Where, C_i is the number of credits of the ith subject, G_i is the grade point scored by the student in the ith course and n is the no. of subjects. 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 aprogramme, i.e.

$$CGPA = \sum_{i=1}^{n}(C_i \times S_i) \Big/ \sum_{i=1}^{n} C_i$$

Where S_i is the SGPA of the ith semester, C_i is the total number of credits in that semester and n is the no. of semesters. Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts. 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 the letters S, A, B, C, D, E and F.

24. Award of Class:

After a student has satisfied the requirements prescribed for the completion of the program 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	≥ 5.0 < 5.5

CGPA to Percentage Conversion Formula – (CGPA – 0.5) x 10

25. 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.

26. 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.

27. 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.

28. 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 fulfil 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. 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.

29. Multiple Entry / Exit Option:

(a) Exit Policy:

The students can choose to exit the four-year programme at the end of first/second/third year.

UG Certificate in (Field of study/discipline) - Programme duration: First year (first two semesters) of the undergraduate programme, 40 credits followed by an additional exit 10-credit bridge / Skill oriented course(s) lasting two months, including at least 6- credit job-specific internship/ apprenticeship that would help the candidates acquire job-ready competencies required to enter the workforce.

UG Diploma (in Field of study/discipline) - Programme duration: First two years (first four semesters) of the undergraduate programme, 80 credits followed by an additional exit 10-credit bridge / Project oriented course(s) lasting two months, including at least 6- credit job-specific internship/ apprenticeship that would help the candidates acquire job-ready competencies required to enter the workforce.

Bachelor of Science (in Field of study/discipline) i.e., **B.Sc. Engineering in (Field of study/discipline)**- Programme duration: First three years (first six semesters) of the undergraduate programme, 120 credits.

(b) Entry Policy:

Modalities on multiple entry by the student into the B.Tech. programme will be provided in due course of time.

Note: The Universities shall resolve any issues that may arise in the implementation of Multiple Entry and Exit policies from time to time and shall review the policies in the light of periodic changes brought by UGC, AICTE and State government.

30. Gap Year Concept:

Gap year concept for Student Entrepreneur in Residence is introduced and outstanding students who wish to pursue entrepreneurship / become entrepreneur are allowed to take a break of one year at any time after II year to pursue full-time entrepreneurship programme/to establish start-ups. 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 principal of the respective college shall forward such proposals submitted by the students to the College. An evaluation committee constituted by the College shall evaluate the proposal submitted by the student and the committee shall decide whether to permit the student(s) to avail the Gap Year or not.

31. Transitory Regulations:

Discontinued, detained, or failed candidates are eligible for readmission as and when the semester is offered after fulfillment 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 as and when subjects are offered, subject to **section 4. (c)** and they will follow the academic regulations into which they are readmitted.

Candidates who are permitted to avail Gap Year shall be eligible for re-joining into the succeeding year of their B.Tech. from the date of commencement of class work, subject to **section 4. (c)** and they will follow the academic regulations into which they are readmitted.

32. Minimum Instruction Days for a Semester:
The minimum instruction days including exams for each semester shall be 90 days.

33. Medium of Instruction:
The medium of instruction of the entire B. Tech undergraduate programme in Engineering & Technology (including examinations and project reports) will be in English only.

34. Student Transfers:
Student transfers shall be as per the guidelines issued by the Government of Andhra Pradesh and the Universities from time to time.

35. General Instructions:
The academic regulations should be read as a whole for purpose of any interpretation.

i. Malpractices **rules-nature** and punishments are appended.
ii. Where the words "he", "him", "his", occur in the regulations, they also include "she", "her", "hers", respectively.
iii. In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Head of the institution is final.
iv. The College may change or amend the academic regulations or syllabi at any time and the changes or amendments shall be made applicable to all the students on rolls with effect from the dates notified by the College.
v. In the case of any doubt or ambiguity in the interpretation of the guidelines given, the decision of the Head of the institution is final.

36. 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

37. 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	Expulsion from the examination hall and cancellation of the performance in that subject only.

S No	Nature of Malpractices/ Improper conduct	Punishment
	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).	
(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

S No	Nature of Malpractices/ Improper conduct	Punishment
		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 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.	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 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

S No	Nature of Malpractices/ Improper conduct	Punishment
		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 and 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.

ACADEMIC REGULATIONS (R23)
FOR B.TECH. (LATERAL ENTRY SCHEME)

(Effective for the students admitted into II year through Lateral Entry Scheme from the Academic Year **2024-25** onwards)

1. Award of the Degree

(a) Award of the B.Tech. Degree / B.Tech. Degree with a Minor if he/she fulfils the following:

i. Pursues a course of study for not less than three academic years and not more than six academic years. However, for the students availing Gap year facility this period shall be extended by two years at the most and these two years would in addition to the maximum period permitted for graduation (Six years).
ii. Registers for 120 credits and secures all 120 credits.

(b) Award of B.Tech. Degree with Honors if he/she fulfils the following:

i. Student secures additional 15 credits fulfilling all the requisites of a B.Tech. program i.e., 120 credits.
ii. Registering for Honors is optional.
iii. Honors is to be completed simultaneously with B.Tech. programme.

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

3. Minimum Academic Requirements:

The following academic requirements have to be satisfied in addition to the requirements mentioned in item no.**2**

i. 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 secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the mid semester evaluation and end examination taken together.
ii. A student shall be promoted from III year to IV year if he/she fulfils the academic requirements of securing 40% of the credits (any decimal fraction should be rounded off to lower digit) in the subjects that have been studied up to V semester. And in case if student is already detained for want of credits for particular academic year, the student may make up the credits through supplementary exams of the above exams before the commencement of IV year I semester class work of next year.

4. Course Pattern:

i. The entire course of study is three academic years on semester pattern.
ii. 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.
iii. 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 fulfillment of academic regulations, the student shall be in the academic regulations into which he/she is readmitted.

5. All other regulations as applicable for B. Tech. Four-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme).

COURSE STRUCTURE

B.Tech. – I Year I Semester

S. No	Course Code	Course Name	Category	Contact Periods per Week				Credits	Scheme of Examination Max. Marks		
				L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
1	EE23AES101	Basic Electrical and Electronics Engineering	ES	3	0	0	3	3	30	70	100
2	EG23AHS101	Communicative English	BS	2	0	0	2	2	30	70	100
3	PH23ABS101	Engineering Physics	BS	3	0	0	3	3	30	70	100
4	CS23AES101	Introduction to Programming	ES	3	0	0	3	3	30	70	100
5	MA23ABS101	Linear Algebra & Calculus	BS	3	0	0	3	3	30	70	100
6	EG23AHS102	Communicative English Lab	BS	0	0	2	2	1	30	70	100
7	CS23AES102	Computer Programming Lab	ES	0	0	3	3	1.5	30	70	100
8	EE23AES102	Electrical & Electronics Engineering Workshop	ES	0	0	3	3	1.5	30	70	100
9	PH23ABS102	Engineering Physics Lab	BS	0	0	2	2	1	30	70	100
10	CH23ABS105	Health and Wellness, Yoga and Sports	BS	0	0	1	1	0.5	100	--	100
Total				**14**	**0**	**11**	**25**	**19.5**	**370**	**630**	**1000**

B.Tech. – I Year II Semester

S. No	Course Code	Course Name	Category	Contact Periods per Week				Credits	Scheme of Examination Max. Marks		
				L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
1	ME23AES101	Basic Civil & Mechanical Engineering	ES	3	0	0	3	3	30	70	100
2	MA23ABS201	Differential Equations & Vector Calculus	ES	3	0	0	3	3	30	70	100
3	EE23APC201	Electrical Circuit Analysis-I	PC	3	0	0	3	3	30	70	100
4	CH23ABS101	Chemistry	BS	3	0	0	3	3	30	70	100
5	ME23AES102	Engineering Graphics	ES	1	0	4	5	3	30	70	100
6	EE23APC202	Electrical Circuit Analysis-I Lab	PC	0	0	3	3	1.5	30	70	100
7	CH23ABS102	Chemistry Lab	BS	0	0	2	2	1	30	70	100
8	ME23AES103	Engineering Workshop	ES	0	0	3	3	1.5	30	70	100
9	CS23AES103	IT Workshop	BS	0	0	2	2	1	30	70	100
10	CH23ABS106	NSS/NCC/Scouts & Guides / Community Service	BS	0	0	1	1	0.5	100	--	100
Total				**13**	**0**	**15**	**28**	**20.5**	**370**	**630**	**1000**

B.Tech. – II Year I Semester

S. No	Course Code	Course Name	Category	Contact Periods per Week				Credits	Scheme of Examination Max. Marks		
				L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
1	MA23ABS301	Complex Variables and Numerical Methods	BS	3	0	0	3	3	30	70	100
2	EE23AES301	Electromagnetic Field Theory	ES	3	0	0	3	3	30	70	100
3	BA23AHS302	Universal Human Values	HS	2	1	0	3	3	30	70	100
4	EE23APC301	DC Machines and Transformers	PC	3	0	0	3	3	30	70	100
5	EE23APC302	Electrical Circuit Analysis-II	PC	3	0	0	3	3	30	70	100
6	EE23APC303	DC Machines and Transformers Lab	PC	0	0	3	3	1.5	30	70	100
7	EE23APC304	Electrical Circuit Analysis-II and Simulation Lab	PC	0	0	3	3	1.5	30	70	100
8	CS23ASC301	Data Structures	SC	0	1	2	3	2	30	70	100
9	CH23AMC301	Environmental Science	MC	2	0	0	2	0	30	--	30
Total				**16**	**2**	**8**	**26**	**20**	**270**	**560**	**830**

B.Tech. – II Year II Semester

S. No	Course Code	Course Name	Category	Contact Periods per Week				Credits	Scheme of Examination Max. Marks		
				L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
1	EC23AES401	Analog Circuits	ES	3	0	0	3	3	30	70	100
2	BA23AHS403	Managerial Economics and Financial Analysis	HS	2	0	0	2	2	30	70	100
3	EE23APC401	Control Systems	PC	3	0	0	3	3	30	70	100
4	EE23APC402	Induction and Synchronous Machines	PC	3	0	0	3	3	30	70	100
5	EE23APC403	Power Systems-I	PC	3	0	0	3	3	30	70	100
6	CS23AES301	Design Thinking and Innovation	ES	1	0	2	3	2	30	70	100
7	EE23APC404	Control Systems Lab	PC	0	0	3	3	1.5	30	70	100
8	EE23APC405	Induction and Synchronous Machines Lab	PC	0	0	3	3	1.5	30	70	100
9	CS23ASC302	Python Programming	SC	0	1	2	3	2	30	70	100
Total				**15**	**1**	**10**	**26**	**21**	**270**	**630**	**900**
Mandatory Community Service Project Internship of 08 Weeks Duration during Summer Vacation											

I Year B.Tech. EEE – I Semester

L	T	P	C
3	0	0	3

(EE23AES101) BASIC ELECTRICAL & ELECTRONICS ENGINEERING

PART A: BASIC ELECTRICAL ENGINEERING

COURSE OBJECTIVES:

The objective of this course are to:

- Gain the knowledge about various laws, simplification techniques and principles associated with electrical circuits.
- Acquire basic knowledge about the Electric machines, their principle of operation and the concept of measuring instruments.
- Understand the concept of Power Generation, Electricity Bill and Safety Measures.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO 1: Apply the knowledge of theorems/laws to analyze the simple AC and DC circuits.
CO 2: Illustrate the operating principles of various electrical machines and electrical measuring equipment's.
CO 3: Understand the basic concepts of electrical power generation, Electricity Bill and Safety Measures.

UNIT I: (8 Periods)

DC Circuits: Electrical circuit elements (R, L and C), Ohm's Law and its limitations, KCL & KVL, series, parallel, series-parallel circuits, Super Position theorem, Simple numerical problems.

AC Circuits: A.C. Fundamentals: Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor, Voltage and current relationship with phasor diagrams in R, L, and C circuits, Concept of Impedance, Active power, reactive power and apparent power, Concept of power factor (Simple Numerical problems).

UNIT II: (7 Periods)

Machines: Construction, principle and operation of (i) DC Motor, (ii) DC Generator, (iii) Single Phase Transformer, (iv) Three Phase Induction Motor and (v) Alternator, Applications of electrical machines.

Measuring Instruments: Construction and working principle of Permanent Magnet Moving Coil (PMMC), Moving Iron (MI) Instruments and Wheat Stone Bridge.

UNIT III: (7 Periods)

Energy Resources, Electricity Bill & Safety Measures Energy Resources: Conventional and non-conventional energy resources; Layout and operation of various Power Generation systems: Hydel, Nuclear, Solar & Wind power generation.

Electricity Bill: Power rating of household appliances including air conditioners, PCs, Laptops, Printers, etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers.

TEXT BOOKS:

1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition.
2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013.
3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition.

REFERENCES:

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Mc Graw Hill, 2019, Fourth Edition.
2. Principles of Power Systems, V.K. Mehtha, S.Chand Technical Publishers,2020.
3. Basic Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford University Press, 2017.
4. Basic Electrical and Electronics Engineering, S.K.Bhatacharya, Person Publications, 2018, Second Edition.

PART B: BASIC ELECTRONICS ENGINEERING

COURSE OBJECTIVES:

The objective of this course are to:

- Understand the working principle of various electronic devices.
- Acquire knowledge on the operating conditions of a DC power supply system, amplifiers and general electronic instrumentation system.
- Learn basic techniques in the design of a logic circuit.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO 1: Apply the concept of science and mathematics to understand the working principles of electronic devices.
CO 2: Analyze the working principle of a DC power supply system and Amplifiers.
CO 3: Solve digital logic circuits and implement using different logic gates.

UNIT I: (7 Periods)

Semiconductor Devices: Introduction - Evolution of electronics - Characteristics of PN Junction Diode - Zener Effect- Zener Diode and its Characteristics. Bipolar Junction Transistor - CB, CE, CC Configurations and Characteristics - Elementary Treatment of Small Signal CE Amplifier.

UNIT II: (8 Periods)

Basic Electronic Circuits and Instrumentation: Rectifiers and power supplies: Block diagram description of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple Zener voltage regulator. Amplifiers: Block diagram of Public Address system, Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response. Electronic Instrumentation: Block diagram of an electronic instrumentation system.

UNIT III: (8 Periods)

Digital Electronics: Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3 code, Gray code, Hamming code. Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Truth Tables and Functionality of Logic Gates – NOT, OR, AND, NOR, NAND, XOR and XNOR. Simple combinational circuits–Half and Full Adder, Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only).

Total Periods: 45

TEXT BOOKS:

1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
2. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill,2009

REFERENCES:

1. R. S. Sedha, A Textbook of Electronic Devices and Circuits, S. Chand &Co, 2010.
2. SantiramKal, Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India, 2002.
3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education,2009.

I Year B.Tech. EEE – I Semester

L	T	P	C
2	0	0	2

(EG23AHS101) COMMUNICATIVE ENGLISH

COURSE OBJECTIVES:

The objective of this course are to:

- Facilitate effective listening, Reading, Speaking and Writing skills among the students.
- Enhance the same in their comprehending abilities, oral presentations, reporting useful information and providing knowledge of grammatical structures and vocabulary.
- Make them effective in speaking and writing skills and to make them industry ready.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO 1: Understand the context, topic, and pieces of specific information from socialor Transactional dialogues.
CO 2: Apply grammatical structures to formulate and correct word forms.
CO 3: Analyze discourse markers to speak clearly on a specific topic in informal discussions.
CO 4: Evaluate reading/listening texts and write summaries based on global comprehension of these texts.
CO 5: Create a coherent paragraph, essay, and resume.

UNIT I: **(6 Periods)**

Lesson: HUMAN VALUES: The Gift of the Magi (Short Story)
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. Writing: Mechanics of Writing-Capitalization, Spellings, Punctuation-Parts of Sentences.
Grammar: Parts of Speech, Basic Sentence Structures-forming questions.
Writing: Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words.

UNIT II: **(7 Periods)**

Lesson: NATURE: The Brook by Alfred Tennyson (Poem)
Listening: Answering a series of questions about main ideas and supporting ideas after listening to audio texts.
Speaking: Discussion in pairs/small groups on specific topics followed by short structure talks.
Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.
Writing: Structure of a paragraph - Paragraph writing (specific topics)
Grammar: Cohesive devices - linkers, use of articles and zero article; prepositions.
Vocabulary: Homonyms, Homophones, Homographs.

UNIT III: **(6 Periods)**

Lesson: BIOGRAPHY: Elon Musk
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, Note-making, paraphrasing.
Grammar: Verbs - tenses; subject-verb agreement; Compound words, Collocations.

Vocabulary: Compound words, Collocation.

UNIT IV: **(5 Periods)**

Lesson: INSPIRATION: The Toys of Peace by Saki
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: Official Letters, Resumes
Grammar: Reporting verbs, Direct & Indirect speech, Active & Passive Voice.
Vocabulary: Words often confused, Jargons.

UNIT V: **(6 Periods)**

Lesson: MOTIVATION: The Power of Intrapersonal Communication (An Essay)
Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.
Speaking: Formal oral presentations on topics from academic contexts
Reading: Reading comprehension.
Grammar: Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement).
Vocabulary: Technical Jargons

Total Periods: 30

TEXT BOOKS:

1. Pathfinder: Communicative English for Undergraduate Students, 1st Edition, Orient Black Swan, 2023 (Units 1,2 & 3).
2. Empowering with Language by Cengage Publications, 2023 (Units 4 & 5).

REFERENCES:

1. Dubey, Sham Ji & Co. English for Engineers, Vikas Publishers, 2020
2. Bailey, Stephen. Academic writing: A Handbook for International Students. Routledge, 2014.
3. Murphy, Raymond. English Grammar in Use, Fourth Edition, Cambridge University Press, 2019.
4. Lewis, Norman. Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary. Anchor, 2014.

