AVANTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

(Approved by A.I.C.T.E., New Delhi & Permanently Affiliated to JNTU-GV, Vizianagaram)
NAAC Accredited with A+ grade
Tamaram (V), Makavarapalem, Narsipatnam (RD), Anakapalle Dist, Pin-531113

DEPARTMENT OF ECE- ELECTRONICS AND COMMUNICATION ENGINEERING

ACADEMIC REGULATIONS

COURSE STRUCTURE AND SYLLABUS

For UG-R24

B.Tech – ELECTRONICS AND COMMUNICATION ENGINEERING

(Applicable for batches admitted from 2024-2025)

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Academic Regulations 2024 (R24) for B. Tech (Regular-Full time)

(Effective for the students admitted into I year from the
Academic Year: 2024-2025 onwards)

1. Award of the B.Tech 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 be 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 are to be completed simultaneously with B.Tech. Programme.

2. 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 1 a) i).

3. Courses of study:

The following courses of study are offered at present with specialization in the B.Tech

S.No.	Branch Code - Abbreviation	Branch
1.	02-EEE	Electrical and Electronics Engineering
2.	03-ME	Mechanical Engineering
3.	04-ECE	Electronics and Communication Engineering
4.	05-CSE	Computer Science and Engineering

5.	42-CSM	Computer Science and Engineering (Artificial Intelligence and Machine Learning)
6.	44-CSD	Computer Science and Engineering (Data Science)

4. Admissions

Admission to the B. Tech Program shall be made subject to the eligibility, qualifications and specialization prescribed by the A.P. State Government/ Institution 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 /Institution or to any other order of merit approved by the A.P. Government / Institution, subject to reservations as prescribed by the Government/ Institution from time to time.

5. 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:

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

a) **Semester:** A semester comprises 90 working days.
b) **Academic Year:** Two consecutive (one odd + one even) semesters constitute one academic year.
c) **Choice Based Credit System (CBCS):** The CBCS provides a choice for students to select from the prescribed courses.

6. 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.

7. Structure of 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 Recommendation(%)
1.	Humanities and Social Science including Management (HM)	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	-

8. Course Classification:

All subjects/ courses offered for the undergraduate programme in Engineering (B.Tech. Degree programmes) are broadly classified as follows:

S. No.	Broad Course Classification	Course Category	Description
1.	Foundation Core Courses	Foundation courses	Includes Mathematics, Physics and Chemistry; fundamental engineering courses; Humanities, Social sciences and Management courses
2.	Professional Core Courses	Professional Core Courses (PC)	Includes subjects related to the parent discipline/department/branch of Engineering
3.	Open Elective Courses	Professional Elective Courses (PE)	Include selective 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
		Domains Specific Skill Enhancement Courses (SEC)	Interdisciplinary/ job-oriented / domain courses which are relevant to the industry
4.	Project Internships	Project	B.Tech. Project (or) Major Project
		Internships	Summer Internships–Community based and Industry Internships; Industry oriented Full Semester Internship
5.	Audit Courses	Mandatory non-credit courses	Covering subjects of developing desired attitude among the learners

9. Programme Pattern

i. Total duration of the 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 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 NCC / NSS / Scouts & Guides / Community service activities are made mandatory as credit courses for all the undergraduate students

vi. Courses like Environmental Sciences, Indian Constitution, and Technical Paper Writing & IPR are offered as non-credit mandatory courses for all the undergraduate students.

vii. Design Thinking for Innovation & Tinkering Labs is 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 Institution 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.

10. Evaluation Process

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, and mandatory courses with no credits shall be evaluated for 30 MID semester marks.

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.

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 2.5 units each (Part-A and Part-B) and external examination question paper shall be set with two parts each for 35 marks.

iv) If any subject is having both theory and practical components, they will be evaluated separately as theory subject and practical subject. However, they will be given same subject code with an extension of "T for theory subject and P for practical" subject.

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 questions / short answer questions (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 / multiple choice questions (MCQ's) for 10 marks. Subjective paper shall contain 3 questions and each question carries 10 marks. The marks obtained in the subjective paper are condensed to 15 marks.

Note:

- The objective paper shall be prepared in line with the quality of competitive examinations questions.
- The subjective paper shall contain 3 questions of equal weightage of 10 marks. Any fraction shall be rounded off to the next higher mark.
- The objective paper shall be conducted either online or offline by the respective department on the day of subjective paper test.
- 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.

iii) 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.

iv) First midterm examination shall be conducted for 2.5 (I Unit, II Unit and III Unit half part) units of syllabus the second midterm examination shall be conducted for remaining 2.5 Units (III Unit half part, IV and V units).

v) Final mid semester marks shall be arrived at by considering the marks secured by the student in both the mid examinations with 80% weightage given to the better mid exam and 20% to the other.

For Example:

- Marks obtained in first mid: 25
- Marks obtained in second mid: 20
- Final mid semester Marks: (25 x 0.8) + (20 x 0.2) = 24

If the student is absent for any one midterm examination, the final mid semester marks shall be arrived at by considering 80% weightage 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: (25 x 0.8) + (0 x 0.2) = 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 20 marks such that each question carries 2 marks. There shall be 2 short answer questions from each unit

(iii) In each of the questions from 2 to 6, there shall be either / or type questions of 10 marks each and each question have internal choice. 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.

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

(i) Question paper shall be in two parts viz., Part A and Part B with equal weightage of 35 marks each.

(ii) In each part, question 1 shall contain 5 compulsory short answer questions for a total of 5 marks such that each question carries 1mark.

(iii) 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.

(iv) The questions from 2 to 4 shall be set by covering one unit of the syllabus for each question.

Practical Courses

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

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

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

c) 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 examination shall be conducted for 70 marks as a single laboratory in 3 hours. Mid semester examination shall be evaluated 30 marks in each part. 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.

d) 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.