ONLINE RESOURCES:

Grammar:

1. www.bbc.co.uk/learningenglish
2. https://dictionary.cambridge.org/grammar/british-grammar/
3. www.eslpod.com/index.html
4. https://www.learngrammar.net/
5. https://english4today.com/english-grammar-online-with-quizzes/
6. https://www.talkenglish.com/grammar/grammar.aspx

Vocabulary:

1. https://www.youtube.com/c/DailyVideoVocabulary/videos
2. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA

I Year B.Tech. EEE – I Semester

L	T	P	C
3	0	0	3

(PH23ABS101) ENGINEERING PHYSICS

COURSE OBJECTIVES:

The objective of this course are to:

- Bridge the gap between the Physics in school at 10+2 level and UG level engineering courses by identifying the importance of the optical phenomenon like interference, diffraction etc, enlightening the periodic arrangement of atoms in crystalline solids and concepts of quantum mechanics, introduce novel concepts of dielectric and magnetic materials, physics of semiconductors.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO 1: Understand the intensity variation of light due to interference, diffraction and polarization.

CO 2: Apply the basic concepts of crystal structures and X-ray diffraction to study the behavior of materials for engineering applications.

CO 3: Summarize the fundamental properties of dielectric and magnetic materials for engineering applications.

CO 4: Analyze the properties of quantum particles to interpret the energy band formation and classification of solids

CO 5: Assess the current flow mechanism to understand the transport phenomenon of charge carriers in semiconductors.

UNIT I: (10 Periods)

Wave Optics Interference: Introduction - Principle of superposition –Interference of light Interference in thin films (Reflection Geometry) & applications - Colours in thin films- Newton's Rings, Determination of wavelength and refractive index. Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit & N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative).

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

UNIT II: (8 Periods)

Crystallography: Space lattice, Basis, Unit Cell and lattice parameters – Bravais Lattices – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC - Miller indices – separation between successive (hkl) planes.

X- ray diffraction: Bragg's law - X-ray Diffractometer – crystal structure determination by Laue's and powder methods.

UNIT III: (10 Periods)

Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector – Relation between the electric vectors - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative)

- Lorentz internal field - Clausius- Mossotti equation – Frequency dependence of polarization – dielectric loss.

Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization- Magnetic susceptibility and permeability – Atomic origin of magnetism - Classification of magnetic materials: Dia, para, Ferro, anti-ferro &Ferri magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials- Applications of magnetic materials.

UNIT IV: **(9 Periods)**

Quantum Mechanics: Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well.

Free Electron Theory: Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory – electrical conductivity based on quantum free electron theory - Fermi-Dirac distribution
- Density of states - Fermi energy

UNIT V: **(8 Periods)**

Semiconductors: Formation of energy bands – classification of solids - Intrinsic semiconductors: Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors: density of charge carriers (Qualitative) – dependence of Fermi energy on carrier concentration and temperature - Drift and diffusion currents – Einstein's equation – Hall effect and its applications - Direct and indirect bandgap semiconductors and its applications.

Total Periods: 45

TEXT BOOKS:

1. A Text book of Engineering Physics, M. N. Avadhanulu, P.G.Kshirsagar& TVS Arun Murthy, S. Chand Publications, 11th Edition 2019.
2. Engineering Physics - D.K.Bhattacharya and Poonam Tandon, Oxford press (2015).

REFERENCES:

1. Engineering Physics - B.K. Pandey and S. Chaturvedi, CengageLearning 2021.
2. Engineering Physics - Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.
3. Engineering Physics" - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press.2010
4. Engineering Physics - M.R. Srinivasan, New Age internationalpublishers (2009).

ONLINE RESOURCES:

1. https://www.loc.gov/rr/scitech/selected-ternet/physics.html

I Year B.Tech. EEE – I Semester

L	T	P	C
3	0	0	3

(CS23AES101) INTRODUCTION TO PROGRAMMING

COURSE OBJECTIVES:
The objective of this course are to:
- Learn how to solve a given problem.
- Illustrate the basic concepts of C programming language.
- Discuss the concepts of Functions, Arrays, Pointers and Structures.
- Familiarize with dynamic memory allocation concepts.
- Apply concepts of structures and files to solve real word problems.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:
- **CO 1:** Solve computational problems.
- **CO 2:** Select the features of C language appropriate for solving a problem.
- **CO 3:** Design computer programs for real world problems.
- **CO 4:** Organize the data which is more appropriated for solving a problem.
- **CO 5:** Understanding the basic concept of structures and file handling.

UNIT I: (10 Periods)
Introduction to Problem Solving: Problem Solving Aspect, Problem Identification, Problem Understanding, Algorithm Development, Solution Planning, characteristics of algorithm, Top-down approach, Bottom-up approach, Time and space complexities of algorithms, Flowchart. Overview of C: History of C, C Language Elements, Basic Structure of C Program, C Tokens-Variables and Data Types, Operators, Expressions and Type Conversions.

UNIT II: (8 Periods)
Control Statements: Selection Statements- if and switch statements.
Iterative Statements: for, while and do-while statements.
Jump Statements: break, continue, go to statements.

UNIT III: (8 Periods)
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.

UNIT IV: (10 Periods)
Pointers: Declaration and Initialization of pointer variables, Pointer arithmetic, Pointers and arrays, Pointer to pointer, Array of pointers, Pointers and functions, Dynamic Memory Allocation.
Strings: Introduction to Strings, String handling functions, Preprocessor Directives.

UNIT V: (9 Periods)
Structures: Introduction, Nested Structures, Array of Structures, Structures and Functions, Unions.
Files in C: Using Files in C, read data from Files, Writing data to Files, Random access to files, Command-line Arguments

Total Periods: 45

TEXT BOOKS:
1. B. A. Forouzan and R. F. Gilberg, Computer Science: A Structured Programming Approach Using C, 3/e, Cengage Learning, 2007.
2. Problem solving with C, M.T.Somashekara, PHI

REFERENCES:

1. Jeri R. Hanly, Ellot B. Koffman, Problem Solving and Program Design in C, 5/e, Pearson
2. Brian W Kernighan and Dennis M Ritchie, The C Programming Language, Second Edition, Prentice Hall Publication.
3. Reema Thareja, Programming in C, Oxford University Press, AICTE Edition, 2018.
4. R.G. Dromey, "How to Solve it by Computer". 2014, Pearson.

I Year B.Tech. EEE – I Semester

L	T	P	C
3	0	0	3

(MA23ABS101) LINEAR ALGEBRA & CALCULUS

COURSE OBJECTIVES:

The objective of this course are to:

- Illuminate the students in the concepts of calculus and linear algebra.
- 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.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO 1: Understanding the concepts of matrix algebra techniques to solve the system of linear equations.

CO 2: Develop the use of matrix algebra techniques that is needed by engineers for practical applications.

CO 3: Apply mean value theorems to solve real life problems in engineering.

CO 4: Make use of partial differentiation to solve optimization problems.

CO 5: Familiarize with double and triple integrals of functions of several variables in two dimensions using Cartesian and polar coordinates and in three dimensions using cylindrical and spherical coordinates.

UNIT I: (8 Periods)

Matrices: Rank of a matrix by echelon form, normal form, Cauchy–Binet formulae (without proof). Inverse of Non- singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Jacobi and Gauss Seidel Iteration Methods.

UNIT II: (10 Periods)

Eigenvalues, Eigenvectors and Orthogonal Transformation: Eigenvalues, Eigenvectors and their properties, Diagonalization of a matrix, Cayley- Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley- Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

UNIT III: (7 Periods)

Calculus: Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem with their geometrical interpretation, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof), Problems and applications on the above theorems.

UNIT IV: (10 Periods)

Partial differentiation and Applications (Multi variable calculus): Functions of several variables: Continuity and Differentiability, Partial derivatives, total derivatives, chain rule, Taylor's and Maclaurin's series expansion of functions of two variables. Jacobians, Functional dependence, maxima and minima of functions of two variables, method of Lagrange multipliers.

UNIT V: (10 Periods)

Multiple Integrals (Multi variable Calculus): Double integrals, triple integrals, change of order of integration, change of variables to polar, cylindrical and spherical coordinates. Finding areas (by double integrals) and volumes (by double integrals and triple integrals).

Total Periods: 45

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.

REFERENCES:

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. GlynJames, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.
4. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education
5. H. k Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand.
6. N. Bali, M. Goyal, C. Watkins, Advanced Engineering Mathematics, Infinity Science Press.

I Year B.Tech. EEE – I Semester

L	T	P	C
0	0	2	1

(EG23AHS102) COMMUNICATIVE ENGLISH LAB

COURSE OBJECTIVES:

The objective of this course are to:

- Expose the students to a variety of self-instructional, learner friendly modes of language learning.
- Train students in basic communication skills and also make them ready to face job interviews.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO 1: Understand the different aspects of the English language proficiency with an emphasis on LSRW skills.
CO 2: Apply communication skills through various language learning activities.
CO 3: Analyze the English speech sounds, stress, rhythm, intonation, and syllable division for better listening and speaking comprehension.
CO 4: Evaluate and exhibit professionalism in participating in debates and group discussions.
CO 5: Create effective Course Objectives.

List of Topics:

1. Vowels & Consonants
2. Neutralization/Accent Rules
3. Communication Skills & JAM
4. Role Play or Conversational Practice
5. E-mail Writing
6. Resume Writing, Cover letter, SOP
7. Group Discussions-methods & practice
8. Debates - Methods & Practice
9. PPT Presentations/ Poster Presentation
10. Interviews Skills

Suggested Software:

- Walden InfoTech
- Young India Films

REFERENCES:

1. Raman Meenakshi, Sangeeta-Sharma. Technical Communication Oxford Press.2018.
2. Taylor Grant: English Conversation Practice, Tata McGraw-Hill Education India, 2016.
3. Hewing's, Martin. Cambridge Academic English (B2). CUP, 2012.
4. J. Sethi & P.V. Dhamija. A Course in Phonetics and Spoken English, (2nd Ed), Kindle, 2013

ONLINE RESOURCES:

Spoken English:

1. www.esl-lab.com
2. www.englishmedialab.com
3. www.englishinteractive.net
4. https://www.britishcouncil.in/english/online
5. http://www.letstalkpodcast.com/
6. https://www.youtube.com/c/mmmEnglish_Emma/featured
7. https://www.youtube.com/c/ArnelsEverydayEnglish/featured
8. https://www.youtube.com/c/engvidAdam/featured

9. https://www.youtube.com/c/EnglishClass101/featured
10. https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists
11. https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw

VOICE AND ACCENT:

1. https://www.youtube.com/user/letstalkaccent/videos
2. https://www.youtube.com/c/EngLanguageClub/featured
3. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc
4. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA

I Year B.Tech. EEE – I Semester

L	T	P	C
0	0	3	1.5

(CS23AES102) COMPUTER PROGRAMMING LAB

COURSE OBJECTIVES:

The objective of this course are to:

- Use basic data types, operators, expressions and expression evaluation mechanisms using C Programming Language.
- Implement control flows, construct in C Programming Language and understand the syntax, semantics and usability contexts of these different constructs.
- Develop composite data types in C and constructs available to develop their datatypes, utilize them to model things and dealing with data from and to external files.
- Design programs with different variations of the constructs available for practicing modular programming and understand the pros and cons of using different variants and apply optimization.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO 1: Read, understand and trace the execution of programs written in C language.
CO 2: Select the right control structure for solving the problem.
CO 3: Develop C programs which utilize the memory efficiently using programming constructs like pointers.
CO 4: Develop, Debug and Execute programs to demonstrate the applications of arrays, functions, basic concepts of pointers in C.

WEEK 1:

Objective: Getting familiar with the programming environment on the computer and writing the first program.

Activities:

Tutorial 1: Problem-solving using Computers.

Lab1: Familiarization with programming environment

- Basic Linux environment and its editors like Vi, Vim & Emacs etc.
- Exposure to Turbo C, gcc.
- Writing simple programs using printf (), scanf ()

WEEK 2:

Objective: Getting familiar with how to formally describe a solution to a problem in a series of finite steps both using textual notation and graphic notation.

Activities:

Tutorial 2: Problem-solving using Algorithms and Flow charts.

Lab 1: Converting algorithms/flow charts into C Source code. Developing the algorithms/flowcharts for the following sample programs

- Sum and average of 3 numbers
- Conversion of Fahrenheit to Celsius and vice versa
- Simple interest calculation

WEEK 3:

Objective: Learn how to define variables with the desired data-type, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.

Activities:

Tutorial 3: Variable types and type conversions:

Lab 2: Simple computational problems using arithmetic expressions.

- Finding the square root of a given number
- Finding compound interest
- Area of a triangle using heron's formulae
- Distance travelled by an object

WEEK 4:
Objective: Explore the full scope of expressions, type-compatibility of variables & constants and operators used in the expression and how operator precedence works.
Activities:
Tutorial 4: Operators and the precedence and as associativity:
Lab 3: Simple computational problems using the operator precedence and associativity

i) Evaluate the following expressions.
   a. A+B*C+(D*E) + F*G
   b. A/B*C-B+A*D/3
   c. A+++B---A
   d. J= (i++) + (++i)

ii) Find the maximum of three numbers using conditional operator.
iii) Take marks of 5 subjects in integers, and find the total, average in float

WEEK 5:
Objective: Explore the full scope of different variants of "if construct" namely if- else, null-else, if-else if*-else, switch and nested-if including in what scenario each one of them can be used and how to use them. Explore all relational and logical operators while writing conditionals for "if construct".
Suggested Experiments/Activities:
Tutorial 5: Branching and logical expressions:
Lab 4: Problems involving if-then-else structures.

i. Write a C program to find the max and min of four numbers using if-else.
ii. Write a C program to generate electricity bill.
iii. Find the roots of the quadratic equation.
iv. Write a C program to simulate a calculator using switch case.
v. Write a C program to find the given year is a leap year or not.

WEEK 6:
Objective: Explore the full scope of iterative constructs namely while loop, do- while loop and for loop in addition to structured jump constructs like break and continue including when each of these statements is more appropriate to use.
Activities:
Tutorial 6: Loops, while and for loops
Lab 5: Iterative problems e.g., the sum of series

i. Find the factorial of given number using any loop.
ii. Find the given numberis a prime or not.
iii. Compute sine and cos series.
iv. Checking a number palindrome.
v. Construct a pyramid of numbers.

WEEK 7:
Objective: Explore the full scope of Arrays construct namely defining and initializing 1-D and 2-D and more generically n-D arrays and referencing individual array elements from the defined array. Using integer 1-D arrays, explore search solution linear search.
Activities:
Tutorial 7: 1 D Arrays: searching.
Lab 6:1D Array manipulation, linear search

i. Find the min and max of a 1-D integer array.
ii. Perform linear search on1Darray.
iii. The reverse of a 1D integer array
iv. Find 2's complement of the given binary number.
v. Eliminate duplicate elements in an array.

WEEK 8:
Objective: Explore the difference between other arrays and character arrays that can be used as Strings by using null character and get comfortable with string by doing experiments that will reverse a string and concatenate two strings. Explore sorting solution bubble sort

using integer arrays.
Activities:
Tutorial 8: 2 D arrays, sorting and Strings.
Lab 7: Matrix problems, String operations, Bubble sort

i. Addition of twomatrices
ii. Multiplication two matrices
iii. Sort array elements using bubble sort
iv. Concatenate two strings without built-in functions
v. Reverse a string using built-in and without built-in string functions

WEEK 9:
Objective: Explore the Functions, sub-routines, scope and extent of variables, doing some experiments by parameter passing using call by value. Basic methods of numerical integration
Activities:
Tutorial 9: Functions, call by value, scope and extent,
Lab 8: Simple functions using call by value, solving differential equations using Eulers theorem

i. Write a C function to calculate NCR value
ii. Write a C function to find the length of a string
iii. Write a C function to transpose of a matrix
iv. Write a C function to demonstrate numerical integration of differential equations using Euler's method

WEEK 10:
Objective: Explore how recursive solutions can be programmed by writing recursive functions that can be invoked from the main by programming at-least five distinct problems that have naturally recursive solutions.
Activities:
Tutorial 10: Recursion, the structure of recursive calls
Lab 9: Recursive functions

i. Write a recursive function to generate Fibonacci series
ii. Write a recursive function to find the lcm of two numbers
iii. Write arecursive function to find the factorial of a number
iv. Write a C Program to implement Ackermann function using recursion
v. Write a recursive function to find the sum of series.

WEEK 11:
Objective: Explore the basic difference between normal and pointer variables, Arithmetic operations using pointers and passing variables to functions using pointers
Activities:
Tutorial 11: Call by reference, dangling pointers
Lab 10: Simple functions using Call by reference, Dangling pointers

i. Write a C program to swap two numbers using call by reference
ii. Demonstrate Dangling pointer problem using a C program
iii. Write a C program to copy one string into another using pointer
iv. Write a C program to find no of lowercase, uppercase, digits and other characters using pointers.

WEEK 12:
Objective: Explore pointers to manage a dynamic array of integers, including memory allocation & value initialization, resizing changing and reordering the contents of an array and memory de-allocation using malloc (), calloc (), realloc () and free () functions. Gain experience processing command-line arguments received by C.
Suggested Experiments/Activities:
Tutorial 12: Pointers, structures and dynamic memory allocation
Lab 11: Pointers and structures, memory dereference.

i. Write a C program to find the sum of a 1D array using malloc()
ii. Write a C program to find the total, average of n students using structures
iii. Enter n students data using calloc() and display failed students list

iv. Read student name and marks from the command line and display the student details along with the total.
v. Write a C program to implement realloc()

WEEK 13:
Objective: Experiment with C Structures, Unions, bit fields and nested structures
Activities:
Tutorial 13: Bit fields, Self-Referential Structures, Linked lists
Lab 12: Bit fields, linked lists Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the same without using bit- fields

i. Demonstrate the differences between structures and unions using a C program
ii. Write a C program to shift/rotate using bitfields.
iii. Write a C program to copy one structure variable to another structure of the same type.

WEEK14:
Objective: To understand data files and file handling with various file I/O functions. Explore the differences between text and binary files.
Activities:
Tutorial 14: File handling
Lab 13: File operations

i. Write a C program to write and read text into a file.
ii. Write a C program to write and read text into a binary file using fread() and fwrite().
iii. Copy the contents of one file to another file.
iv. Write a C program to merge two files into the third file using command-line arguments.
v. Find no. of lines, words and characters in a file
vi. Write a C program to print last n characters of a given file.

TEXT BOOKS:

1. Ajay Mittal, Programming in C: A practical approach, Pearson.
2. Byron Gottfried, Schaum' s Outline of Programming with C, McGraw Hill.

REFERENCES:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice- Hall of India.
2. C Programming, A Problem-Solving Approach, Forouzan, Gilberg, Prasad, Cengage.

I Year B.Tech. EEE – I Semester

L	T	P	C
0	0	3	1.5

(EE23AES102) ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP

PART A: ELECTRICAL ENGINEERING LAB

COURSE OBJECTIVES:

The objective of this course are to:

- Gain the practical knowledge about various laws/theorems for the given circuit.
- Acquire knowledge about various electrical measuring instruments and safety measures.
- Obtain the performance characteristics of DC generator.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO 1: Understand the concept of KCL, KVL and Theorems practically for the given circuit.
CO 2: Evaluate the resistance, power and power factor of circuit elements by using measuring instruments.
CO 3: Obtain the Magnetization Characteristics of DC shunt Generator

List of Experiments:

1. Verification of KCL and KVL
2. Verification of Superposition theorem
3. Measurement of Resistance using Wheat stone bridge
4. Magnetization Characteristics of DC shunt Generator
5. Measurement of Power and Power factor using Single-phase wattmeter
6. Measurement of Earth Resistance using Megger
7. Calculation of Electrical Energy for Domestic Premises

REFERENCES:

1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition.
2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013.
3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition.

Note: Minimum Six Experiments to be performed.

PART B: ELECTRONICS ENGINEERING LAB

COURSE OBJECTIVES:

The objective of this course are to:

- Gain hands on experience in testing various electronic components.
- Acquire knowledge related to the use of electronic measuring instruments for different applications.
- Design and simulate a RC coupled amplifier.
- Verify the operating conditions of combinational and sequential circuits.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO 1: Identify & Test various electronic components.
CO 2: Employ various electronic measuring instruments for different applications.
CO 3: Evaluate the biasing conditions of various diodes and BJTs.
CO 4: Examine the operating conditions of a digital circuit

List of Experiments:

1. Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.
2. Plot V – I characteristics of Zener Diode and its application as voltage Regulator.
3. Implementation of half wave and full wave rectifiers
4. Plot Input & Output characteristics of BJT in CE and CB configurations
5. Frequency response of CE amplifier.
6. Simulation of RC coupled amplifier with the design supplied
   i. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs.
7. Verification of Truth Tables of S-R, J-K& D flip flops using respective ICs. Tools / Equipment Required: DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices.

REFERENCES:

1. R. L. Boylestad& Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
2. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009
3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education, 2009.

Note: Minimum Six Experiments to be performed. All the experiments shall be implemented using both Hardware and Software.

I Year B.Tech. EEE – I Semester

L	T	P	C
0	0	2	1

(PH23ABS102) ENGINEERING PHYSICS LAB

COURSE OBJECTIVES:

The objective of this course are to:

- Study the concepts of optical phenomenon like interference, diffraction etc., recognize the importance of energy gap in the study of conductivity, Hall effect in semiconductors, study the parameters and applications of dielectric and magnetic materials by conducting experiments.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO 1: Compare the wavelengths of different colours using diffraction grating.
CO 2: Utilize optical instruments like travelling microscope and spectrometer.
CO 3: Analyze the intensity of the magnetic field of circular coil carrying current with distance.
CO 4: Evaluate dielectric constant for a dielectric material.
CO 5: Estimate the band gap of a given semiconductor and the type of semiconductor using Hall effect.

List of Experiments:

1. Determination of radius of curvature of a given Plano-convex lens by Newton's rings.
2. Determination of wavelengths of different spectral lines in mercury spectrum using diffraction grating in normal incidence configuration.
3. Determination of dielectric constant using charging and discharging method.
4. Study the variation of B versus H by magnetizing the magnetic material (B- H curve).
5. Determination of wavelength of Laser light using diffraction grating.
6. Estimation of Planck's constant using photoelectric effect.
7. Determination of the resistivity of semiconductors by four probe methods.
8. Determination of energy gap of a semiconductor using p-n junction diode.
9. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's Method.
10. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.
11. Determination of temperature coefficients of a thermistor.
12. Sonometer: Verification of laws of stretched string.

Note: Any TEN of the listed experiments are to be conducted. Out of which any TWO experiments may be conducted in virtual mode.

REFERENCES:

1. A Textbook of Practical Physics - S. Balasubramanian, M.N. Srinivasan, S. Chand Publishers, 2017.

ONLINE RESOURCES:

1. www.vlab.co.inhttps://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype

I Year B.Tech. EEE – I Semester

L	T	P	C
0	0	1	0.5

(CH23ABS105) HEALTH AND WELLNESS, YOGA AND SPORTS

COURSE OBJECTIVES:

The objective of this course are to:

- Make the students maintain their mental and physical wellness by balancing emotions in their life. It mainly enhances the essential traits required for the development of the personality.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO 1: Understand the importance of yoga and sports for Physical fitness and sound health.
CO 2: Demonstrate an understanding of health-related fitness components.
CO 3: Compare and contrast various activities that help enhance their health.
CO 4: Assess current personal fitness levels.
CO 5: Develop Positive Personality.

UNIT I:

Concept of health and fitness, Nutrition and Balanced diet, basic concept of immunity Relationship between diet and fitness, Globalization and its impact on health, Body Mass Index (BMI) of all age groups.

Activities:

ii) Organizing health awareness programmes in community.
iii) Preparation of health profile.
iv) Preparation of chart for balance diet for all age groups.

UNIT II:

Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asanas-Pranayama and meditation, stress management and yoga, Mental health and yoga practice.

Activities:

Yoga practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar

UNIT III:

Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Commonwealth games.

Activities:

i) Participation in one major game and one individual sport viz., Athletics, Volleyball, Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho,Table tennis, Cricket etc. Practicing general and specific warm up, aerobics
ii) Practicing cardiorespiratory fitness, treadmill, run test, 9 min walk, skipping and running.

REFERENCES:

2. Gordon Edlin, Eric Golanty. Health and Wellness, 14th Edn. Jones &Bartlett Learning, 2022
3. T. K. V. Desikachar. The Heart of Yoga: Developing a Personal Practice
4. Archie J.Bahm. Yoga Sutras of Patanjali, Jain Publishing Company, 1993
5. Wiseman, John Lofty, SAS Survival Handbook: The Ultimate Guide to Surviving Anywhere Third Edition, William Morrow Paperbacks, 2014
6. The Sports Rules Book/ Human Kinetics with Thomas Hanlon. -- 3rd ed. Human Kinetics, Inc.2014 General

I Year B.Tech. EEE – II Semester

L	T	P	C
3	0	0	3

(ME23AES101) BASIC CIVIL & MECHANICAL ENGINEERING

PART A: BASIC CIVIL ENGINEERING

COURSE OBJECTIVES:

The objective of this course are to:

- Get familiarized with basic Construction Materials; the scope and importance of Civil Engineering specializations.
- Introduce the preliminary concepts of Structural and Geotechnical Engineering.
- Acquire preliminary knowledge on Surveying and Transportation Engineering.
- Get familiarized with the importance of Water Resources and Environmental Engineering.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO 1: Understand various sub-divisions of Civil Engineering and to appreciate their role in ensuring better society and the basic characteristics of Construction Materials.
CO 2: Gain knowledge regarding Structural and Geotechnical Engineering.
CO 3: Explain the concepts of surveying and Transportation Engineering, Water Resources and Environmental Engineering.

UNIT I: (8 Periods)

Basics of Civil Engineering: Role of Civil Engineers in Society- Various Disciplines of Civil Engineering- Structural Engineering- Geo-Technical Engineering- Transportation Engineering - Hydraulics and Water Resources Engineering - Environmental Engineering- Scope of each discipline.

Construction Materials - Cement – Sand - Aggregate - Bricks- Cement concrete – Steel - Timber.

UNIT II: (7 Periods)

Structural Engineering: Importance- Types of Structures and structural Members- Building Components –Building Planning principles.

Geotechnical Engineering: Types of Foundations-Functions and Requirement of a good foundation

UNIT III: (8 Periods)

Surveying & Transportation Engineering: Objectives and Principles of Surveying-Instruments used in Surveying-Importance of Transportation in Nation's economic development- Modes of Transportation- Types of Highway Pavements- Flexible Pavements and Rigid Pavements -Traffic signals and signs.

Water Resources and Environmental Engineering: Introduction to Hydrology–hydrological cycle- Sources of water- Quality of water- Specifications- Rainwater Harvesting-Water Storage and Conveyance Structures- Dams and Reservoirs-types and components.

TEXT BOOKS:

1. Basic Civil Engineering, M.S. Palanisamy, Tata Mc Graw Hill publications (India) Pvt., Ltd., Fourth Edition.
2. Introduction to Civil Engineering, S.S. Bhavikatti, New Age International Publishers, 2022, First Edition.
3. Basic Civil Engineering, Satheesh Gopi, Pearson Publications, 2009, First Edition.

REFERENCES:

1. Surveying, Vol – I and Vol - II, S.K.Duggal, Tata McGraw Hill Publishers2019, Fifth Edition.

2. Hydrology and Water Resources Engineering, Santosh Kumar Garg, Khanna Publishers, Delhi, 2016.
3. Irrigation Engineering and Hydraulic Structures –Santosh Kumar Garg, Khanna Publishers, Delhi 2023, 38thEdition.
4. Highway Engineering, S.K.Khanna, C.E.G.Justoand Veeraraghavan, Nemchandand Brothers Publications2019. 10thEdition.
5. Indian Standard DRINKING WATER — SPECIFICATIONIS 10500-2012.

PART B: BASIC MECHANICAL ENGINEERING

COURSE OBJECTIVES:

The objective of this course are to:

- Get familiarized with the scope and importance of Mechanical Engineering in different sectors and industries.
- Understand and familiarize the different engineering materials and different manufacturing processes.
- Get an overview of different thermal and mechanical transmission systems and introduce basics of robotics and its applications.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO 1: Understand the different manufacturing processes.
CO 2: Explain the basics of thermal engineering and its applications.
CO 3: Describe the working of different mechanical power transmission systems and power plants and describe the basics of robotics and its applications.

UNIT I: (7 Periods)

Introduction to Mechanical Engineering: Role of Mechanical Engineering in Industries and Society- Technologies in Different Sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine Sectors.

Engineering Materials: Metals-Ferrous and Non-Ferrous, Ceramics, Composites, Smart Materials.

UNIT II: (8 Periods)

Manufacturing Processes: Principles of Casting, Forming, Joining Processes, Machining, Introduction to CNC Machines, 3D Printing, and Smart Manufacturing.

Thermal Engineering – Working Principle of Boilers, Otto Cycle, Diesel Cycle, Refrigeration and Air-Conditioning Cycles, IC Engines, 2-Stroke and 4-Stroke Engines, SI/CI Engines, Components of Electric and Hybrid Vehicles.

UNIT III: (7 Periods)

Power Plants – Working Principle of Steam, Diesel, Hydro, Nuclear Power Plants.

Mechanical Power Transmission - Belt Drives, Chain, Rope drives, Gear Drives and their applications.

Introduction to Robotics - Joints & Links, Configurations and Applications of Robotics.

Total Periods: 45

TEXT BOOKS:

2. Internal Combustion Engines by V.Ganesan, By Tata McGraw Hill publications (India) Pvt. Ltd.
3. A Tear book of Theory of Machines by S.S. Rattan, Tata McGraw Hill Publications, (India) Pvt. Ltd.
4. An introduction to Mechanical Engg by Jonathan Wicker and Kemper Lewis, Cengage learning India Pvt. Ltd.

REFERENCES:

1. Appuu Kuttan KK, Robotics, I.K. International Publishing House Pvt. Ltd. Volume-I
2. 3D printing & Additive Manufacturing Technology- L. Jyothish Kumar, Pulak M Pandey, Springer publications
3. Thermal Engineering by Mahesh M Rathore Tata McGraw Hill publications (India) Pvt. Ltd.
4. G. Shanmugam and M.S.Palanisamy, Basic Civil and the Mechanical Engineering, Tata McGraw Hill publications (India) Pvt. Ltd.

I Year B.Tech. EEE – II Semester

L	T	P	C
3	0	0	3

(MA23ABS201) DIFFERENTIAL EQUATIONS & VECTOR CALCULUS

COURSE OBJECTIVES:

The objective of this course are to:

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

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO 1: Familiarize to solve the first and higher order differential equations.
CO 2: Apply the knowledge of linear differential equations related to various engineering fields.
CO 3: Identify solution methods for partial differential equations that model physical processes.
CO 4: Interpret the physical meaning of different operators such as gradient, curl and divergence.
CO 5: Evaluate the work done by force field, circulation and transformation between single, double and triple integrals using vector calculus.

UNIT I: (8 Periods)

Differential Equations: Linear differential equations – Bernoulli's equations- Exact equations and equations reducible to exact form. Applications: Newton's Law of cooling – Law of natural growth and decay, Electrical circuits.

UNIT II: (10 Periods)

Linear Differential Equations of Higher Order: Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral, Wronskian, Method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit problems and Simple Harmonic motion.

UNIT III: (10 Periods)

Partial Differential Equations: Introduction, Formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange's method. Homogenous linear Partial Differential equations with constant coefficients.

UNIT IV: (8 Periods)

Vector Differentiation: Scalar and vector point functions, vector operator Del, Del applies to scalar point functions, Gradient, Directional derivative, del applied to vector point functions- Divergence and Curl, vector identities.

UNIT V: (9 Periods)

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 related problems.

Total Periods: 45

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.

REFERENCES:

1. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones andBartlett,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 Dass, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand.
7. N. Bali, M.Goyal, C. Watkins, Advanced Engineering Mathematics, Infinity Science Press.

I Year B.Tech. EEE – II Semester

L	T	P	C
3	0	0	3

(EE23APC201) ELECTRICAL CIRCUIT ANALYSIS-I

COURSE OBJECTIVES:

To make the student learn about:

- Basic characteristics of R, L, C parameters, their Voltage and Current Relations and network reduction techniques.
- Basic knowledge about the Magnetic circuits, electromagnetism, self and mutual inductances.
- The Single Phase AC circuits and concepts of real power, reactive power, complex power, phase angle and phase difference.
- Study of Series and parallel resonances, bandwidth, current locus diagrams
- Network theorems and their applications

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO 1: Apply the knowledge of basic circuital laws and simplify the dc networks using reduction techniques.
CO 2: Analyse magnetically coupled circuits and concept of inductance.
CO 3: Evaluate the performance of given electrical circuit with AC excitation.
CO 4: Understand the concept of Resonance, Locus diagrams for R-L, R-C and R-L-C.
CO 5: Apply the network theorems suitably to analyze complex circuits with DC and AC excitation.

UNIT I: (8 Periods)

INTRODUCTION TO ELECTRICAL CIRCUITS: Basic Concepts of passive elements of R, L, C and their V-I relations, Sources (dependent and independent), Kirchoff's laws, Network reduction techniques (series, parallel, series - parallel, star-to-delta and delta-to-star transformation), source transformation technique, nodal analysis and mesh analysis to DC networks with dependent and independent voltage and current sources, node and mesh analysis.

UNIT II: (12 Periods)

MAGNETIC CIRCUITS: Basic definition of MMF, flux and reluctance, analogy between electrical and magnetic circuits, Faraday's laws of electromagnetic induction – concept of self and mutual inductance, Dot convention – coefficient of coupling and composite magnetic circuit, analysis of series and parallel magnetic circuits.

UNIT III: (8 Periods)

SINGLE PHASE CIRCUITS: Characteristics of periodic functions, Average value, R.M.S. value, form factor, representation of a sine function, concept of phasor, phasor diagrams, node and mesh analysis. Steady state analysis of R, L and C circuits to sinusoidal excitations-response of pure resistance, inductance, capacitance, series RL circuit, series RC circuit, series RLC circuit, parallel RL circuit, parallel RC circuit.

UNIT IV: (9 Periods)

RESONANCE AND LOCUS DIAGRAMS: Series Resonance: Characteristics of a series resonant circuit, Q-factor, selectivity and bandwidth, expression for half power frequencies; Parallel resonance: Q-factor, selectivity and bandwidth; Locus diagram: RL, RC, RLC with R, L and C variables.

UNIT V: (8 Periods)

NETWORK THEOREMS (DC & AC EXCITATIONS): Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem, Reciprocity theorem, Millman's theorem and compensation theorem

Total Periods: 45

TEXT BOOKS:

1. Engineering Circuits Analysis, Jack Kemmerly, William Hayt and Steven Durbin, Tata Mc Graw Hill Education, 2005, sixth edition.
2. Network Analysis, M. E. Van Valkenburg, Pearson Education, 2019, Revised Third Edition.