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

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 weightage of 80% to better mid marks and 20% for the other. The subjective paper shall contain 3 either or type questions of equal weightage 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.

e) 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.

f) 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.

11. 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 their main 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) 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 Institute.

12. Massive Open Online Courses (MOOCs):

A Student has to pursue and complete one course compulsorily through MOOCs approved by the Institute. 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 Institute.

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

13. 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 Institution 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 AIET (A) shall offer credit mobility for MOOCs and give the equivalent credit weightage 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) The 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 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 Institute shall ensure no overlap of MOOC exams with that of the Institute examination schedule. In case of delay in results, the Institute 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 institution shall submit the following to the examination section of the Institute:
(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 Institution` 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 Institute from time to time.

14. Academic Bank of Credits (ABC)

The Institute 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.

15. Mandatory Internships

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 / Institute 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 as 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% weightage 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 Institute.

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 show cased 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 Institute and is evaluated for 140 marks.

The institute 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.

16. Guidelines for offering Minor

To promote inter disciplinary 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.

i) The Minor program requires the completion of 12 credits in Minor stream chosen.

ii) Two courses for 06 credits related to a Minor are to be pursued compulsorily for them in or degree, but may be waived for students who have done similar / equivalent courses. If waived for a student, then the student must take an extra elective course in its place. It is recommended that students should complete the compulsory courses (or equivalents) before registering for the electives.

iii) Electives (minimum of 2 courses) to complete a total of 12 credits.

Note: A total of 04 Open Electives are offered in the curriculum. A student can complete the requirement for Minor within the 160 credits by opting for the courses offered through various verticals/tracks under Open Electives.

17. Guidelines for offering Honors

The objective of introducing B.Tech. (Honors) 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 are 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.

ii) A student shall earn additional 15 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 under graduate degree in Major Discipline (i.e., 160 credits).

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 head of the department shall arrange separate class work and timetable of the courses offered under Honors program.

v) Courses that are used to fulfill 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.

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 incase 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.

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.

18. Attendance Requirements:

i) A student shall be eligible to appear for the Institution's / Institute's 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's 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 Institute.

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/she 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.

19. 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.

20. Grading:

As 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: **A**fter 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

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

ii) For 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):

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

$$\mathbf{SGPA=\Sigma\ (C_i \times G_i)\ /\ \Sigma\ C_i}$$

Where, C_i is the number of credits of the i^{th} subject and G_i is the grade point scored by the student in the i^{th} course.

CGPA: The Cumulative Grade Point Average (CGPA) will be computed in the same manner considering all the courses under gone by a student over all the semesters of a program, i.e.

$$\mathbf{CGPA=\Sigma\ (C_i \times S_i)\ /\ \Sigma C_i}$$

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

Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts. While computing the SGPA the subjects in whom 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.

Award of Class:

After a student has satisfied the requirements prescribed for the completion of the program and are 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 (Without any supplementary appearance)
First Class	≥ 6.5 < 7.5
Second Class	≥ 5.5 < 6.5
Pass Class	≥ 5.0 < 5.5

Note: Students who have written supplementary examinations to fulfill the credit requirement will not be awarded First Class with Distinction. For such students the highest degree that is awarded will be First Class Only.

CGPA to Percentage conversion Formula: (CGPA–0.75) x 10

21. With-holding of Results

If the candidate has any dues not paid to the Institute or if any case of indiscipline or malpractice is pending against him/her, the result of the candidate shall be with held in such cases.

22. 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.

i) **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 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.

ii) **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 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.

iii) **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 Institute 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/APSCHE and State government.

23. 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 startups. 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 Institute. An evaluation committee constituted by the Institute 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.

24. 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, subjected to Section 2 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, subjected to Section **2** and they

will follow the academic regulations in to which they are readmitted.

25. Minimum Instruction Days for a Semester:

The minimum instruction days including internal exams for each semester shall be 90 days.

26. Medium of Instruction:

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

27. Student Transfers:

Student transfers shall be as per the guidelines issued by the Government of Andhra Pradesh / JNTU-GV and the Institute from time to time.

28. General Instructions:

i) The academic regulations should be read as a whole for purpose of any interpretation.

ii) Malpractices rules-nature and punishments are appended.

iii) Where the words “he”, “him”, “his”, occur in the regulations, they also include “she”, “her”, “hers”, respectively.

iv) In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal / Dean-Academics of the institution is final.

v) The Institute 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 Institute.

vi) In the case of any doubt or ambiguity in the interpretation of the guidelines given, the decision of the Principal / Dean-Academics of the institution is final.

ACADEMIC REGULATIONS (R24) for B.Tech (LATERAL ENTRY SCHEME)

(Effective for the students getting admitted into II year through Lateral Entry Scheme from the Academic Year **2025-2026** onwards)

1. Award of the Degree

(a) Award of the B.Tech. Degree / B.Tech. Degree with a Minor if he/she fulfills 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**

A student will be declared eligible for the award of the B.Tech. 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 are to be completed simultaneously with B.Tech programme.

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

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).

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(Dr. R Prasad Rao)
Dean(Academics) &
Member Secretary (AC)

(Dr.C P V N J Mohan Rao)
Chairman
Academic Council

AVANTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY
(Autonomous)
(Approved by A.I.C.T.E., New Delhi & Permanently Affiliated to JNTU-GV, Vizianagaram)
NAAC Accredited with A+ grade
Tamaram (V), Makavarapalem, Narsipatnam (RD), Anakapalle Dist, Pin-531113.
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Department of ELECTRONICS AND COMMUNICATION ENGINEERING

Course Structure

Program– B. Tech Electronics and CommunicationEngineering

Regulation-R24

(Applicable from the academic year 2024-2025 to 2026-2027)