REFERENCES:

1. Fundamentals of Electrical Circuits, Charles K. Alexander and Mathew N.O. Sadiku, Mc Graw Hill Education (India), 2013, Fifth Edition
2. Electric Circuits (Schaum's outline Series), Mahmood Nahvi, Joseph Edminister, and K. Rao, Mc Graw Hill Education, 2017, Fifth Edition.
3. Electric Circuits, David A. Bell, Oxford University Press, 2009, Seventh Edition.
4. Introductory Circuit Analysis, Robert L Boylestad, Pearson Publications, 2023, Fourteenth Edition.
5. Circuit Theory: Analysis and Synthesis, A. Chakrabarti, Dhanpat Rai & Co., 2018, Seventh Revised Edition.

I Year B.Tech. EEE – II Semester

L	T	P	C
3	0	0	3

(CH23ABS101) CHEMISTRY

COURSE OBJECTIVES:

The objective of this course are to:

- Familiarize engineering chemistry and its applications.
- Train the students on the principles and applications of electrochemistry and polymers.
- Introduce instrumental methods

COURSE OUTCOMES:

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

- **CO 1:** Understand Schrodinger Wave equation, MOT, energy level diagrams Apply the knowledge of linear differential equations related to various engineering fields.
- **CO 2:** Apply the principle of Band diagrams in the application of conductors and semiconductors.
- **CO 3:** Compare the materials for construction of a battery and electrochemical sensors.
- **CO 4:** Explain the preparation, properties, and applications of thermoplastics & thermosetting & elastomers conducting polymers.
- **CO 5:** Explain the principles of spectrometry and separation of solid and liquid mixtures by chromatography

UNIT I: (8 Periods)

Structure and Bonding Models: Fundamentals of Quantum Mechanics-Plank's quantum theory, de-Broglie's hypothesis, Heisenberg uncertainty principle, Schrodinger Wave equation, significance of Ψ and Ψ2, molecular orbital theory – bonding in homo- and hetero nuclear diatomic molecules – energy level diagrams of O2 and CO, etc. π-molecular orbitals of butadiene and benzene, calculation of bond order.

UNIT II: (10 Periods)

Modern Engineering materials: Crystal field theory, d- orbital's splitting in tetra hedral and octa hedral complexes, Semiconductors – Introduction, doping concept, application, Super Conductors- Introduction basic concept, applications. Super capacitors-: Introduction, Basic Concept-Classification – applications. Nano materials: Introduction, classification, properties and applications of Fullerenes, carbon Nano tubes and Graphenes

UNIT III: (10 Periods)

Electrochemistry and Applications: Electrochemical cell, Nernst equation, cell potential calculations and numerical problems, 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 –lithium-ion batteries- working of the batteries including cell reactions; Fuel cells, hydrogen-oxygen fuel cell– working of the cells. Polymer Electrolyte Membrane Fuel cells (PEMFC).

UNIT IV: (8 Periods)

Polymer Chemistry: Introduction to polymers, functionality of monomers, Tactility, chain growth and step growth polymerization, co- polymerization, with specific examples and mechanisms of polymer formation.

Plastics–Thermo and Thermosetting plastics, Preparation, properties and applications of – PVC, Teflon, Bakelite, Nylon-6, 6.

Elastomers–Processing and vulcanization of natural rubber, Buna-S, Buna-N– preparation, properties and applications.

Conducting polymers – poly acetylene, poly aniline, – mechanism of conduction and applications. Bio-Degradable polymer - Poly Glycolic Acid (PGA).

UNIT V: **(9 Periods)**

Instrumental Methods and Applications: Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. UV- Visible Spectroscopy- electronic transition, Instrumentation and applications, IR spectroscopy- principle, Instrumentation and applications. Chromato graphy-Basic Principle, Classification-HPLC: Principle, Instrumentation and Applications.

Total Periods: 45

TEXT BOOKS:

1. Jain and Jain, Engineering Chemistry, 16/e, Dhanpat Rai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical.Chemistry,10/e, Oxford University Press, 2010.
3. Vogel's quantitative chemical analysis, 6th edition-2009.

REFERENCES:

1. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson,2007.
2. J.D. Lee, Concise Inorganic Chemistry, 5th Edition, Wiley Publications, Feb.2008
3. Textbook of Polymer Science, Fred W. Billmayer Jr, 3rd Edition
4. Chemistry Mc GrawHill, K.N.Jayaveera, G.V. Subba Reddy and C. Rama Chandraiah.

I Year B.Tech. EEE – II Semester

L	T	P	C
1	0	4	3

(ME23AES102) ENGINEERING GRAPHICS

COURSE OBJECTIVES:

The objective of this course are to:

- Enable with various concepts like dimensioning, conventions and standards related to engineering drawing.
- Impart knowledge on the projection of points, lines and plane surfaces.
- Improve the visualization skills for better understanding of projection of solids.
- Develop the imaginative skills required to understand section of solids and developments of surfaces.
- Draw the viewing perception of a solid object in isometric and orthographic projections.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO 1: Draw various engineering curves, scales.
CO 2: Draw and Interpret orthographic projections of points, lines, planes.
CO 3: Draw the projection of solids in various positions.
CO 4: Draw and Explore the sections of solids and development of surfaces.
CO 5: Draw an isometric and orthographic views of simple solids.

UNIT I: (2 Periods and 8 Practical's)

Introduction to Engineering Drawing: Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing Regular Polygons by General Methods.
Curves: Construction of Ellipse, Parabola and Hyperbola by General Method, Cycloids, Involutes, Normal and Tangent to Curves.
Scales: Plain Scales, Diagonal Scales and Vernier Scales.

UNIT II: (3 Periods and 12 Practical's)

Orthographic Projections: Reference Plane, Importance of Reference Lines or Plane, Projections of a Point Situated in any One of the Four Quadrants.
Projections of Straight Lines: Projections of Straight Lines Parallel to both Reference Planes, Perpendicular to One Reference Plane and Parallel to other Reference Plane, Inclined to one Reference Plane and Parallel to the other Reference Plane. Projections of Straight Line Inclined to both the Reference Planes.
Projections of Planes: Regular Planes Perpendicular to both Reference Planes, Parallel to One Reference Plane and Inclined to the other Reference Plane; Plane Inclined to both the Reference Planes.

UNIT III: (3 Periods and 12 Practical's)

Projections of Solids: Types of Solids: Polyhedra and Solids of Revolution. Projections of Solids in Simple Positions: Axis Perpendicular to Horizontal Plane, Axis Perpendicular to Vertical Plane and Axis Parallel to both the Reference Planes, Projection of Solids with Axis Inclined to One Reference Plane and Parallel to another Plane, Projection of Solids Inclined to both the Reference Planes.

UNIT IV: (3 Periods and 12 Practical's)

Sections of Solids: Perpendicular and Inclined Section Planes, Sectional Views and True Shape of Section, Sections of Solids in Simple Position only.
Development of Surfaces: Methods of Development: Parallel Line Development and Radial Line Development. Development of a Cube, Prism, Cylinder, Pyramid and Cone.

UNIT V: (4 Periods and 16 Practical's)

Conversion of Views: Conversion of Isometric Views to Orthographic Views of Simple Solids; Conversion of Orthographic Views to Isometric views of Simple Solids.

Computer Graphics: Creating 2D&3D Drawings of Objects Including Domain Specific Engineering Applications using Auto CAD (Not for end examination).

Total Periods: 15 Periods and 60 Practical's

TEXT BOOKS:

1. Engineering Drawing, K.L. Narayana and P. Kannaiah, Tata McGraw Hill, 2013.
2. N. D. Bhatt, Engineering Drawing, Charotar Publishing House, 54th Edition, 2023.

REFERENCES:

1. Engineering Drawing, M.B.Shah and B.C. Rana, Pearson Education Inc,2009.
2. Engineering Drawing with an Introduction to AutoCAD, Dhananjay Jolhe, Tata McGraw-Hill, 2017.
3. Engineering Drawing and Graphics by K. Venugopal, 4/e, New Age Publishers, 2004.
4. Engineering Drawing by Basant Agarwal & C.M. Agarwal, 2/e, Tata McGraw-Hill, 2013

I Year B.Tech. EEE – II Semester

L	T	P	C
0	0	2	1.5

(EE23APC202) ELECTRICAL CIRCUIT ANALYSIS-I LAB

COURSE OBJECTIVES:

The objective of this course are to:

- Impart hands on experience in verification of circuit laws and network reduction techniques.
- Impart hands on experience in verification of theorems
- Gain the knowledge about measurement of circuit parameters
- Know the concept of resonance and locus diagrams.
- Gain practical exposure to the usage of different circuits with different conditions.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO 1: Measure the cell constant and conductance of solutions. Understand the concepts of network theorems, node and mesh networks, series and parallel resonance and Locus diagrams.

CO 2: Prepare advanced polymer materials. Apply various theorems to compare practical results obtained with theoretical calculations.

CO 3: Determine the physical properties like surface tension, adsorption and viscosity. Determine self, mutual inductances and coefficient of coupling values, parameters of choke coil

CO 4: Estimate the Iron and Calcium in cement. Analyse different circuit characteristics with the help of fundamental laws and various configurations

CO 5: Calculate the hardness of water. Create locus diagrams of RL, RC series circuits and examine series and parallel resonance.

List of Experiments:

1. Verification of Kirchhoff's circuit laws.
2. Verification of node and mesh analysis.
3. Verification of network reduction techniques.
4. Determination of cold and hot resistance of an electric lamp
5. Determination of Parameters of a choke coil.
6. Determination of self, mutual inductances, and coefficient of coupling
7. Series and parallel resonance
8. Locus diagrams of R-L (L Variable) and R-C (C Variable) series circuits
9. Verification of Superposition theorem
10. Verification of Thevenin’s and Norton’s Theorems
11. Verification of Maximum power transfer theorem
12. Verification of Compensation theorem
13. Verification of Reciprocity and Millman’s Theorems

Note: Minimum of 10 experiments should be performed

REFERENCES:

1. Engineering Circuits Analysis, Jack Kemmerly, William Hayt and Steven Durbin, Tata Mc Graw Hill Education, 2005, sixth edition.
2. Network Analysis, M. E. Van Valkenburg, Pearson Education, 2019, Revised Third Edition

I Year B.Tech. EEE – II Semester

L	T	P	C
0	0	2	1

(CH23ABS102) CHEMISTRY LAB

COURSE OBJECTIVES:

The objective of this course are to:

- Verify the fundamental concepts with experiments.

COURSE OUTCOMES:

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

CO 1: To verify Beer Lambert's law
CO 2: To analyse the IR and NMR spectra of some organic compounds
CO 3: To apply electro analytical techniques foe sample analysis.
CO 4: To measure the strength of an acid present in the samples.
CO 5: To prepare advanced polymer materials.

List of Experiments:

1. Measurement of 10Dq by spectrophotometric method
2. Conductometric titration of strong acid vs. strong base
3. Conductometric titration of weak acid vs. strong base
4. Determination of cell constant and conductance of solutions
5. Potentiometry - determination of redox potentials and emfs
6. Determination of Strength of an acid in Pb-Acid battery
7. Preparation of Bakelite
8. Verify Lambert-Beer's law
9. Wavelength measurement of sample through UV-Visible Spectroscopy
10. Identification of simple organic compounds by IR
11. Preparation of nanomaterials by precipitation method
12. Estimation of Ferrous Iron by Dichrometry

REFERENCES:

1. "Vogel's Quantitative Chemical Analysis 6th Edition 6th Edition" Pearson Publications by J. Mendham, R.C. Denney, J.D. Barnes and B. Sivasankar.

I Year B.Tech. EEE – II Semester

L	T	P	C
0	0	3	1.5

(ME23AES103) ENGINEERING WORKSHOP

COURSE OBJECTIVES:

The objective of this course are to:

- Identify and explain safety practices and precautions relevant to workshop activities.
- Recognize and differentiate various types of woods and tools used in woodwork.
- Demonstrate the ability to create different wood joints, including half-lap, mortise and tenon, and dovetail joints.
- Familiarize students with sheet metal working tools and techniques.
- Enable students to develop sheet metal projects such as tapered trays, conical funnels, elbow pipes and brazing.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO 1: Fabricate sheet metal components manually.
CO 2: Construct wood joints such as half-lap, mortise, and tenon.
CO 3: Assemble the components to create joints like a V-fit.
CO 4: Demonstrate the plumbing, welding, foundry, and fitting jobs to form the components.
CO 5: Connect & check the basic house wiring circuit connections for various applications.

1. **Demonstration**: Safety Practices and Precautions to be Observed in the Workshop.
2. **Wood Working:** Familiarity with Different Types of Woods and Tools used in Wood Working and Making Following Joints.
   b) Half – Lap Joint
   c) Mortise and Tenon Joint
   d) Corner Dovetail Joint or Bridle Joint
3. **Sheet Metal Working**: Familiarity with Different Types of Tools used in Sheet Metal Working, Developments of Following Sheet Metal Job from GI Sheets.
   b) Tapered Tray
   c) Conical Funnel
   d) Elbow Pipe
   e) Brazing
4. **Fitting:** Familiarity with Different Types of Tools used in Fitting and do the Following Fitting Exercises.
   b) V-Fit
   c) Dovetail Fit
   d) Semi-Circular Fit
   e) Bicycle Tire Puncture and Change of Two-Wheeler Tyre
5. **Electrical Wiring**: Familiarity with Different Types of Basic Electrical Circuits and make the Following Connections.
   a) Parallel and Series
   b) Two-Way Switch
   c) Godown Lighting
   d) Tube Light
   e) Three Phase Motor
   f) Soldering of Wires
6. **Foundry Trade:** Demonstration and Practice on Moulding Tools and Processes, Preparation of Green Sand Moulds for Given Patterns.
7. **Welding Shop:** Demonstration and Practice on Arc Welding and Gas Welding. Preparation of Lap Joint and Butt Joint.
8. **Plumbing:** Demonstration and Practice of Plumbing Tools, Preparation of Pipe Joints with Coupling for Same Diameter and with Reducer for Different Diameters.

TEXT BOOKS:

1. Basic Workshop Technology: Manufacturing Process, Felix W.; Independently Published,2019. Workshop Processes, Practices and Materials; Bruce J. Black, Routledge Publishers, 5th Edn. 2015.
2. A Course in Workshop Technology Vol I. & II, B.S. Raghuwanshi, Dhanpath Rai & Co., 2015 & 2017.

REFERENCES:

1. Elements of Workshop Technology, Vol. I by S. K. Hajra Choudhury & Others, Media Promoters and Publishers, Mumbai, 2007, 14th edition.
2. Workshop Practice by H. S. Bawa, Tata-McGraw Hill, 2004.
3. Wiring Estimating, Costing and Contracting; Soni P.M. & Upadhyay P.A.; Atul Prakashan, 2021-22.

I Year B.Tech. EEE – II Semester

L	T	P	C
0	0	2	1

(CS23AES103) IT WORKSHOP

COURSE OBJECTIVES:
The objective of this course are to:
- Introduce the internal parts of a computer, peripherals, I/O ports, connecting cables.
- Teach basic command line interface commands on Linux.
- Teach the usage of Internet for productivity and self-paced life-long learning
- Introduce Compression, Multimedia and Antivirus tools and Office Tools such as Word processors, Spread sheets and Presentation tools.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO 1: Perform Hardware troubleshooting.
CO 2: Understand Hardware components and inter dependencies.
CO 3: Safeguard computer systems from viruses/worms.
CO 4: Document/ Presentation preparation.
CO 5: Perform calculations using spreadsheets

Hardware:
Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheraland submit to your instructor.
Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.
Task 3: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.
Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Internet & World Wide Web:
Task1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.
Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.
Task 3: Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.
Task 4: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block pop ups, block activey downloads to avoid viruses and/or worms.

LaTeX and WORD:
Task 1: Word Orientation: The mentor needs to give an overview of La TeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of La TeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using La TeXand word
– Accessing, overview of toolbars, saving files, Using help and resources, rulers, format

painter in word.
Task 2: Using La TeX and Word to create a project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both La TeX and Word.
Task 3: Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.
Task 4: Creating a Newsletter: Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

Excel:
Excel Orientation: The mentor needs to tell the importance of MS office or equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.
Task 1: Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text
Task 2: Calculating GPA - Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function,
LOOKUP/VLOOKUP
Task 3: Split cells, freeze panes, group and outline, Sorting, Boolean andlogical operators, Conditional formatting

Power Point:
Task 1: Students will be working on basic power point utilities and toolswhich help them create basic power point presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrowsin PowerPoint.
Task 2: Interactive presentations - Hyperlinks, Inserting –Images, Clip Art,Audio, Video, Objects, Tables and Charts.
Task 3: Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides.

AI Tools – ChatGPT:
Task 1: Prompt Engineering: Experiment with different types of prompts to see how the model responds. Try asking questions, starting conversations, or even providing incomplete sentences
to see how the model completes them.
Ex: Prompt: "You are a knowledgeable AI. Please answer the following question: What is the capital of France?"
Task 2: Creative Writing: Use the model as a writing assistant. Provide the beginning of a story or a description of a scene, and let the model generate the rest of the content. This can be a fun way to brainstorm creative ideas
Ex: Prompt: "In a world where gravity suddenly stopped working, people started floating upwards. Write a story about how society adapted to this newreality."
Task 3: Code Generation: Test the model's ability to generate code by giving it partial code snippets and asking it to complete them. You can also ask the model to explain programming concepts or help you debug code.
Ex: Prompt: "Complete the following Python code to swap the values of two variables:\npython\na = 5\nb = 10\ntemp = a\na = b\nb = temp\n"
Task 4: Language Translation: Experiment with translation tasks by providing a sentence in one language and asking the model to translate it intoanother language. Compare the output to see how accurate and fluent the translations are.
Ex: Prompt: "Translate the following English sentence to French: 'Hello, how are you doing today?'"
Task 5: Summarization: Provide a long piece of text, such as an article or a blog post, and

ask the model to summarize it. Compare the model's summary with the original text to assess its ability to condense information effectively.
Ex: Prompt: "Summarize the article titled `Ramayanam' in 3-4 sentences."
Task 6: Futuristic Predictions: Have fun by asking the model to predict future technological advancements, societal changes, or even hypothetical scenarios. Compare its responses with your own ideas.
Ex: Prompt: "Predict how artificial intelligence will transform everyday life in the next 20 years."
Task 7: Technical Explanations: Challenge the model with technical questions from different domains. Ask it to explain scientific concepts, mathematical theorems, or complex algorithms in simple terms.
Ex: Prompt: "Explain the concept of neural networks in machine learning, including their layers and the process of backpropagation."