Induction Programme

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

Department of ELECTRONICS AND COMMUNICATION ENGINEERING

Program: B. Tech- Electronics and Communication Engineering **Regulation: R24**

I Year I Semester- Course Structure

S.No	Category	Course Code	Course Title	Hours per Week			
				L	T	P	Credits
1	BS	R24BS01	Linear Algebra and Calculus	3	0	0	3
2	BS	R24BS05	Applied Chemistry	3	0	0	3
3	ES	R24ES02	Problem Solving and Computer Programming with C	3	0	0	3
4	ES	R24ES06	Engineering Graphics	1	0	4	3
5	ES	R24ES05	Basic Electrical and Electronics Engineering	3	0	0	3
6	BS	R24BS06	Applied Chemistry Lab	0	0	2	1
7	ES	R24ES03	Problem Solving and Computer Programming with C Lab	0	0	3	1.5
8	ES	R24ES07	Basic Electrical and Electronics Engineering Lab	0	0	3	1.5
9	ES	R24ES08	Engineering Workshop	0	0	3	1.5
10	MC	R24MC01	Health and Wellness, Yoga and Sports	0	0	1	0.5
Total				**13**	**0**	**16**	**21.0**

Category	Courses	Credits
BS-Basic Sciences Course	3	7.0
ES-Engineering Science Course	6	13.5
MC-Mandatory Course	1	0.5
Total	**10**	**21.0**

Department of ELECTRONICS AND COMMUNICATION ENGINEERING

Program: B. Tech Electronics and Communication Engineering **Regulation: R24**

I Year II Semester- Course Structure

S.No	Category	Course Code	Course Title	Hours per Week			
				L	T	P	Credits
1	BS	R24BS04	Differential Equations and Vector Calculus	3	0	0	3
2	BS	R24BS02	Engineering Physics	3	0	0	3
3	HS	R24HS01	Communicative English	2	0	0	2
4	ES	R24ES01	Basic Civil and Mechanical Engineering	3	0	0	3
5	PC	R24ECPC01	Network Analysis	3	0	0	3
6	HS	R24HS02	Communicative English Lab	0	0	2	1
7	BS	R24BS03	Engineering Physics Lab	0	0	2	1
8	ES	R24ES04	IT Workshop	0	0	2	1
9	PC	R24ECPC02	Network Analysis and Simulation Lab	0	0	3	1.5
10	MC	R24MC02	NSS/NCC/Scouts Guides/Community Service	0	0	1	0.5
Total				**14**	**0**	**10**	**19.0**

Category	Courses	Credits
BS- Basic Sciences Course	3	7.0
ES-Engineering Science Courses	2	4.0
HS-Humanities and Management Sciences Courses	2	3.0
PCC-Professional Core Courses	2	4.5
MC-Mandatory Course	1	0.5
Total	**10**	**19.0**

Linear Algebra and Calculus
I B.TECH- I SEMESTER (Common to all Branches)

Course Title: **Linear Algebra and Calculus**	Course Code**: R24BS01**
Teaching Scheme (L:T:P): 3:0:0	Credits: 3
Type of Course: Lecture	
Continuous Internal Evaluation: 30 Marks	Semester End Exam: 70 Marks
Pre requisites: Linear algebra is a prerequisite for calculus, and that you should have a deep understanding of linear algebra before moving on to calculus.	

COURSE OVERVIEW:

A course on linear algebra and calculus typically covers fundamental concepts like vectors, matrices, linear systems, differentiation, and integration.

COURSE OBJECTIVES:

The objectives of this course are to:

1. To equip the students with standard concepts and tools of mathematics to handle various real-world problems and their applications.
2. To enable the students to apply linear algebra to solve engineering problems.
3. To enable the students to apply calculus to solve engineering problems.

COURSE OUTCOMES:

CO#	Course Outcomes
CO1	Develop matrix algebra techniques that are needed by engineers for practical applications.
CO2	To find the eigen values and eigen vectors and solve the problems by using linear transformation.
CO3	Apply the knowledge of mean value theorems, solve inequality.
CO4	Familiarize with functions of several variables which is useful in optimization.
CO5	Familiarize with double and triple integrals of functions of several variables in two and three dimensions.

COURSE CONTENT (SYLLABUS)

UNIT-I: Matrices and Linear System of Equations **10 Hours**

Matrices: Vector Space, Linear independent, dependent (only definitions).

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. **COs-CO1**

Self-Learning Topic: Encoding and Decoding messages by using matrices

UNIT- II: Linear Transformation and Orthogonal Transformation **10 Hours**

Eigen values and Eigen vectors and their properties(without proof), 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. **COs-CO2**

Self-Learning Topic: Google's page rank Algorithm.

UNIT–III: Calculus **10 Hours**

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 on the above theorems. **COs-CO3** Self-Learning Topic: Application of mean value theorems

UNIT- IV: Partial differentiation and Applications **10 Hours**

Partial derivatives, total derivatives, chain rule, change of variables, Taylor's and Maclaurin's series expansion of functions of two variables. Jacobian, maxima and minima of functions of two variables, method of Lagrange multipliers. **COs-CO4**

Self-Learning Topic: Jacobian of implicit functions.

UNIT-V: Multiple Integrals **10 Hours**

Double integrals - change of variables (Cartesian and Polar coordinates), change of order of integration, Cylindrical and Spherical coordinates, triple integrals. Finding areas (by double integrals) and volumes (by double integrals and triple integrals). **COs-CO5**

Self-Learning topic: Calculating Centers of Mass and Moment of inertia

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, 2018.

Reference Books:

1. Dennis G. Zill and Warren S. Wright , Advanced Engineering Mathematics, Jones and Bartlett, 2018.
2. Michael Green berg, Advanced Engineering Mathematics, 9th edition, Pearson edn.
3. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 14/e, Pearson Publishers, 2018.
4. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 5/e, Alpha Science
5. International Ltd., 2021 (9th reprint).
6. B.V. Ramana, Higher Engineering Mathematics, McGraw Hill Education, 2017.

Web References:

1. http://onlinecourses.nptel.ac.in
2. https://nptel.ac.in/courses/111105121
3. https://onlinecourses.nptel.ac.in/noc24_ma91/course
4. https://onlinecourses.nptel.ac.in/noc24_ma53/course
5. https://onlinecourses.nptel.ac.in/noc24_ma11/course

APPLIED CHEMISTRY
IB.TECH-I SEMESTER (Common to ECE ,EEE)

Course Title: APPLIED CHEMISTRY	Course Code: **R24BS05**
Teaching Scheme(L:T:P): 3:0:0	Credits:3
Type of Course: Lecture	
Continuous Internal Evaluation: 30Marks	Semester End Exam: 70Marks
Prerequisites:	

COURSE OVERVIEW:

An Applied Chemistry course is typically designed to bridge the gap between theoretical Chemical principles and engineering applications, providing students with a foundation solve real-world problems and design products

COURSE OBJECTIVES:

The objectives of this course are to

1. To familiarize Applied Chemistry and its application.
2. To train the students on the principles and applications of electrochemistry and polymers
3. To elucidate the Structure and bonding of molecules
4. To impart Basic concepts of Semiconductors
5. To introduce modern engineering materials
6. To introduce instrumental methods, chromatographic technique

COURSE OUTCOMES:

CO#	Course Outcomes
CO1	Describe Molecular orbital diagrams
CO2	Importance of Graphenes. Apply the principle of band diagrams in the application of Super conductors and semiconductors.
CO3	Compare the Materials of Construction for Battery and Electro Chemical Sensors.
CO4	Explain the Preparation, Properties and applications of thermos plastics and thermos setting plastics, Elastomers and conducting polymers.
CO5	Summarize the concepts of instrumental methods

COURSE CONTENT(SYLLABUS)

UNIT- I: Structure and Bonding models **10 hours**

Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of Ψ and Ψ^2, particle in one dimensional box, molecular orbital theory–bonding in homo-and hetero nuclear diatomic molecules – energy level diagrams of O2 and CO, etc. π-molecular orbital's of butadiene and Benzene, calculation of bondorder. **COs-CO1**

Self-Learning Topics: Energy Level Diagrams of N2 & CN Molecule.

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UNIT- II: SeriesModern Engineering materials **10 hours**

Semiconductors – Introduction, Classification semiconductor devices P-N junction diode as a rectifier and transistor, applications.Super conductors- Introduction basic concept, Classification, applications.
Super capacitors: Introduction , Basic Concept-Classification–Applications.
Nanomaterial: Introduction, classification, properties and applications of Fullerenes, carbon nanotubes and

Graphenes **COs-CO2**

Self Learning Topics: Band Theory of Solids, Sol-Gel method.

UNIT- III: Electrochemistry and Applications: 14 hours

Electrochemical cell, Nernst equation, cell potential calculations and numerical problems, potentiometry-potentiometric titrations(redoxtitrations), concept of conductivity,conductivitycell Conductometry-conducto metric titrations (acid-base titrations). Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples.

Primarycells–Zinc-airbattery,Secondarycells–lithium-ionbatteries-working of the batteries including cell reactions; Fuel cells, hydrogen-oxygen fuel cell– working of the cells. **COs-CO3**

Self-Learning Topics: Frequency dependence of polarization.

UNIT- IV: Polymer Chemistry 14 hours

Introduction to polymers,functionality of monomers, chain growth and step growth polymerization, Coordination polymerization,with specific examples and mechanisms of polymerformation.

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

Elastomers– Buna-S,Buna-N–preparation, properties and applications.

Conducting polymers–polyacetylene mechanism of conduction and applications.

Bio-Degradablepolymers-Poly Glycolic Acid(PGA),Poly Lactic Acid (PLA). C**Os-CO4**

Self Learning Topics: Differences between Thermo and Thermo Setting Plastics.Vulcanization of Rubber

UNIT- V: Instrumental Methods and Applications 10 hours

Electromagnetic spectrum.Absorption of Radiation:Beer-Lambert'slaw.UV-Visible Spectroscopy, electronic transition, Instrumentation, IR spectroscopies, fundamental modes and selection rules, Instrumentation. Chromatography-Basic Principle, Classification-HPLC:Principle,Instrumentation and Applications. **COs-CO5**

Self Learning Topics: Intensity Shifts in UV-Spectroscopy, Gas Chromatography.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Skoog and West, Principles of Instrumental Analysis, 6/e,Thomson,2007.
2. J.D.Lee,Concise Inorganic Chemistry,5thEdition,WileyPublications,Feb.2008
3. Text book of PolymerScience, FredW.BillmayerJr,3rdEdition.

Web References:

1. https://swayam.gov.in/nc_details/NPTEL
2. https://onlinecourses.nptel.ac.in/noc19_cy29
3. https://archive.nptel.ac.in/noc/courses/noc21/SEM2/noc21-cy50

Problem Solving & Programming with C
I B.TECH- I SEMESTER (Common to all Branches)

Course Title: **Problem Solving & Programming with C**	Course Code: **24ES02**
Teaching Scheme (L:T:P): 3:0:0	Credits: 3
Type of Course: Lecture	
Continuous Internal Evaluation: 30 Marks	Semester End Exam: 70 Marks
Pre requisites: for learning C programming, a strong background in problem-solving skills and an understanding of data structures and algorithms.	

COURSE OVERVIEW:

1. To understand computer programming and its roles in problem solving.
2. To understand and develop well-structured programs using C language.

COURSE OBJECTIVES:

The objectives of this course are to:

1. To impart adequate knowledge on the need of programming languages and problem-solving techniques and develop programming skills.
2. To express algorithms and draw flowcharts in a language independent manner.
3. To enable effective usage of Operators &Control Structures.
4. To learn about the design concept of Arrays, Strings and Functions.
5. To understand Structures and Unions and their usage.
6. To assimilate about Pointers, Dynamic Memory Allocation and know the significance of Pre-processors, perform operations on files.