REFERENCES:

1. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dream tech
2. The Complete Computer upgrade and repair book, 3rd edition Cheryl A chmidt, WILEY Dream tech
3. Introduction to Information Technology, ITL EducationSolutions limited, Pearson Education.
4. PC Hardware - A Handbook – Kate J. Chase PHI (Microsoft)
5. LaTeX Companion – Leslie Lamport, PHI/Pearson.
6. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfins on and Ken Quamme. – CISCO Press, Pearson Education.
7. IT Essentials PC Hardware and Software Labs and Study Guide Third Edition by Patrick Regan– CISCO Press, Pearson Education.

I Year B.Tech. EEE – II Semester

L	T	P	C
0	0	1	0.5

(CH23ABS106) NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE

COURSE OBJECTIVES:

The objective of this course are to:

- Impart discipline, character, fraternity, teamwork, social consciousness among the students and engaging them in selfless service.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO 1: Understand the importance of discipline, character and service motto.
CO 2: Solve some societal issues by applying acquired knowledge, facts, and techniques.
CO 3: Explore human relationships by analyzing social problems.
CO 4: Determine to extend their help for the fellow beings and downtrodden people.
CO 5: Develop leadership skills and civic responsibilities

UNIT I:

Orientation: General Orientation on NSS/NCC/ Scouts & Guides/Community Service activities, career guidance.

Activities:

i) Conducting –ice breaking sessions-expectations from the course- knowing personal talents and skills
ii) Conducting orientations programs for the students –future plans- activities-releasing road map etc.
iii) Displaying success stories-motivational biopics- award winning movies on societal issues etc.
iv) Conducting talent show in singing patriotic songs-paintings-any other contribution.

UNIT II:

Nature & Care

Activities:

i) Best out of waste competition.
ii) Poster and signs making competition to spread environmental awareness.
iii) Recycling and environmental pollution article writing competition.
iv) Organising Zero-waste day.
v) Digital Environmental awareness activity via various social media platforms.
vi) Virtual demonstration of different eco-friendly approaches for sustainable living.
vii) Write a summary on any book related to environmental issues.

UNIT III:

Community Service

Activities:

i) Conducting One Day Special Camp in a village contacting village-area leaders-Survey in the village, identification of problems- helping them to solve via media-authorities experts-etc.
ii) Conducting awareness programs on Health-related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS,
iii) Conducting consumer Awareness. Explaining various legal provisions etc.
iv) Women Empowerment Programmes- Sexual Abuse, Adolescent Health and Population Education.
v) Any other programmes in collaboration with local charities, NGOs etc.

REFERENCES:

1. Nirmalya Kumar Sinha & Surajit Majumder, A Text Book of National Service Scheme Vol;.I, Vidya Kutir Publication, 2021 (ISBN 978-81- 952368-8-6)
2. Red Book - National Cadet Corps – Standing Instructions Vol I & II, Directorate General of NCC, Ministry of Defence, New Delhi
3. Davis M. L. and Cornwell D. A., "Introduction to Environmental Engineering", McGraw Hill, New York 4/e 2008
4. Masters G. M., Joseph K. and Nagendran R. "Introduction to Environmental Engineering and Science", Pearson Education, New Delhi. 2/e 2007 5. Ram Ahuja. Social Problems in India, Rawat Publications, New Delhi.

II Year B.Tech. EEE – I Semester

L	T	P	C
3	0	0	3

(MA23ABS301) COMPLEX VARIABLES AND NUMERICAL METHODS

COURSE OBJECTIVES:

The objective of this course are to:

- Describe continuity/differentiability/analyticity of a function and find the derivative of a function.
- Classify and explain complex power series, singularities, calculus of residues and its applications in the evaluation of integrals.
- Introduce numerical methods for solving algebraic and transcendental equations.
- Introduce the numerical solutions of ordinary differential equations.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO 1: Analyze the behavior of a complex function and understand Cauchy-Riemann equation in testing the analytic functions

CO 2: Apply Cauchy integral theorem, formula and residue theorem to evaluating the complex integrals.

CO 3: Apply numerical methods to solve algebraic and transcendental equations.

CO 4: Derive interpolating polynomials using interpolation formulae.

CO 5: Solve differential equations and integrals using numerically.

UNIT I: (9 periods)

Complex Variable–Differentiation: Introduction to functions of complex variable-concept of Limit & continuity- Differentiation, Cauchy-Riemann equations, analytic functions harmonic functions, finding harmonic conjugate-construction of analytic function by Milne Thomson method

UNIT II: (9 periods)

Complex Variable–Integration: Line integral-Contour integration, Cauchy's integral theorem (without proof), Cauchy Integral formula, Power series expansions: Taylor's series and Maclaurin's series, zeros of analytic functions, Laurent's series, singularities, Residues, Cauchy Residue theorem (without proof). Evaluation of definite Integral involving sine and cosine.

UNIT III: (9 periods)

Solution of Algebraic, Transcendental Equations and Interpolation: Induction-Bisection Method, Regula-falsi method, Iterative method and Newton Raphson method.

Interpolation: Finite differences-Newton's forward and backward interpolation formulae – Lagrange's formulae.

UNIT IV: (9 periods)

Numerical differentiation, Integration and Curve fitting: Numerical differentiation and **Integration:** Numerical differentiation based on Newton's interpolation, Trapezoidal rule, Simpson's 1/3 rule and Simpson's 3/8 rule.

Curve fitting: Fitting of straight line, second-degree and Exponential curve by method of least squares

UNIT V: (9 periods)

Solution of Initial value problems in Ordinary differential equations: Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of Successive Approximations - Euler's and modified Euler's methods - Runge-Kutta method of fourth order

Total Periods: 45

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers,017,44thEdition
2. SS Sastry, Introductory Methods of Numerical Analysis, PHI Learning Private Limited.

REFERENCES:

1. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 2018, 10th Edition.
2. B.V.Ramana, Higher Engineering Mathematics, by Mc Graw Hill publishers
3. R.K.Jainand S.R.K. Iyengar, Advanced Engineering Mathematics, Alpha Science International Ltd., 2021, 5th Edition (9th reprint).

ONLINE RESOURCES:

1. https://onlinecourses.nptel.ac.in/noc17_ma14/preview
2. https://onlinecourses.nptel.ac.in/noc20_ma50/preview
3. http://nptel.ac.in/courses/111105090.

II Year B.Tech. EEE – I Semester

L	T	P	C
3	0	0	3

(EE23AES301) ELECTROMAGNETIC FIELD THEORY

COURSE OBJECTIVES:

The objective of this course are to:

- Introduce the basic mathematical concepts related to electromagnetic vector fields
- Impart knowledge on the concepts of electrostatics, electric potential, energy density and their applications.
- Impart knowledge on the concepts of magneto statics, magnetic flux density, scalar and vector potential and its applications.
- Impart knowledge on the concepts of Faraday's law, induced emf and Maxwell's equations.
- Impart knowledge on the concepts of Concepts of electromagnetic waves

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

- **CO 1:** Apply vector algebra and calculus to solve problems involving electric field intensity and potential in various coordinate systems.
- **CO 2:** Analyze the behaviour of dielectrics and conductors in electric fields, and determine the capacitance for different configurations.
- **CO 3:** Evaluate the magnetic field intensity and forces on current-carrying conductors using Biot-Savart's law and Ampere's law.
- **CO 4:** Synthesize knowledge of self and mutual inductance to design and analyze inductive components in electrical circuits.
- **CO 5:** Understand and explain Faraday's laws of electromagnetic induction and their implications in time-varying electromagnetic fields.

UNIT I: (10 periods)

Vector Analysis: Scalar and Vector operations, Coordinate Systems, Del operator, Gradient of a scalar, Divergence of a vector and Divergence theorem (definition only). Curl of a vector and Stoke's theorem (definition only).

Electrostatics: Coulomb's law and Electric field intensity (EFI) – EFI due to Continuous charge distributions (line and surface charge), Electric flux density, Gauss's law (Maxwell's first equation), Applications of Gauss's law, Electric Potential, Work done in moving a point charge in an electrostatic field (Second Maxwell's equation for static electric fields), Potential gradient, Laplace's and Poisson's equations.

UNIT II: (9 periods)

Conductors – Dielectrics and Capacitance: Electric dipole and dipole moment – Potential and EFI due to an electric dipole, Torque on an Electric dipole placed in an electric field, Current density-conduction and convection current densities, Ohm's law in point form, Continuity equation, Behaviour of conductors in an electric field, Polarization, dielectric constant and strength, Boundary conditions between conductor to dielectric, dielectric to dielectric and conductor to free space, Capacitance of parallel plate, coaxial and spherical capacitors, Energy stored and density in a static electric field.

UNIT III: (9 periods)

Magneto statics, Ampere's Law and Force in magnetic fields: Biot-Savart's law and its applications viz. Straight current carrying filament and circular current carrying wire – Magnetic flux density and Maxwell's second Equation, Ampere's circuital law and its applications viz. MFI due to an infinite sheet, long filament, solenoid current carrying conductor, point form of Ampere's circuital law, Maxwell's third equation.

Magnetic force, moving charges in a magnetic field – Lorentz force equation, force on a current element in a magnetic field, force on a straight and a long current carrying conductor in a magnetic field, force between two straight long and parallel current carrying conductors, Magnetic dipole, Magnetic torque, and dipole moment.

UNIT IV: (8 periods)

Self and mutual inductance: Self and mutual inductance – determination of self-inductance of a solenoid, toroid, coaxial cable and mutual inductance between a straight long wire and a square loop wire in the same plane – Energy stored and energy density in a magnetic field.

UNIT V: (9 periods)

Time Varying Fields: Faraday's laws of electromagnetic induction, Maxwell's fourth equation integral and point forms of Maxwell's equations, statically and dynamically induced EMF, Displacement current, Modification of Maxwell's equations for time varying fields, Poynting theorem and Poynting vector.

Total Periods: 45

TEXT BOOKS:

1. "Elements of Electromagnetics" by Matthew N O Sadiku, Oxford Publications, 7th edition, 2018.
2. "Engineering Electromagnetics" by William H. Haytand John. A. Buck Mc. Graw-Hill, 7th Editon.2006.

REFERENCES:

1. "Introduction to Electro Dynamics" by D J Griffiths, Prentice-Hall of India Pvt. Ltd, 2nd edition.
2. "Electromagnetic Field Theory" by Yaduvir Singh, Pearson India, 1st edition, 2011.
3. "Fundamentals of Engineering Electromagnetics" by Sunil Bhooshan, Oxford University Press, 2012.
4. Schaum's Outline of Electro magnetics by Joseph A. Edminister, Mahamood Navi, 4th Edition,2014.

ONLINE RESOURCES:

1. https://archive.nptel.ac.in/courses/108/106/108106073/
2. https://nptel.ac.in/courses/117103065

II Year B.Tech. EEE – I Semester

L	T	P	C
2	1	0	3

(BA23AHS302) UNIVERSAL HUMAN VALUES

COURSE OBJECTIVES:

The objective of this course is:

- Help the students appreciate the essential complementary between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- Facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
- Highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO 1: Define the terms like Natural Acceptance, Happiness and Prosperity
CO 2: Identify one's self, and one's surroundings (family, society nature).
CO 3: Apply what they have learnt to their own self in different day-to-day settings in real life.
CO 4: Relate human values with human relationship and human society.
CO 5: Justify the need for universal human values and harmonious existence.
CO 6: Develop as socially and ecologically responsible engineers

UNIT I: (7 Periods)

Introduction to Value Education: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education) – Understanding Value Education; Practice Session - Sharing about Oneself; Self-Exploration as the Process for Value Education - Continuous Happiness and Prosperity - the Basic Human Aspirations; Practice Session - Exploring Human Consciousness; Happiness and Prosperity – Current Scenario - Method to Fulfill the Basic Human Aspirations; Practice Session - Exploring Natural Acceptance.

UNIT II: (6 Periods)

Harmony in the Human Being: Understanding Human Being as the Co-existence of the Self and the Body - Distinguishing between the Needs of the Self and the Body; Practice Session - Exploring the difference of Needs of self and body; The Body as an Instrument of the Self - Understanding Harmony in the Self; Practice Session - Exploring Sources of Imagination in the Self; Harmony of the Self with the Body - Programme to ensure Self-regulation and Health; Practice Session - Exploring Harmony of Self with the Body.

UNIT III: (6 Periods)

Harmony in the Family and Society: Harmony in the Family – The Basic Unit of Human Interaction - 'Trust' – The Foundational Value in Relationship; Practice Session - Exploring the Feeling of Trust; 'Respect' – as the Right Evaluation; Practice Session - Exploring the Feeling of Respect; Other Feelings, Justice in Human-to-Human Relationship - Understanding Harmony in the Society - Vision for the Universal Human Order; Practice Session; Exploring Systems to fulfill Human Goal.

UNIT IV: (5 Periods)

Harmony in the Nature / Existence: Understanding Harmony in the Nature - Interconnectedness, Self-regulation and Mutual fulfillment among the Four Orders of Nature; Practice Session - Exploring the Four Orders of Nature; Realizing Existence as Co-existence at

All Levels - The Holistic Perception of Harmony in Existence; Practice Session - Exploring Co-existence in Existence**.**

UNIT V: (6 Periods)

Implications of the Holistic Understanding – a Look at Professional Ethics: Natural Acceptance of Human Values - Definitiveness of (Ethical) Human Conduct; Practice Session - Exploring Ethical Human Conduct; A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order - Competence in Professional Ethics; Practice Session - Exploring Humanistic Models in Education; Holistic Technologies, Production Systems and Management Models-Typical Case Studies - Strategies for Transition towards Value-based Life and Profession; Practice Session - Exploring Steps of Transition towards Universal Human Order.

Total Periods: 30

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

REFERENCES:

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. A.N. Tripathy, 2003, Human Values, New Age International Publishers. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi.
3. E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press.
4. M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
5. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow, Reprinted 2008.

ONLINE RESOURCES:

1. https://www.studocu.com/in/document/kiet-group-of-institutions/universal-human-values/chapter-5-holistic-understanding-of-harmony-on-professional ethics/62490385
2. https://onlinecourses.swayam2.ac.in/aic22_ge23/preview

II Year B.Tech. EEE – I Semester

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3	0	0	3

(EE23APC301) DC MACHINES AND TRANSFORMERS

COURSE OBJECTIVES:

The objective of this course are to:

- Understand the construction, operation, and characteristics of DC machines, including excitation techniques, EMF equations, and applications.
- Analyze DC motor characteristics, efficiency, starting methods, speed control techniques, and testing procedures.
- Understand the construction, operation, and performance analysis of single-phase transformers, including phasor diagrams, equivalent circuits, and efficiency.
- Perform transformer tests and parallel operation and comparisons of transformers.
- Analyze three-phase transformer connections, harmonics, parallel operations, and Scott connection.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

- **CO 1:** Understand the construction, operation, principles of DC machines and their applications.
- **CO 2:** Analyze the starting, speed control, and testing methods for DC machines.
- **CO 3:** Obtain the equivalent circuit of single-phase transformer and determine its efficiency and regulation.
- **CO 4:** Apply various testing methods for transformers.
- **CO 5:** Analyze various configurations of three-phase transformers.

UNIT I: (9 periods)

DC Machines: Construction and principle of operation of DC machines_- Types– EMF equation for generator ––Excitation techniques– Armature reaction and commutation, characteristics of DC generators –applications of DC Generators, - Back-emf and torque equations of DC motor.

UNIT II: (9 periods)

Starting, Speed Control and Testing of DC Machines: Characteristics of DC motors – losses and efficiency – applications of DC motors. Necessity of a starter – starting by 3-point and 4-point starters – speed control by armature voltage and field current control – testing of DC machines – brake test, Swinburne's test –Hopkinson's test–Field Test.

UNIT III: (9 periods)

Single-phase Transformers: Introduction to single-phase Transformers (Construction and principle of operation)–emf equation – operation on no-load and on load –lagging, leading and unity power factors loads –Phasor diagrams– equivalent circuit –regulation – losses and efficiency – effect of variation of frequency and supply voltage on losses – all day efficiency, Applications.

UNIT IV: (9 periods)

Testing of Transformers: Open Circuit and Short Circuit tests – Sumpner's test – separation of losses–– Parallel operation with equal and unequal voltage ratios– auto transformer – equivalent circuit – comparison with two winding transformers.

UNIT V: (9 periods)

Three-Phase Transformers: Polyphase connections- Y/Y, Y/Δ, Δ/Y, Δ/Δ, open Δ and Vector groups – third harmonics in phase voltages– Parallel operation–three winding transformers-transients in switching –off load and on load tap changers–Scott connection.

Total Periods: 45

TEXT BOOKS:

1. Electrical Machinery by Dr. P S Bimbhra, 7th edition, Khanna Publishers, New Delhi, 1995.
2. Performance and analysis of AC machines by M.G. Say, CBS, 2002.