COURSE OUTCOMES:

CO#	Course Outcomes
CO1	Illustrate the fundamental concepts of computers and basic computer programming and problem-solving approach.
CO2	Understand the Control structures, Branching and Looping.
CO3	Make use of Arrays and Develop Programs on modular programming using functions and strings.
CO4	Demonstrate the ability to write programs using Structures and Unions.
CO5	Apply File handling operations.

COURSE CONTENT (SYLLABUS)

UNIT-I: Introduction to Programming and Algorithm for Problem Solving: 10 Hours

Introduction to Programming: The Basic Model of Computation, Algorithms, Flow-charts, Programming Languages, Compilation, Linking and Loading, Testing and Debugging, Documentation,

Algorithm for Problem Solving: Exchanging values of two variables, summation of a set of numbers, Decimal Base to Binary Base conversion, Reversing digits of an integer, GCD (Greatest Common Division) of two numbers, Test whether a number is prime, Organize numbers in ascending order, Find square root of a number, factorial computation, Fibonacci sequence, Evaluate 'sin x' as sum of a series, Reverse order of elements of an array, Find largest number in an array, Print elements of upper triangular matrix, multiplication of two matrices, Evaluate a Polynomial. **COs–CO1**
Self-Learning Topics: Compilation and Interpretation

UNIT- II: Introduction to the 'C' Programming **15 Hours**

Introduction: Character set, Variables and Identifiers, Built-in Data Types, Input/output statements, Variable Definition, Arithmetic operators and Expressions, Constants and Literals, Simple assignment statement, Basic input/output statement, Type Casting and Type def Simple 'C' programs.Storage Classes**:** Scope and extent, Storage Classes in a single source file: auto, extern and static, register, Storage Classes in multiple source files: extern and static.

Conditional Statements and Loops: Decision making within a program, Conditions, Relational Operators, Logical Connectives, if statement, if-else statement, Loops: while loop, do while, for loop, Nested loops, Infinite loops, Switch statement, Break statement, Go to statement. **COs-CO2**

Self-Learning Topics: Escape Sequences

UNIT – III: Arrays **15 Hours**

Arrays: One dimensional array: Array manipulation; Searching, Insertion, Deletion of an element from an array; Finding the largest/smallest element in an array; two dimensional arrays with examples.

Strings: Concepts, String Types, String Input / Output functions, String manipulation functions, Null terminated strings as array of characters, **COs–CO3**

Self-Learning Topics: String Pattern Matching

UNIT- IV: Functions&Pointers **15 Hours**

Functions: Top-down approach of problem solving, Modular programming and functions, Standard Library of C functions, Prototype of a function: Formal parameter list, Return Type, Function call, Block structure, passing arguments to a Function: call by reference; call by value, Recursive Functions, arrays as function arguments, Standard library string functions..

Pointers: Address operators, pointer type declaration, pointer assignment, pointer initialization, pointer arithmetic, functions and pointers, Arrays and Pointers, pointer arrays, pointers and structures, dynamic memory allocation. **COs– CO4**

Self-Learning Topics: How do you pass a structure to a function?

UNIT-V: Structures and Unions **10 Hours**

Structures and Unions: Structure variables, initialization, structure assignment, nested structure, structures and functions, structures, and arrays: arrays of structures, structures containing arrays, unions, Enumeration.

File Processing: Concept of a file, streams, text files and binary files, Differences between text and binary files, State of a file, Opening and Closing files, file input/output functions (standard library input/output functions for files), file status functions (error handling), Positioning functions **Cos-CO5**
Self-Learning Topics: Binary Files and operations on Binary files

TEXT BOOKS:

1. Byron S Gottfried “Programming with C” Second edition, Tata McGrawhill, 2007 (Paperback)
2. R.G. Dromey, “How to solve it by Computer”, Pearson Education, 2008.
3. Kanetkar Y, “Let us C”, BPB Publications, 2007.
4. 4. Hanly J R & Koffman E.B, “Problem Solving and Program design in C”, Pearson Education, 2009.

REFERENCE BOOKS:

1. E. Balaguruswamy, “Programming with ANSI-C”, Fourth Edition,2008, Tata McGraw Hill.
2. Venugopal K. R and Prasad S. R, “Mastering ‘C’”, Third Edition, 2008, Tata McGraw Hill.
3. B.W. Kernighan & D. M. Ritchie, “The C Programming Language”, Second Edition, 2001, Pearson Education
4. ISRD Group, “Programming and Problem-solving Using C”, Tata McGraw Hill, 2008.
5. Pradip Dey, Manas Ghosh, “Programming in C”, Oxford University Press, 2007.

Web References:

1. http://www.c4learn.com/
2. http://www.geeksforgeeks.org/c/
3. http://nptel.ac.in/courses/122104019/
4. http://www.learn-c.org/
5. https://www.tutorialspoint.com/c programming/

Engineering Graphics

I B.TECH- I SEMESTER (Common to All Branches)

Course Title : Engineering Graphics	Course Code : R24ES06
Teaching Scheme (L:T:P): 1:0:4	Credits: 3
Type of Course: Lecture + Practical	
Continuous Internal Evaluation: 30 Marks	Semester End Exam: 70 Marks
Pre requisites:	

COURSE OVERVIEW:

- The Engineering Graphics and Drawing course provides essential skills in visualizing and representing three-dimensional objects on two-dimensional media. Through structured units, students learn fundamentals such as line work, lettering, dimensioning, and geometric construction. The syllabus includes constructing curves, understanding scales, and mastering orthographic and isometric projections, essential for accurately depicting objects in engineering design.
- Additionally, students gain experience with computer-aided drafting using AutoCAD, learning to create 2D and 3D drawings and perform basic transformations. This course provides a strong foundation for technical drawing, crucial for design, manufacturing, and communication in engineering.

COURSE OBJECTIVES:

The objectives of this course are to

1. Understand the fundamentals of engineering drawing, including lines, lettering, and dimensioning.
2. Develop skills in geometrical constructions, including regular polygons and curves.
3. Learn orthographic projection techniques, including projections of points, lines, and planes.
4. Understand how to project solids in simple positions and create sectional views.
5. Develop skills in converting isometric views to orthographic views and vice versa.
6. Apply computer-aided design (CAD) techniques using AutoCAD to create 2D and 3Ddrawings.
7. Understand the importance of reference planes and reference lines in orthographic projection.
8. Develop problem-solving skills in engineering drawing, including creating and interpretingdrawings.

COURSE OUTCOMES:

CO#	Course Outcomes
CO1	Understand the basics of EngineeringGraphics to construct the polygon, curves,and scales.
CO2	Draw the orthographic projections of points and straight lines inclined to both the planes.
CO3	Draw the projections of planes in variousconditions.
CO4	Draw the projections of regular solids, with its axis inclined to one plane and sections of solids.
CO5	Visualize the 3D isometric views from 2Dorthographic views and vice versa along with basic introduction to CAD.

COURSE CONTENT (SYLLABUS)

UNIT -I:

Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing regular polygons by general method.

Curves: construction of ellipse, parabola, and hyperbola by general method, Normal and tangent to Curves.

Scales: Plain scales, diagonal scales and vernier scales.

UNIT-II:

Orthographic Projections: Reference plane, importance of reference lines or Plane, Projections ofa 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.

UNIT-III:

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-IV:

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.

Sections of Solids: Perpendicular and inclined section planes, Sectional views and True shape of sections for simple position only.

UNIT-V:

Conversion of Views: Conversion of isometric views to orthographic views and Conversion of orthographic views to isometric views for simple objects only.

Computer graphics: Creating 2D&3D drawings of objects including PCB and Transformationsusing Auto CAD (Not for end examination).

TEXT BOOKS:

1. N. D. Bhatt, Engineering Drawing, Charotar Publishing House.

REFERENCE BOOKS:

1. Engineering Drawing, K.L. Narayana and P. Kannaiah, Tata McGraw Hill.
2. Engineering Drawing, M.B.Shah and B.C. Rana, Pearson Education Inc.
3. Engineering Drawing with an Introduction to AutoCAD, DhananjayJolhe, Tata McGraw Hill.

ONLINE RESOURCES:

1. https://www.iitg.ac.in/rkbc/me111.htm
2. https://archive.nptel.ac.in/courses/112/105/112105294/

E-BOOKS:

https://www.pdfdrive.com/textbook-of-engineering-drawing-e28918244.html

Basic Electrical and Electronics Engineering
I B.TECH- I SEMESTER (Common to ECE & EEE)

Course Title: Basic Electrical and Electronics Engineering	Course Code: R24ES05
Teaching Scheme (L:T:P): 3:0:0	Credits: 3
Type of Course: Lecture	
Continuous Internal Evaluation: 30 Marks	Semester End Exam: 70 Marks
Pre requisites: Solid state physics, Linear algebra, calculus.	

COURSE OVERVIEW:

- This course introduces to the concepts and definitions of Ohms law, KCL, KVL, power and energy. By applying Kirchhoff's current and voltage laws to circuits in order to determine voltage, current and power in branches of any circuits excited by DC voltages and current sources. Apply simplifying techniques to solve DC circuit problems using basic circuit theorems and structured methods like node voltage and mesh current analysis. This course also introduces the construction and operating principle of AC machines, DC machines, Generators and Transformers.
- This course explores the evolution of electronics, characteristics of PN junction and Zener diodes, and bipolar junction transistors in various configurations. It includes rectifiers, power supplies, and amplifiers, focusing on circuit diagrams and frequency responses and covers number systems, Boolean algebra, and logic gates, along with simple combinational circuits like adders. It also introduces sequential circuits, including flip-flops and counters, and concludes with a block diagram of an electronic instrumentation system.

COURSE OBJECTIVES:

The objectives of this course are to

1. To expose to the field of electrical & electronics engineering.
2. To understand the importance of electrical safety.
3. To teach the fundamentals of semiconductor devices and its applications.
4. To teach the working process and analysis of different rectifying and Amplifying Circuits.
5. To teach the fundamental principles and rules of digital electronic circuits like gates, Sequential and Combinational Circuits.

COURSE OUTCOMES:

CO#	Course Outcomes
CO1	Understand the problem-solving concepts associated to AC and DC circuits
CO2	Remember the fundamental laws, construction and operation of AC and DC machines, instruments.
CO3	Understand different power generation mechanisms, Electricity billing concept and important safety measures related to electrical operations.
CO4	Understand the fundamental principles of electronic devices, analyzing the different rectifying and Amplifying Circuits.
CO5	Analyze and design different digital electronic circuits like gates, Sequential and Combinational Circuits and Understand the basic Electronic instrumentation system.

COURSE CONTENT (SYLLABUS)

Part A-BASIC ELECTRICAL ENGINEERING

UNIT -I: DC & AC Circuits

DC Circuits: Electrical circuit elements (R, Land 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).

COs – CO1

Self-Learning Topics: Source Transformation

UNIT-II: Machines and Measuring Instruments

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.

COs – CO2

Self-Learning Topics: Magnetic materials.

UNIT-III: 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 house hold 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.

Equipment Safety Measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.

COs– CO3

Self-Learning Topics: Different types of electrical tools.

Part B: ELECTRONICS ENGINEERING

UNIT-IV: Semiconductor Devices and Basic Electronic Circuits

Introduction - Evolution of electronics – Vacuum tubes to nano electronics - Characteristics of PN Junction Diode — Breakdown Effects in diodes — Zener Diode and its Characteristics. Bipolar Junction Transistor — CB, CE, CC Configurations and Characteristics — Introduction to Small Signal CE configuration. Rectifiers and power supplies: Block diagram description of a dc power supply, Half-Wave Rectifiers, Full-Wave Rectifiers, capacitor filter (no analysis). Amplifiers: Block diagram of Public Address system, Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response.