REFERENCES:

1. Electrical Machines by D. P.Kothari, I .J .Nagarth, McGraw Hill Publications, 5th edition
2. Electrical Machinery Fundamentals by Stephen J Chapman McGraw Hill education 2011.
3. Generalized Theory of Electrical Machines by Dr. P S Bimbhra, 7th Edition, Khanna Publishers, 2021.
4. Theory and Performance of Electrical Machines by J.B.Gupta, S.K.Katariaand Sons, 2007.
5. Electric Machinery by Fitzgerald, A.E., Kingsley, Jr., C., and Umans, S. D, 7th edition, McGraw-Hill Education, 2014.

ONLINE RESOURCES:

1. nptel.ac.in/courses/108/105/108105112
2. nptel.ac.in/courses/108/105/108105155

II Year B.Tech. EEE – I Semester

L	T	P	C
3	0	0	3

(EE23APC302) ELECTRICAL CIRCUIT ANALYSIS-II

COURSE OBJECTIVES:

The objective of this course are to:

The objectives of this course are to:

- Understand and analyze three-phase circuits, including how to measure power and use different connection techniques.
- Learn how to use Laplace transforms to solve problems in basic electrical circuits.
- Get familiar with network parameters and how to analyze simple two-port networks.
- Learn how to use Fourier series to analyze periodic waveforms and their effects on circuits.
- Understand the basics of designing and classifying different types of filters.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

- **CO 1:** Apply the concepts of phase sequence, star and delta connections, and power measurement to analyze balanced and unbalanced three-phase circuits.
- **CO 2:** Analyze transient responses of R-L, R-C, and R-L-C circuits using differential equations and Laplace transforms for both DC and sinusoidal excitations.
- **CO 3:** Evaluate and convert various network parameters (impedance, admittance, hybrid, and transmission) and analyze two-port network interconnections.
- **CO 4:** Apply Fourier series to analyze periodic waveforms in electrical circuits, determining effective and average values, power factor, and harmonic effects.
- **CO 5:** Understand and design various types of filters (low pass, high pass, band pass, band elimination, and constant-k) for specific applications.

UNIT I: (9 periods)

Analysis of three phase balanced circuits: Phase sequence, star and delta connection of sources and loads, relation between line and phase quantities, analysis of balanced three phase circuits, and measurement of active and reactive power.

Analysis of three phase unbalanced circuits: Loop method, Star-Delta transformation technique, two-wattmeter method for measurement of three phase power.

UNIT II: (10 periods)

Laplace transforms – Definition and Laplace transforms of standard functions– Shifting theorem – Transforms of derivatives and integrals, Inverse Laplace transforms and applications.

Transient Analysis: Transient response of R-L, R-C and R-L-C circuits (Series and parallel combinations) for D.C. and sinusoidal excitations – Initial conditions - Solution using differential equation approach and Laplace transform approach.

UNIT III: (9 periods)

Network Parameters: Impedance parameters, Admittance parameters, Hybrid parameters, Transmission (ABCD) parameters, conversion of Parameters from one form to other, Conditions for Reciprocity and Symmetry, Interconnection of Two Port networks in Series, Parallel and Cascaded configurations- problems.

UNIT IV: (9 periods)

Analysis of Electric Circuits with Periodic Excitation: Fourier series and evaluation of Fourier coefficients, Trigonometric and complex Fourier series for periodic waveforms, Application to Electrical Systems – Effective value and average value of non-sinusoidal periodic waveforms, power factor, effect of harmonics

UNIT V: (8 periods)

Filters: Classification of filters-Low pass, High pass, Band pass and Band Elimination filters, Constant-k filters -Low pass and High Pass, Design of Filters.

Total Periods: 45

TEXT BOOKS:

1. Engineering Circuit Analysis, William Hayt and Jack E. Kemmerly, 8th Edition McGraw-Hill, 2013
2. Fundamentals of Electric Circuits, Charles K. Alexander, Mathew N. O. Sadiku, 3rd Edition, Tata McGraw-Hill, 2019

REFERENCES:

1. Network Analysis, M. E. Van Valkenburg, 3rd Edition, PHI, 2019.
2. Network Theory, N. C. Jagan and C. Lakshmi Narayana, 1st Edition, B. S. Publications, 2012.
3. Circuits and Networks Analysis and Synthesis, A. Sudhakar, Shyam Mohan S. Palli, 5th Edition, Tata McGraw-Hill, 2017.
4. Engineering Network Analysis and Filter Design (Including Synthesis of One Port Networks)- Durgesh C. Kulshreshtha Gopal G. Bhise, Prem R. Chadha, Umesh Publications 2012.
5. Circuit Theory: Analysis and Synthesis, A. Chakrabarti, Dhanpat Raiand Co., 2018, 7th Revised Edition.

ONLINE RESOURCES:

1. https://archive.nptel.ac.in/courses/117/106/117106108/
2. https://archive.nptel.ac.in/courses/108/105/108105159/

II Year B.Tech. EEE – I Semester

L	T	P	C
0	0	3	1.5

(EE23APC303) DC MACHINES AND TRANSFORMERS LAB

Course Objectives:
The objective of this course are to:
- Conduct various experiments on the speed control techniques of DC motors
- Conduct various experiments on DC motors and DC Generators
- Conduct various experiments for testing on 1-phase transformers

Course Outcomes:
After successful completion of the course, students will be able to:
- **CO 1:** Understand and analyze speed control techniques and efficiency of DC machines.
- **CO 2:** Apply theoretical concepts to determine the performance characteristics of DC Machines
- **CO 3:** Obtain the load characteristics of D.C. Generators
- **CO 4:** Determine the performance parameters of single-phase transformer.
- **CO 5:** Analyze the performance analysis of transformers using various tests

List of Experiments:
1. Speed control of DC shunt motor by Field Current and Armature Voltage Control.
2. Brake test on DC shunt motor- Determination of performance curves.
3. Swinburne's test - Predetermination of efficiencies as DC Generator and Motor.
4. Hopkinson's test on DC shunts Machines.
5. Load test on DC compound generator-Determination of characteristics.
6. Load test on DC shunt generator-Determination of characteristics.
7. Fields test on DC series machines-Determination of efficiency.
8. Brake test on DC compound motor-Determination of performance curves.
9. OC and SC tests on single phase transformer.
10. Sumpner's test on single phase transformer.
11. Scott connection of transformers.
12. Parallel operation of Single-phase Transformers.
13. Separation of core losses of a single-phase transformer.

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

REFERENCE:
1. https://ems-iitr.vlabs.ac.in/List%20of%20experiments.html

II Year B.Tech. EEE – I Semester

L	T	P	C
0	0	3	1.5

(EE23APC304) ELECTRICAL CIRCUIT ANALYSIS-II AND SIMULATION LAB

COURSE OBJECTIVES:

The objective of this course are to:

- Understand the various electric circuit concepts through circuit simulation using PSPICE software
- Know performance of RLC series and parallel circuits through simulation studies
- Know the analysis of 3-phase balanced and unbalanced circuits by simulation
- Know the different parameter calculation and study the transient of given network
- Evaluate the performance of theorems through circuit simulation using PSPICE software

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO 1: Understand the power calculations in three phase circuits.
CO 2: Analyze the time response of given network.
CO 3: Determination of two port network parameters
CO 4: Simulate and analyze electrical circuits using software tools.
CO 5: Apply various theorems to solve different electrical networks using simulation tools

List of Experiments:

Any 10 of the following experiments are to be conducted:

1. Measurement of Active Power and Reactive Power for balanced loads.
2. Measurement of Active Power and Reactive Power for unbalanced loads.
3. Determination of Z and Y parameters.
4. Determination of ABCD and hybrid parameters
5. Verification of Kirchhoff's current law and voltage law using simulation tools.
6. Verification of mesh and nodal analysis using simulation tools.
7. Verification of super position and maximum power transfer theorems using simulation tools.
8. Verification of Reciprocity and Compensation theorems using simulation tools.
9. Verification of Thevenin's and Norton's theorems using simulation tools.
10. Verification of series and parallel resonance using simulation tools.
11. Simulation and analysis of transient response of RL, RC and RLC circuits.
12. Verification of self-inductance and mutual inductance by using simulation tools.

II Year B.Tech. EEE – I Semester

L	T	P	C
0	1	2	2

(CS23ASC301) DATA STRUCTURES

Course Objectives:
The objective of this course are to:
- Understand fundamental data structures, arrays, and basic search/sort algorithms.
- Explore linked lists and their operations, comparing them with arrays.
- Learn about stacks, their implementation, and applications.
- Study queues, including circular queues and deques, and their applications.
- Introduce trees, focusing on binary trees and binary search trees.

Course Outcomes:
After successful completion of the course, students will be able to:
- **CO 1:** Understand the role of data structures in organizing and accessing data.
- **CO 2:** Design, implement and apply linked lists for dynamic data storage.
- **CO 3:** Develop applications using stacks and queues.
- **CO 4:** Design and implement algorithms for operations on binary trees and binary search trees.
- **CO 5:** Design novel solutions to small scale programming challenges involving data structures such as stacks, queues, Trees.

UNIT I:
Introduction to Data Structures: Definition and importance of Data structures, Abstract data types (ADTs) and its specifications. Arrays: Introduction, 1-D, 2-D Arrays, accessing elements of array, Row Major and Column Major storage of Arrays. Searching Techniques: Linear & Binary Search. Sorting Techniques: Bubble sort, Selection sort, Quick sort.
Sample experiments:
1. Program to find min & max element in an array.
2. Program to implement matrix multiplication.
3. Find an element in given list of sorted elements in an array using Binary search.
4. Implement Selection and Quick sort techniques.

UNIT II:
Linked Lists: Singly linked lists: representation and operations, doubly linked lists and circular linked lists, Comparing arrays and linked lists, Applications of linked lists.
Sample experiments:
1. Write a program to implement the following operations.
   a. Insert b. Deletion c. Traversal
2. Write a program to store name, roll no, and marks of students in a class using circular double linked list.
3. Write a program to perform addition of given two polynomial expressions using linked list.

UNIT III:
Stacks: Introduction to stacks: properties and operations, implementing stacks using arrays and linked lists, Applications of stacks in expression evaluation, backtracking, reversing list etc.
Sample experiments:
1. Implement stack operations using
   a. Arrays b. Linked list
2. Convert given infix expression into post fix expression using stacks.
3. Evaluate given post fix expression using stack.
4. Write a program to reverse given linked list using stack.

UNIT IV:

Queues: Introduction to queues: properties and operations, Circular queues, implementing queues using arrays and linked lists, Applications of queues scheduling, etc.

Deques: Introduction to deques (double-ended queues), Operations on deques and their applications.

Sample experiments:

1. Implement Queue operations using
    a. Arrays b. Linked list
2. Implement Circular Queue using
    a. Arrays b. Linked list
3. Implement Dequeue using linked list.

UNIT V:

Trees: Introduction to Trees, Binary trees and traversals, Binary Search Tree – Insertion, Deletion & Traversal.

Sample experiments:

1. Implement binary tree traversals using linked list.
2. Write program to create binary search tree for given list of integers. Perform in-order traversal of the tree. Implement insertion and deletion operations.

TEXT BOOKS:

1. Data Structures and algorithm analysis in C, Mark Allen Weiss, Pearson, 2nd Edition.
2. Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Susan Anderson Freed, Silicon Press, 2008.

REFERENCES:

1. Algorithms and Data Structures: The Basic Toolbox by Kurt Mehlhorn and Peter Sanders
2. C Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman, and John E. Hopcroft
3. Problem Solving with Algorithms and Data Structures by Brad Miller and David Ranum
4. Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein
5. Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms" by Robert Sedgewick.

II Year B.Tech. EEE – I Semester

L	T	P	C
2	0	0	0

(CH23AMC301) ENVIRONMENTAL SCIENCE

COURSE OBJECTIVES:

The objective of this course is:

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

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

- **CO 1:** Exploring different types of renewable and non-renewable energy sources.
- **CO 2:** Students will learn about the structure and function of different ecosystems.
- **CO 3:** Students will learn about different types of pollution and their sources, effects and control measures.
- **CO 4:** Exploring the science behind climate change, its evidence, and its impacts on ecosystems and human societies.
- **CO 5:** Understanding demographic factors and their environmental implications.

UNIT I: (6 Periods)

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

Natural Resources: Energy 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.

UNIT II: (7 Periods)

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 Ecosystems:

a) Forest Ecosystem.
b) Grassland Ecosystem
c) Desert Ecosystem.
d) Aquatic Ecosystems (Freshwater - Ponds, Streams, Lakes, Rivers, Marine Ecosystem- Oceans, Estuaries)

Biodiversity and its Conservation : Introduction, Definition: Genetic, Species and Ecosystem Diversity – Bio-Geographical Classification of India – Value of Biodiversity: Consumptive use, Productive use, Social, Ethical, Aesthetic and Option Values – Biodiversity at Global, National and Local levels – India as a Mega-Diversity Nation – Hot-Spots of Biodiversity – Threats to Biodiversity: Habitat Loss, Poaching of Wildlife, Man-Wildlife Conflicts – Endangered and Endemic Species of India – Conservation of Biodiversity: In-situ and Ex-situ Conservation of Biodiversity. Specific Case Studies.

UNIT III: (6 Periods)

Environmental Pollution: Definition, Cause, Effects, and Control measures of: Air Pollution, Water Pollution, Soil Pollution, Marine Pollution, Noise Pollution, Thermal Pollution, Nuclear Hazards - Pollution Case Studies - Role of an Individual in the Prevention of Pollution - Solid

Waste Management- Causes, Effects and Control Measures of Urban and Industrial Wastes - Disaster Management-Floods, Earthquakes, Cyclones and Landslides.

UNIT IV: (5 Periods)

Social Issues and the Environment: Sustainable Development Goals, From Unsustainable to Sustainable Development–Urban Problems related to Energy – Water Conservation, Rainwater 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.

UNIT V: (6 Periods)

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 a Local Area to Document Environmental Assets River / Forest Grassland / Hill / Mountain – Polluted Site – Urban / Rural / Industrial / Agricultural - Study of Common Plants, Insects and Birds – River, Hill Slopes.

Total Periods: 30

TEXT BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses Erach Bharucha for University Grants Commission, Universities Press, Third Edition, 2021.
2. K. Raghavan Nambiar, "Textbook of Environmental Studies for Undergraduate Courses as per UGC model syllabus", Scitech Publications (India), Pvt. Ltd. Second Edition, 2008.
3. Palaniswamy, "Environmental Studies", Pearson Education, Second Edition, 2014.
4. S. Azeem Unnisa, "Environmental Studies" Academic Publishing Company
5. A. Koushik & C. P. Koushik, Perspectives in Environmental Studies, New Age International,Fourth Edition, 2006.

REFERENCES:

1. Deeksha Dave and E. Sai Baba Reddy, "Textbook of Environmental Science", Cengage Publications, Second Edition, 2012.
2. M. Anji Reddy, "Textbook of Environmental Sciences and Technology", BS Publication, Second Edition, 2023.
3. J.P. Sharma, Comprehensive Environmental studies, Laxmi publications, Third Edition, 2009.
4. J. Glynn Henry and Gary W. Heinke, "Environmental Sciences and Engineering", Prentice Hall of India Private Limited, Second Edition, 2004.
5. G.R. Chatwal, "A Text Book of Environmental Studies" Himalaya Publishing House, Fourth Edition, 2014.
6. Gilbert M. Masters and Wendell P. Ela, "Introduction to Environmental Engineering and Science, Prentice Hall of India Private Limited, Third Edition, 2007.

II Year B.Tech. EEE – II Semester

L	T	P	C
3	0	0	3

(EC23AES401) ANALOG CIRCUITS

COURSE OBJECTIVES:

The objective of this course are to:

- List various types of feedback amplifiers, oscillators and large signal Amplifiers.
- Explain the operation of various electronic circuits and linear ICs.
- Apply various types of electronic circuits to solve engineering problems.
- Analyze various electronic circuits and regulated power supplies for proper understanding
- Design electronic circuits for a given specification

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO 1: Analyze the working principles of clippers& clappers and understand the DC analysis of BJT for various parameters.

CO 2: Design and Analysis of amplifiers using h-parameter model and feedback amplifier circuits.

CO 3: Apply basic principle to solve the problems on oscillators based on specifications and understand the basic building blocks of operational amplifiers.

CO 4: Analyze and Design of various linear and non-linear applications of OP-AMP.

CO 5: Analyze special integrated circuits and understand the working principle of data converters.

UNIT I: (9 Periods)

Diode clipping and clamping circuits: Diode clippers, clipping at two independent levels, Transfer characteristics of clippers, clamping circuit operation.

DC biasing of BJTs: Load lines, Operating Point, Bias Stability, Collector-to-Base Bias, Self-Bias, Stabilization against Variations in V and ß for the Self-Bias Circuit, Bias Compensation, Thermal Runaway, Thermal Stability.

UNIT II: (10 Periods)

Small Signals Modeling of BJT: Analysis of a Transistor Amplifier Circuit using h parameters, Simplified CE Hybrid Model, Analysis of CE, CC, CB Configuration using Approximate Model, Frequency Response of CE and CC amplifiers.

Feedback Amplifiers: Classification of Amplifiers, the Feedback Concept, General Characteristics of Negative-Feedback Amplifiers, Effect of Negative Feedback upon Output and Input Resistances, Voltage-Series Feedback, Current-Series Feedback, Current-Shunt Feedback, Voltage-Shunt Feedback.

UNIT III: (8 Periods)

Oscillator Circuits: Barkhausen Criterion of oscillation, Oscillator operation, R-C phase shift oscillator, Wien bridge Oscillator, Crystal Oscillator.