COs –CO4

Self-Learning Topics: Electronic components and characteristics, Design Amplifier circuit at different R, C Values

UNIT -V: DIGITAL ELECTRONICS and INSTRUMENTTAION

Overview of Number Systems, 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 Adders. Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only), Electronic Instrumentation: Block diagram of an electronic instrumentation system

COs–CO5

Self-Learning Topics: Develop digital circuits using minimum no. of gates, design principles of electronic instruments.

TEXT BOOKS:

1. Basic Electrical Engineering, D.C.Kulshreshtha,Tata McGrawHill,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
4. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, PearsonEducation, 2021.
5. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009

REFERENCE BOOKS :(Basic Electrical Engineering)

1. Basic Electrical Engineering, D.P.Kothari and I.J.Nagrath, McGrawHill, 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, Pearson Publications,2018, Second Edition.

REFERENCE BOOKS: Electronics Engineering

1. R. S. Sedha, A Textbook of Electronic Devices and Circuits, S. Chand & Co, 2010.
2. Santiram Kal, Basic Electronics- Devices, Circuits and IT Fundamentals, PrenticeHall,India, 2002.
3. R.T.Paynter, Introductory Electronic Devices & Circuits – Conventional FlowVersion,Pearson

ONLINE RESOURCES:

Web References: (Basic Electrical Engineering)

1. https://nptel.ac.in/courses/108105053
2. https://nptel.ac.in/courses/108108076

Web References: (Electronics Engineering)

1. https://archive.nptel.ac.in/courses/108/101/108101091/
2. https://www.tutorialspoint.com/basic_electronics/index.htm
3. https://www.tutorialspoint.com/digital_circuits/index.htm

E-BOOKS:

https://www.pdfdrive.com/basic-electronics-for-scientists-and-engineers-e28939124.html

APPLIED CHEMISTRY LAB

I B.TECH-I SEMESTER

Course Title: APPLIED CHEMISTRY LAB	Course Code: **R24BS06**
Teaching Scheme(L:T:P): 0:0:2	Credits:1
Type of Course: Practical	
Continuous Internal Evaluation:30Marks	Semester End Exam: 70Marks
Prerequisites:	

COURSE OVERVIEW:

To succeed in an *APPLIED CHEMISTRY Lab* course, certain foundational skills and knowledge are necessary for effective participation and understanding. Here are the key prerequisites:

1. Basic Chemistry Knowledge
2. Measurement
3. Basic Laboratory Skills
4. Problem-Solving and Analytical Skills
5. Familiarity with Safety Practices

COURSE OBJECTIVES:

1.Verify the fundamental concepts with experiments.

2 Learn and carry out some of the important experiments related to batteries and their properties.

3. Learn the preparation of engineering polymer materials like Bakelite

4. Know the fundamental principles of chemistry lab experiments which include volumetric analysis, dichrometry, conductometry and potentiometer

COURSE OUTCOMES:

CO#	Course Outcomes
CO1	Determine the cell constant an conductance of solutions. Determine redox potentials
CO2	Prepare advanced polymer Bakelite materials. Calculate strength of acid in Pb-Acid battery and Ferrous Iron by Dichrometry
CO3	Measure the strength of an acid present in secondary batteries. Moisture content in a coal sample.

COURSE CONTENT(SYLLABUS)

List of Experiments

1.Conductometric titration of strong acid vs. strong base

2. Conductometric titration of weak acid vs. strong base

3. Determination of cell constant and conductance of solutions

4. Potentiometry - determination of redox potentials and emfs

5. PH metric titration – determination of Strength of Strong acid vs Strong base

6. Determination of Strength of an acid in Pb-Acid battery

7. Determination of Hardness of Water

8. Determination of $KMnO_4$ Using Standard Oxalic Acid Solution

9. Adsorption of acetic acid by charcoal

10. Estimation of Ferrous Iron by Dichrometry

11.Preparation of a Bakelite

12.Preparation of nanomaterials by precipitation method.

REFERENCEBOOKS:

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

Problem Solving &Programming with C Lab
I B.TECH- I SEMESTER (Common to all Branches)

Course Title: **Problem Solving &Programming with C Lab**	Course Code: **R24ES03**
Teaching Scheme (L:T:P): **0 0 3**	Credits: 1.5
Type of Course: Practical	
Continuous Internal Evaluation: 30 Marks	Semester End Exam: 70 Marks
Pre requisites: **Problem Solving & Programming with C lab include: Understanding programming fundamentals, Writing C programs, Applying programming techniques, Using algorithms, Using pseudocode and flowcharts**	

COURSE OVERVIEW:

3. To understand computer programming and its roles in problem solving.
4. To understand and develop well-structured programs using C language.

COURSE OBJECTIVES:

The objectives of this course are to:

The course aims to give students hands – on experience and train them on the concepts of the C- programming language.

COURSE OUTCOMES:

CO#	Course Outcomes
CO1	Read, understand, and trace the execution of programs written in C language.
CO2	Select the right control structure for solving the problems .and demonstrate the application of arrays functions and strings
CO3	Develop Debug and Execute programs to demonstrate the applications of Pointers, Structures& Unions, and Files.