Operational Amplifiers: Introduction, Basic information of Op-Amp, Ideal Operational Amplifier, Block Diagram Representation of Typical Op-Amp, OP-Amps Characteristics: Introduction, DC and AC characteristics, 741 op-amp & its features.

UNIT IV: (8 Periods)

OP-AMPS Applications: Introduction, Basic Op-Amp Applications, Instrumentation Amplifier, AC Amplifier, V to I and I to V Converter, Sample and Hold Circuit, Log and Antilog Amplifier, Multiplier and Divider, Differentiator, integrator.

Comparators and Waveform Generators: Introduction, Comparator, Square Wave Generator, Monostable Multivibrator, Triangular Wave Generator, Sine Wave Generators.

UNIT V: (10 Periods)

Timers and Phase Locked Loop: Introduction to 555 timer, functional diagram, Monostable and Astable operations and applications, Schmitt Trigger, PLL block schematic, principles and

description of individual blocks, 565 PLL, Applications of VCO (566).
Digital to Analog and Analog To Digital Converters: Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, A-D Converters – parallel Comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC, DAC and ADC Specifications.

Total Periods: 45

TEXT BOOKS:

1. Electronic Devices and Circuits- J. Millman, C.Halkias, Tata Mc-Graw Hill, 2nd edition, 2010.
2. Linear Integrated Circuits – D. Roy Choudhury, New Age International (p) Ltd, 2nd edition, 2003.

REFERENCES:

1. Electronic Devices and Circuit Theory – Robert L.Boylestad and Lowis Nashelsky, Pearson edition, 2021.
2. Electronic Devices and Circuits–G.K. Mithal, Khanna Publisher, 23rd edition, 2017.
3. Electronic Devices and Circuits – David Bell, Oxford, 5th edition, 2008.
4. Electronic Principles–Malvino, Albert Paul, and David J. Bates, McGraw-Hill/Higher Education, 2007.
5. Operational Amplifiers and Linear Integrated Circuits– Gayakwad R.A, Prentice Hall India, 2002.
6. Operational Amplifiers and Linear Integrated Circuits –Sanjay Sharma, Kataria & Sons, 2nd edition, 2010.
7. Design of Analog CMOS Integrated Circuits - Behzad Razavi

ONLINE RESOURCES:

1. https://nptel.ac.in/courses/122106025.
2. https://nptel.ac.in/courses/108102112.

II Year B.Tech. EEE – II Semester

L	T	P	C
2	0	0	2

(BA23AHS403) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

COURSE OBJECTIVES:

The objective of this course are to:

- Inculcate the basic knowledge of micro economics and financial accounting.
- Make the students learn how demand is estimated for different products, input-output relationship for optimizing production and cost.
- Know the Various types of market structure and pricing methods and strategy.
- Give an over view on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
- Provide fundamental skills on accounting and to explain the process of preparing financial statements.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO 1: Define the concepts related to Managerial Economics, financial accounting and management.

CO 2: Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets.

CO 3: Apply the Concept of Production cost and revenues for effective Business decision.

CO 4: Analyze how to invest their capital and maximize returns and evaluate the capital budgeting techniques.

CO 5: Develop the accounting statements and evaluate the financial performance of business entity.

UNIT I: (6 Periods)

Managerial Economics: Introduction – Nature, meaning, significance, functions, and advantages. Demand-Concept, Function, Law of Demand- Demand Elasticity- Types– Measurement. Demand Forecasting- Factors governing Forecasting, Methods. Managerial Economics and Financial Accounting and Management.

UNIT II: (6 Periods)

Production and Cost Analysis: Introduction – Nature, meaning, significance, functions and advantages. Production Function– Least- cost combination– Short run and long run Production Function- Isoquants and Is costs, Cost & Break-Even Analysis - Cost concepts and Cost behaviour- Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems).

UNIT III: (6 Periods)

Business Organizations and Markets: Introduction – Forms of Business Organizations- Sole Proprietary- Partnership - Joint Stock Companies - Public Sector Enterprises. Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition Monopoly- Monopolistic Competition– Oligopoly-Price-Output Determination - Pricing Methods and Strategies

UNIT IV: (6 Periods)

Capital Budgeting: Introduction – Nature, meaning, significance. Types of Working Capital, Components, Sources of Short-term and Long-term Capital, Estimating Working capital requirements.

Capital Budgeting: Features, Proposals, Methods and Evaluation. Projects – Pay Back Method, Accounting Rate of Return (ARR) Net Present Value (NPV) Internal Rate Return (IRR) Method (sample problems)

UNIT V: (6 Periods)

Financial Accounting and Analysis: Introduction–Concepts and Conventions- Double-Entry Bookkeeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss

Account and Balance Sheet with simple adjustments). Introduction to Financial Analysis - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.

Total Periods: 30

TEXT BOOKS:

1. Varshney & Maheswari: Managerial Economics, Sultan Chand.
2. Aryasri: Business Economics and Financial Analysis,4/e, MGH.

REFERENCES:

1. Ahuja Hl Managerial economics Schand.
2. S.A.Siddiqui and A.S.Siddiqui: Managerial Economics and Financial Analysis, New Age International.
3. Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi.
4. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage.

ONLINE RESOURCES:

1. https://www.slideshare.net/123ps/managerial-economics-ppt
2. https://www.slideshare.net/rossanz/production-and-cost-45827016
3. https://www.slideshare.net/darkyla/business-organizations-19917607
4. https://www.slideshare.net/balarajbl/market-and-classification-of-market
5. https://www.slideshare.net/ruchi101/capital-budgeting-ppt-59565396
6. https://www.slideshare.net/ashu1983/financial-accounting

II Year B.Tech. EEE – II Semester

L	T	P	C
3	0	0	3

(EE23APC401) CONTROL SYSTEMS

Course Objectives:
The objective of this course are to:
- Introduce the basic principles and applications of control systems.
- Learn the time response and steady state response of the systems.
- Know the time domain analysis and solutions to time invariant systems.
- Understand different aspects of stability analysis of systems in frequency domain.
- Understand the concept of state space, controllability and observability.

Course Outcomes:
After successful completion of the course, students will be able to:
- **CO 1:** Analyze and model various control systems using differential equations and block diagram reduction techniques and signal flow graphs
- **CO 2:** Evaluate the transient and steady-state response of control systems and the effects of different controllers.
- **CO 3:** Apply stability criteria and root locus methods to determine and analyze system stability.
- **CO 4:** Analyze frequency response data using Bode, Polar, and Nyquist plots to assess system stability and performance.
- **CO 5:** Construct and solve state space models of continuous systems and evaluate their controllability and observability.

UNIT I: (9 periods)
CONTROL SYSTEMS CONCEPTS: Open loop and closed loop control systems and their differences- Examples of control systems- Classification of control systems, Feedback characteristics, Effects of positive and negative feedback, Mathematical models – Differential equations of translational and rotational mechanical systems and electrical systems, Analogous Systems.
Block diagram reduction methods – Signal flow graphs - Reduction using Mason's gain formula. Principle of operation of DC and AC Servo motor, Transfer function of DC servo motor - AC servo motor, Synchros.

UNIT II: (9 periods)
TIME RESPONSE ANALYSIS: Step Response - Impulse Response - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants, P, PI, PID Controllers.

UNIT III: (9 periods)
STABILITY ANALYSIS IN TIME DOMAIN: The concept of stability – Routh's stability criterion – Stability and conditional stability – limitations of Routh's stability. The Root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci.

UNIT IV: (9 periods)
FREQUENCY RESPONSE ANALYSIS: Introduction, Frequency domain specifications-Bode Diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Stability Analysis from Bode Plots. Polar Plots - Nyquist Plots- Phase margin and Gain Margin-Stability Analysis.
Compensation techniques – Lag, Lead, Lag-Lead Compensator (Basics only).

UNIT V: (9 periods)
STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS: Concepts of state, state variables and state model, state models - differential equations and Transfer function models - Block diagrams. Diagonalization, Transfer function from state model, Solving the Time invariant

state Equations- State Transition Matrix and it's Properties. System response through State Space models. The concepts of controllability and observability.

Total Periods: 45

TEXT BOOKS:

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

REFERENCES:

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

ONLINE RESOURCES:

1. https://nptel.ac.in/courses/108102043
2. https://nptel.ac.in/courses/108106098.

II Year B.Tech. EEE – II Semester

L	T	P	C
3	0	0	3

(EE23APC402) INDUCTION AND SYNCHRONOUS MACHINES

COURSE OBJECTIVES:
The objective of this course are to:
- Understand the fundamentals of induction machines, know equivalent circuit performance characteristics.
- Understand the torque developed and methods of starting of Induction motors.
- Understand the methods of starting of single-phase motors.
- Understand the working operation of alternator and their EMF's, parallel operation of Alternators.
- Understand the principal operations and methods of starting of synchronous motors

COURSE OUTCOMES:
After successful completion of the course, students will be able to:
- **CO 1:** Understand the construction, operation, and performance parameters of squirrel cage and slip ring induction motors.
- **CO 2:** Analyze the performance characteristics and testing methods for 3-phase induction motors.
- **CO 3:** Evaluate the operation and starting methods of single-phase induction motors.
- **CO 4:** Apply knowledge of synchronous generators to analyze their performance and Voltage regulations and synchronization methods.
- **CO 5:** Understand the principles, operation, and performance issues of synchronous motors.

UNIT I: (10 periods)
3- Phase induction motors: Construction of Squirrel cage and Slipring induction motors– production of rotating magnetic field – principle of operation – rotor emf and rotor frequency – rotor current and power factor at standstill and during running conditions– rotor power input, rotor copper loss and mechanical power developed and their inter-relationship – equivalent circuit – phasor diagram, Applications.

UNIT II: (9 periods)
Performance of 3-Phase induction motors: Torque equation – expressions for maximum torque and starting torque – torque-slip characteristics – double cage and deep bar rotors – No load, Brake test and Blocked rotor tests – circle diagram for predetermination of performance- methods of starting –starting current and torque calculations -speed control of induction motor with V/f control method, rotor resistance control and rotor emf injection technique –crawling and cogging – induction generator operation.

UNIT III: (8 periods)
Single Phase Motors: Single phase induction motors – constructional features – double revolving field theory, Cross field theory – equivalent circuit- starting methods: capacitor start capacitor run, capacitor start induction run, split phase and shaded pole, AC series motor, Applications.

UNIT IV: (10 periods)
Synchronous Generator: Constructional features of non-salient and salient pole type alternators- armature windings – distributed and concentrated windings – distribution and pitch factors – E.M.F equation – armature reaction – voltage regulation by synchronous impedance method – MMF method and Potier triangle method –two reaction analysis of salient pole machines -methods of synchronization- Slip test – Parallel operation of alternators.

UNIT V: (8 periods)
Synchronous Motor: Synchronous motor principle and theory of operation – Effect of excitation on current and power factor– synchronous condenser –expression for power

developed –hunting and its suppression – methods of starting, Applications.

Total Periods: 45

TEXT BOOKS:

1. Electrical Machinery, Dr. P.S. Bhimbra, Khanna Publishing, 2021, First Edition.
2. Performance and analysis of AC machines by M.G. Say, CBS, 2002.

REFERENCES:

1. Electrical machines, D.P. Kothari and I.J. Nagrath, McGraw Hill Education, 2017, Fifth Edition.
2. Theory and Performance of Electrical Machines by J.B.Gupta, S.K.Katariaand Sons, 2007.
3. Electric Machinery, A.E.Fitzgerald, Charles kingsley, Stephen D.Umans, McGraw- Hill, 2020, Seventh edition.

ONLINE RESOURCES:

1. https://nptel.ac.in/courses/108/105/108105131
2. https://nptel.ac.in/courses/108106072

II Year B.Tech. EEE – II Semester

L	T	P	C
3	0	0	3

(EE23APC403) POWER SYSTEMS-I

COURSE OBJECTIVES:

The objective of this course are to:

- Understand the Concepts of Hydro and Thermal power generating stations.
- Understand the concepts of nuclear power stations.
- Understand the concepts about Different Substations
- Understand and compare Distribution Systems and Underground cables.
- Illustrate the economic aspects of power generation and tariff methods

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO 1: Understand the Concepts of Hydro and Thermal Power plants.
CO 2: Apply knowledge of nuclear power plant components and types of reactors to the operation of nuclear power stations.
CO 3: Analyze the layouts and bus bar arrangements of air-insulated and gas-insulated substations, comparing their advantages and constructional aspects.
CO 4: Understand the concepts of distribution systems, underground cables
CO 5: Analyze various economic aspects related to power generation and distribution

UNIT I: (9 periods)

Hydroelectric Power Stations: Selection of site, general layout of a hydroelectric power plant with brief description of major components and principle of operation

Thermal Power Stations: Selection of site, general layout of a thermal power plant. Brief description of components: boilers, super heaters, economizers and electrostatic precipitators, steam turbines: impulse and reaction turbines, condensers, feed water circuit, cooling towers and chimney.

UNIT II: (9 periods)

Nuclear Power Stations: Location of nuclear power plant, working principle, nuclear fission, nuclear fuels, nuclear chain reaction, nuclear reactor components: moderators, control rods, reflectors and coolants, types of nuclear reactors and brief description of PWR, BWR and FBR. Radiation: radiation hazards and shielding, nuclear waste disposal.

UNIT III: (9 periods)

Substations: Air Insulated Substations – indoor & outdoor substations, substations layouts of 33/11 kV showing the location of all the substation equipment. Bus bar arrangements in the substations: simple arrangements like single bus bar, sectionalized single bus bar, double bus bar with one and two circuit breakers, main and transfer bus bar system with relevant diagrams. Gas Insulated Substations (GIS) – advantages of gas insulated substations, constructional aspects of GIS, comparison of air insulated substations and gas insulated substations.

UNIT IV: (10 periods)

Distribution Systems: Classification of Distribution systems, A.C Distribution, Overhead versus Underground system, Connection schemes of Distribution system, Requirements of Distribution system, Design considerations in Distribution system.

Underground Cables: Types of cables, construction, types of insulating materials, calculation of insulation resistance, stress in insulation and power factor of cable. Capacitance of single and 3-Core belted Cables. Grading of cables: capacitance grading and intersheath grading

UNIT V: (8 periods)

Economic Aspects & Tariff:

Economic Aspects – load curve, load duration and integrated load duration curves, discussion on economic aspects: connected load, maximum demand, demand factor, load

factor, diversity factor, plant capacity factor and plant use factor, base and peak load plants. **Tariff Methods–** Costs of generation and their division into fixed, semi-fixed and running costs, desirable characteristics of a tariff method, tariff methods: simple rate, flat rate, block rate, two-part, three–part, and power factor tariff methods, Time of Day (ToD) tariff and Time of Use (ToU) tariff.

Total Periods: 45

TEXT BOOKS:

1. S. N. Singh, Electric Power Generation, Transmission and Distribution, PHI Learning Pvt Ltd, New Delhi, 2nd Edition, 2010.
2. J. B. Gupta, Transmission and Distribution of Electrical Power, S. K. Kataria and sons,10th Edition, 2012.

REFERENCES:

1. I.J.Nagarath& D.P. Kothari, Power System Engineering, McGraw-Hill Education, 3 rd Edition, 2019.
2. C.L.Wadhwa,Generation, Distribution and Utilization of Electrical Energy, New Age International Publishers, 6th Edition, 2018.
3. V. K. Mehta and Rohit Mehta, Principles of Power System, S. Chand, 4th Edition, 2005.
4. Turan Gonen, Electric Power Distribution System Engineering, McGraw-Hill, 1985.
5. Handbook of switchgear, BHEL, McGraw-Hill Education, 2007.

ONLINE RESOURCES:

1. https://nptel.ac.in/courses/108102047

II Year B.Tech. EEE – II Semester

L	T	P	C
1	0	2	2

(CS23AES301) DESIGN THINKING AND INNOVATION

COURSE OBJECTIVES:

The objective of this course are to:

- Familiarize students with design thinking process as a tool for breakthrough innovation.
- Equip students with design thinking skills and ignite their minds to create innovative ideas, develop solutions for real-time problems.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO 1: Define the concepts related to design thinking.
CO 2: Explain the fundamentals of Design Thinking and innovation.
CO 3: Apply the design thinking techniques for solving problems in various sectors.
CO 4: Analyze to work in a multidisciplinary environment.
CO 5: Evaluate the value of creativity.
CO 6: Formulate specific problem statements of real-time issues.

UNIT I: (2 Periods)

Introduction to Design Thinking Introduction to elements and principles of Design, basics of design - dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, new materials in Industry.

UNIT II: (2 Periods)

Design Thinking Process Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, customer, journey map, brainstorming, product development.

Activity: Every student presents their idea in three minutes. Every student can present the design process in the form of a flow diagram or flow chart, etc. Every student should explain about product development.

UNIT III: (4 Periods)

Innovation Art of innovation, difference between innovation and creativity, role of creativity and innovation in organizations - Creativity to Innovation - Teams for innovation - Measuring the impact and value of creativity.

Activity: Debate on innovation and creativity, flow and planning from idea to innovation, debate on value-based innovation.

UNIT IV: (3 Periods)

Product Design Problem formation, introduction to product design, product strategies, product value, product planning, product specifications - Innovation towards product design - Case studies.

Activity: Importance of modeling, how to set specifications, explaining their own product design.

UNIT V: (4 Periods)

Design Thinking in Business Processes Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business - Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs - Design thinking for Startups - Defining and testing Business Models and Business Cases - Developing & testing prototypes.

Activity: How to market our own product, about maintenance, reliability and plan for startup.

Total Periods: 15

TEXT BOOKS:

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

REFERENCES:

1. David Lee, Design Thinking in the Classroom, Ulysses Press
2. Shrutin N Shetty, Design the Future, Norton Press
3. William Lidwell, Universal Principles of Design - Kritinaholden, Jill Butter.
4. Chesbrough H, The Era of Open Innovation – 2013

ONLINE RESOURCES:

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

II Year B.Tech. EEE – II Semester

L	T	P	C
0	0	3	1.5

(EE23APC404) CONTROL SYSTEMS LAB

Course Objectives:

The objectives of this course are to:

- Analyze the dynamic response and stability of control systems
- Understand the operational characteristics of Synchros, servo motors, and magnetic amplifiers.
- Apply feedback control strategies, including PID and compensator design, to enhance system performance.
- Implement and troubleshoot control logic and automation systems using PLCs.
- Utilize MATLAB for stability analysis and state-space modeling of control systems.

Course Outcomes:

After successful completion of the course, students will be able to:

- **CO 1:** Analyze the time response and stability of second-order and linear time-invariant systems using MATLAB and theoretical methods
- **CO 2:** Evaluate the characteristics and control mechanisms of Synchros, servo motors, and magnetic amplifiers
- **CO 3:** Apply the effects of P, PD, PI, and PID controllers on second order system
- **CO 4:** Apply PLCs to implement logic gates, Boolean expressions, and motor speed control in practical scenarios
- **CO 5:** Model state-space representations, and perform comprehensive stability analysis using MATLAB tools.

List of Experiments:

Any 10 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. Temperature controller using PID
9. Characteristics of magnetic amplifiers
10. Characteristics of AC servo motor
11. Linear system analysis (Time domain analysis, Error analysis) using MATLAB.
12. Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant system using MATLAB
13. State space model for classical transfer function using MATLAB – Verification.

II Year B.Tech. EEE – II Semester

L	T	P	C
0	0	3	1.5

(EE23APC405) INDUCTION AND SYNCHRONOUS MACHINES LAB

COURSE OBJECTIVES:

The objectives of this course are to:

- Evaluate the operation of three phase and single phase induction motor.
- Analyze the voltage regulation methods of alternator.
- Obtain the V and Inverted V curves of a three-phase synchronous motor.
- Evaluate the parallel operation of alternator.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO 1: Analyze various performance characteristics of 3-phase and 1-phase induction motors

CO 2: Evaluate the performance of 3-phase Induction Motor by obtaining the circle diagram and equivalent circuit of 3-phase Induction Motor and single phase induction motor

CO 3: Adapt the power factor improvement methods for single phase Induction Motor

CO 4: Pre-determine the regulation of 3-phase alternator

CO 5: Determine the synchronous machine reactance of 3-phase alternator

List of Experiments:

Any 10 experiments of the following are required to be conducted

1. Brake test on three phase Induction Motor.
2. Circle diagram of three phase induction motor.
3. Speed control of three phase induction motor by V/f method.
4. Equivalent circuit of single-phase induction motor.
5. Power factor improvement of single-phase induction motor by using capacitors.
6. Load test on single phase induction motor.
7. Regulation of a three -phase alternator by synchronous impedance and MMF methods.
8. Regulation of three-phase alternator by Potier triangle method.
9. V and Inverted V curves of a three-phase synchronous motor.
10. Determination of Xd, Xq and Regulation of a salient pole synchronous generator.
11. Determination of efficiency of three phase alternator by loading with three phase induction motor.
12. Parallel operation of three-phase alternator under no-load and load conditions.
13. Determination of efficiency of a single-phase AC series Motor by conducting Brake test.

Reference:

1. https://em-coep.vlabs.ac.in/List%20of%20experiments.html

II Year B.Tech. EEE – II Semester

L	T	P	C
0	1	2	2

(CS23ASC302) PYTHON PROGRAMMING

COURSE OBJECTIVES:

The objectives of this course are to:

- Introduce core programming concepts of Python programming language.
- Demonstrate about Python data structures like Lists, Tuples, Sets and dictionaries.
- Implement Functions, Modules and Regular Expressions in PythonProgramming and to create practical and contemporary applications using these

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO 1: Classify data structures of Python.
CO 2: Apply Python programming concepts to solve a variety of computational problems.
CO 3: Understand the principles of object-oriented programming (OOP) in Python, including classes, objects, inheritance, polymorphism, and encapsulation, and apply them to design and implement Python programs.
CO 4: Become proficient in using commonly used Python libraries and frameworks such as JSON, XML, NumPy, pandas.
CO 5: Exhibit competence in implementing and manipulating fundamental data structures such as lists, tuples, sets, dictionaries.
CO 6: Propose new solutions to computational problems

UNIT I

History of Python Programming Language, Thrust Areas of Python, Installing Anaconda Python Distribution, Installing and Using Jupiter Notebook.

Parts of Python Programming Language: Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, the type () Function and Is Operator, Dynamic and Strongly Typed Language.

Control Flow Statements: if statement, if-else statement, if.eif else, Nested if statement, while Loop, for Loop, continue and break Statements, Catching Exceptions Using try and except Statement.

Sample Experiments:

1. Write a program to find the largest element among three Numbers.
2. Write a Program to display all prime numbers within an interval
3. Write a program to swap two numbers without using a temporary variable.
4. Demonstrate the following Operators in Python with suitable examples.
    - Arithmetic Operators
    - Relational Operators
    - Assignment Operators
    - Logical Operators
    - Bit wise Operators Ternary Operator
    - Membership Operators Identity Operators
5. Write a program to print multiplication table of a given number.

UNIT II

Functions: Built-In Functions, Commonly Used Modules, Function Definition and Calling the function, return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments.

Strings: Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings.

Lists: Creating Lists, Basic List Operations, Indexing and Slicing in Lists.

Sample Experiments:

1. Write a program to define a function with multiple return values.
2. Write a program to define a function using default arguments.
3. Write a program to find the length of the string without using any library functions.
4. Write a program to check if the substring is present in a given string or not.
5. Write a program to perform the given operations on a list:
   i. Addition ii. Insertion iii. slicing
6. Write a program to perform any 5 built-in functions by taking any list

UNIT III

Dictionaries: Creating Dictionary, Accessing and Modifying key: value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, del Statement.
Tuples and Sets: Creating Tuples, Basic Tuple Operations, tuple() Function, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries.

Sample Experiments:

1. Write a program to create tuples (name, age, address, college) for at least two members and concatenate the tuples and print the concatenated tuples.
2. Write a program to count the number of vowels in a string (No control flow allowed).
3. Write a program to sum all the items in a given dictionary.

UNIT IV

Files: Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Python os and os.path Modules.
Object-Oriented Programming: Classes and Objects, Creating Classes in Python, Creating Objects in Python, Constructor Method, method overloading, constructor overloading, classes with Multiple Objects, Inheritance, Polymorphism.

Sample Experiments:

1. Write a program to create Classes and Objects in Python
2. Write a program to implement inheritance concept
3. Write a Python program to implement method overloading, constructor overloading

UNIT V

Introduction to Data Science: NumPy, Pandas, Matplotlib libraries.

Sample Experiments:

1. Python Program to demonstrate NumPy arrays creation using array () function.
2. Python program to demonstrate use of ndim, shape, size, dtype.
3. Python programs to demonstrate different ways to create Pandas Dataframe
4. Python programs to demonstrate various plots in matplotlib.

REAL TIME PROJECT:

Dice Rolling Simulator in Python

REFERENCES:

1. Gowrishankar S, Veena A., Introduction to Python Programming, CRC Press1st Edition, 2018
2. Python Programming, S Sridhar, J Indumathi, V M Hariharan, 2nd Edition, Pearson, 2024
3. Introduction to Programming Using Python, Y. Daniel Liang, Pearson 1stEdition 2017.

ONLINE RESOURCES:

1. https://www.coursera.org/learn/python-for-applied-data-science-ai
2. https://www.coursera.org/learn/python?specialization=python#syllabus

COMMUNITY SERVICE PROJECT

Experiential learning through community engagement

Introduction

- Community Service Project is an experiential learning strategy that integrates meaningful community service with instruction, participation, learning and community development.
- Community Service Project involves students in community development and service activities and applies the experience to personal and academic development.
- Community Service Project is meant to link the community with the college for mutual benefit. The community will benefit with the focused contribution of the college students for the village/ local development. The college finds an opportunity to develop social sensibility and responsibility among students and emerge as a socially responsible institution.

Objective

Community Service Project should be an integral part of the curriculum, as an alternativeto the 2 months of Summer Internships / Apprenticeships / On the Job Training, wheneverthere is an exigency when students cannot pursue their summer internships.
The specific objectives are;

- To sensitize students to the living conditions of the people who are around them'To help students to realize the stark realities of society.
- To bring about an attitudinal change in the students and help them to develop societal consciousness, sensibility, responsibility and accountability
- To make students aware of their inner strength and help them to find new /out ofbox solutions to social problems.
- To make students socially responsible citizens who are sensitive to the needs ofthe disadvantaged sections.
- To help students to initiate developmental activities in the community incoordination with public and government authorities.
- To develop a holistic life perspective among the students by making themstudy culture, traditions, habits, lifestyles, resource utilization, wastages and its management, social problems, public administration system and the roles and responsibilities of different persons across different social systems.

Implementation of Community Service Project

- Every student should put in 6 weeks for the Community Service Project during the summer vacation.
- Each class/section should be assigned with a mentor.
- Specific Departments could concentrate on their major areas of concern. For example, Dept. of Computer Science can take up activities related to Computer Literacy to different sections of people like - youth, women, housewives, etc
- A logbook must be maintained by each of the students, where the activities undertaken/involved to be recorded.
- The logbook has to be countersigned by the concerned mentor/faculty in charge.
- An evaluation to be done based on the active participation of the student and grade could be awarded by the mentor/faculty member.
- The final evaluation to be reflected in the grade memo of the student.The Community Service Project should be different from the regular programs of
- NSS/NCC/Green Corps/Red Ribbon Club, etc.
- Minor project reports should be submitted by each student. An internal Viva shallalso be conducted by a committee constituted by the principal of the college.
- Award of marks shall be made as per the guidelines of Internship/apprentice/ onthe job training.

Procedure

A group of students or even a single student could be assigned for a particular habitation or village or municipal ward, as far as possible, in the near vicinity of their place of stay, to

enable them to commute from their residence and return back by evening or so.
The Community Service Project is a twofold one –

- First, the student/s could conduct a survey of the habitation, if necessary, interms of their own domain or subject area. Or it can even be a general survey, incorporating all the different areas. A common survey format couldbe designed. This should not be viewed as a duplication of work by the Village or Ward volunteers, rather, it could be another primary source of data.
- Secondly, the student/s could take up a social activity, concerning their domain or subject area. The different areas, could be like
  - Agriculture Health
  - Marketing and Cooperation
  - Animal Husbandry
  - Horticulture
  - Fisheries Sericulture
  - Revenue and Survey
  - Natural Disaster Management
  - Irrigation
  - Law & Order
  - Excise and Prohibition
  - Mines and Geology
  - Energy
  - Internet
  - Free Electricity
  - Drinking Water

EXPECTED OUTCOMES

Benefits of Community Service Project To Students

Learning Outcomes

- Positive impact on students' academic learning
- Improves students' ability to apply what they have learned in "the real world"
- Positive impact on academic outcomes such as demonstrated complexity of understanding, problem analysis, problem-solving, critical thinking, and cognitive development.
- Improved ability to understand complexity and ambiguity

Personal Outcomes

- Greater sense of personal efficacy, personal identity, spiritual growth, andmoral development
- Greater interpersonal development, particularly the ability to work well withothers, and build leadership and communication skills.

Social Outcomes

- Reduced stereotypes and greater inter-cultural understanding
- Improved social responsibility and citizenship skills
- Greater involvement in community service after graduation

Career Development

- Connections with professionals and community members for learning and career opportunities
- Greater academic learning, leadership skills, and personal efficacy can lead to greater opportunity.

Relationship with the Institution

- Stronger relationships with faculty
- Greater satisfaction with college
- Improved graduation rates

Benefits of Community Service Project to Faculty Members

- Satisfaction with the quality of student learning
- New avenues for research and publication via new relationships between facultyand community
- Providing networking opportunities with engaged faculty in other disciplines or institutions
- A stronger commitment to one's research.

Benefits of Community Service Project to Colleges and Universities

- Improved institutional commitment.Improved student retention
- Enhanced community relations

Benefits of Community Service Project to Community

- Satisfaction with student participation
- Valuable human resources needed to achieve community goals.
- New energy, enthusiasm and perspectives applied to community Work. Enhanced community-university relations.

SUGGESTIVE LIST OF PROGRAMMES UNDER COMMUNITY SERVICE PROJECT

The following are the recommended list of projects for Engineering students. The lists are not exhaustive and open for additions, deletions, and modifications. Colleges are expected to focus on specific local issues for this kind of project. The students are expectedto carry out these projects with involvement, commitment, responsibility, andaccountability. The mentors of a group of students should take the responsibility of motivating, facilitating, and guiding the students. They have to interact with local leadership and people and appraise the objectives and benefits of this kind of project. The project reports shall be placed in the college website for reference. Systematic, Factual, methodical and honest reporting should be ensured.

For Engineering Students

1. Water facilities and drinking water availability
2. Health and hygiene
3. Stress levels and coping mechanisms
4. Health intervention programmes
5. Horticulture
6. Herbal plants
7. Botanical survey
8. Zoological survey
9. Marine products
10. Aqua culture
11. Inland fisheries
12. Animals and species
13. Nutrition
14. Traditional health care methods
15. Food habits
16. Air pollution
17. Water pollution
18. Plantation
19. Soil protection
20. Renewable energy
21. Plant diseases
22. Yoga awareness and practice
23. Health care awareness programmes and their impact
24. Use of chemicals on fruits and vegetables
25. Organic farming
26. Crop rotation
27. Floury culture
28. Access to safe drinking water
29. Geographical survey

30. Geological survey
31. Sericulture
32. Study of species
33. Food adulteration
34. Incidence of Diabetes and other chronic diseases
35. Human genetics
36. Blood groups and blood levels
37. Internet Usage in Villages
38. Android Phone usage by different people
39. Utilization of free electricity to farmers and related issues
40. Gender ration in schooling level- observation.

Complementing the community service project the students may be involved to take up some awareness campaigns on social issues/special groups. The suggested list of programs are

Programs for School Children

1. Reading Skill Program (Reading Competition)
2. Preparation of Study Materials for the next class.
3. Personality / Leadership Development
4. Career Guidance for X class students
5. Screening Documentary and other educational films
6. Awareness Program on Good Touch and Bad Touch (Sexual abuse)
7. Awareness Program on Socially relevant themes.

Programs for Women Empowerment

1. Government Guidelines and Policy Guidelines
2. Women's Rights
3. Domestic Violence
4. Prevention and Control of Cancer
5. Promotion of Social Entrepreneurship

General Camps

1. General Medical camps
2. Eye Camps
3. Dental Camps
4. Importance of protected drinking water
5. ODF awareness camp
6. Swatch Bharath
7. AIDS awareness camp
8. Anti-Plastic Awareness
9. Programs on Environment
10. Health and Hygiene
11. Hand wash programmes
12. Commemoration and Celebration of important days

Programs for Youth Empowerment

1. Leadership
2. Anti-alcoholism and Drug addiction
3. Anti-tobacco
4. Awareness on Competitive Examinations
5. Personality Developmen

Common Programs

1. Awareness on RTI
2. Health intervention programmes
3. Yoga
4. Tree plantation
5. Programs in consonance with the Govt. Departments like –
   i. Agriculture
   ii. Health
   iii. Marketing and Cooperation
   iv. Animal Husbandry

v. Horticulture
vi. Fisheries
vii. Sericulture
viii. Revenue and Survey
ix. Natural Disaster Management
x. Irrigation
xi. Law & Order
xii. Excise and Prohibition
xiii. Mines and Geology
xiv. Energy

Role of Students:

- Students may not have the expertise to conduct all the programmes on their own. The students then can play a facilitator role.
- For conducting special camps like Health related, they will be coordinating with the Governmental agencies.
- As and when required the College faculty themselves act as Resource Persons.
- Students can work in close association with Non-Governmental Organizations like Lions Club, Rotary Club, etc or with any NGO actively working in that habitation.
- And also, with the Governmental Departments. If the program is rolled out, the District Administration could be roped in for the successful deployment of the program.
- An in-house training and induction program could be arranged for the faculty and participating students, to expose them to the methodology of Service Learning.

Timeline for the Community Service Project Activity

Duration: 8 weeks

1. Preliminary Survey (One Week)

- A preliminary survey including the socio-economic conditions of the allotted habitation to be conducted.
- A survey form based on the type of habitation to be prepared before visiting the habitation with the help of social sciences faculty. (However, a template could be designed for different habitations, rural/urban.
- The Governmental agencies, like revenue administration, corporation and municipal authorities and village secretariats could be aligned for the survey.

2. Community Awareness Campaigns (One Week)

- Based on the survey and the specific requirements of the habitation, different awareness campaigns and programmes to be conducted, spread over two weeksof time. The list of activities suggested could be taken into consideration.

3. Community Immersion Programme (Three Weeks)

- **Along with the Community Awareness Programmes**, the student batch can also work with any one of the below-listed governmental agencies and work in tandem with them. This community involvement programme will involve the students in exposing themselves to experiential learning about the community and its dynamics. Programs could be in consonance with the Govt. Departments.

4. Community Exit Report (One Week)

During the last week of the Community Service Project, a detailed report of the outcome of the 8 weeks' works to be drafted and a copy shall be submitted to thelocal administration. This report will be a basis for the next batch of students visiting that habitation. The same report submitted to the teacher-mentor will be evaluated bythe mentor and suitable marks are awarded for onward submission to the University. Throughout the Community Service Project, a daily logbook need to be maintained by the students batch, which should be countersigned by the governmental agencyrepresentative and the teacher-mentor, who is required to periodically visit the studentsand guide them.