COURSE CONTENT (SYLLABUS)

Developing the following programs:

Week 1:

1. Write a C program using printf() and Scanf(). COs:CO1
2. Write a C program on swapping of two nos. COs:CO1
3. Write a C program using arithmetic Expressions. COs:CO1

Week 2:

4. Simple interest calculation COs:CO2
5. Finding compound interest COs:CO2
6. Area of a triangle using heron's formulae COs:CO2
7. Distance travelled by an object COs:CO2

Week 3:

8. Find the maximum of three numbers using conditional operator COs:CO2

9. Take marks of 5 subjects in integers, and find the total, average in float COs:CO2
10. Write a C program to shift/rotate using bit fields. COs:CO2
11. Finding the square root of a given number COs:CO2
12. Write a C program using if-else statement. COs:CO2

Week 4:

13. Write a C program to find the max and min of four numbers using if-else. COs:CO2
14. Write a C program to generate electricity bill. COs:CO2
15. Find the roots of the quadratic equation. ` COs:CO2
16. Write a C program to find the given year is a leap year or not. COs:CO2
17. Write a C program to simulate a calculator using switch case. COs:CO2

Week 5:

18. Find the factorial of given number using any loop. COs:CO2
19. Find the given number is a prime or not. COs:CO2
20. Compute sine and cos series. COs:CO2
21. Checking a number palindrome. COs:CO2
22. Construct a pyramid of numbers. COs:CO2

Week 6:

23. Write a C program on Linear Search. COs:CO3
24. Find the min and max of a 1-D integer array. COs:CO3
25. Perform linear search on1D array. COs:CO3
26. The reverse of a 1D integer array. COs:CO3

Week 7:

27. Find 2's complement of the given binary number. COs:CO3
28. Eliminate duplicate elements in an array. COs:CO3
29. Sort array elements using bubble sort. COs:CO3
30. Addition of two matrices. COs:CO3

Week 8:

31. Multiplication two matrices. COs:CO3
32. Write a C program using call by reference. COs:CO3
33. Write a C program to find factorial of n using recursion. COs:CO3
34. Write a C function to calculate NCR value COs:CO3
35. Concatenate two strings without built-in functions. COs:CO3

Week 9:

36. Write a C function to transpose of a matrix. COs:CO3
37. Write a C function to find the length of a string. COs:CO3
38. Reverse a string using built-in and without built-in string functions. COs:CO3
39. Write a C program to find the sum of a 1D array using malloc ( ). COs:CO3

Week 10:

40. Write a recursive function to find the lcm of two numbers. COs:CO3
41. Write a recursive function to find the sum of series. COs:CO3
42. Write a C program to swap two numbers using call by reference. COs:CO3
43. Write a C program using Pointers, Structures and Unions. COs:CO4
44. Write a C program to find the total, average of n students using structures. COs:CO4

Week 11:

45. Enter n students data using calloc() and display failed students list. COs:CO4
46. Read student name and marks from the command line and display the student details along with the total. COs:CO4
47. Write a C program to implement realloc(). COs:CO4
48. Write a C program to copy one structure variable to another structure of the same type. COs: CO4

Week 12:

49. Demonstrate Dangling pointer problem using a C program. COs: CO4
50. Write a C program to copy one string into another using pointer. COs: CO4
51. Write a C program to find no of lowercase, uppercase, digits and other characters using pointers. COs: CO4

Week 13:

52. Write a C program using Files operations. COs:CO5
    a. Sum and average of 3 numbers
    b. Conversion of Fahrenheit to Celsius and vice versa.
53. Write a C program to write and read text into a file. COs:CO5

Week 14:

54. Write a C program to write and read text into a binary file using fread() and fwrite() COs:CO5
55. Copy the contents of one file to another file. COs:CO5
56. Write a C program to merge two files into the third file using command-line arguments. COs:CO5

Week 15:

57. Find no. of lines, words and characters in a file. COs:CO5
58. Write a C program to print last n characters of a given file. COs:CO5

Scenario Based Case Study:

1. **Objective:** To develop a simple utility program to calculate the area of geometric shapes.

   Target Audience: Beginner programmers and students.

A basic utility program in C that can:

1. Calculate the area of a circle.

2. Calculate the area of a rectangle.

3. Calculate the area of a triangle.

The program should be easy to understand and serve as an educational tool for new programmers.

1. Program Design:

- The utility program will be designed with a simple menu-driven interface allowing the user to select the shape for which they want to calculate the area. The program will then prompt the user to input the necessary dimensions and display the result.
- This basic C program demonstrates fundamental programming concepts such as variables, functions, and control structures in a practical context. It provides a clear introduction to C programming for

beginners by solving a simple problem using these core concepts.

- This case study outlines a straightforward approach to teaching and implementing basic C programming concepts effectively.

2. Students Marks Sum Hacker Rank Solution

- You are given an array of integers, marks, denoting the marks scored by students in a class.
- The alternating elements marks0, marks2, marks4 and so on denote the marks of boys.
- Similarly,marks1, marks3, marks5 and so on denote the marks of girls.
- The array name, marks, works as a pointer which stores the base address of that array. In other words, marks contains the address where marks0 is stored in the memory.

3. Sorting Array of Strings Hacker Rank Solution

- To sort a given array of strings into lexicographically increasing order or into an order in which the string with the lowest length appears first, a sorting function with a flag indicating the type of comparison strategy can be written. The disadvantage with doing so has to rewrite the function for every new comparison strategy.
- A better implementation would be to write a sorting function that accepts a pointer to the function that compares each pair of strings. Doing this will mean only passing a pointer to the sorting function with every new comparison strategy.

Textbooks:

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

Reference Books:

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

Basic Electrical and Electronics Engineering Lab
I B.TECH- I SEMESTER (Common to ECE & EEE)

Course Title: Basic Electrical and Electronics Engineering Lab	Course Code: R24ES07
Teaching Scheme (L:T:P): 0:0:3	Credits: 1.5
Type of Course: Practical	
Continuous Internal Evaluation: 30 Marks	Semester End Exam: 70 Marks
Pre requisites: Understanding of Circuit Components, Breadboard connections.	

COURSE OVERVIEW:

In this lab, the students of all engineering streams are trained on basic concepts of electrical engineering, such as DC circuits, AC circuits, Resonance for series RLC and Parallel RLC circuit, AC to DC conversion, measurement, Efficiency and voltage regulation of transformer, electrical machines, verification of basic laws and theorems.

COURSE OBJECTIVES:

The objectives of this course are to impart knowledge on the fundamental laws & theorems of electrical circuits, functions of electrical machines and energy calculations.

COURSE OUTCOMES:

CO#	Course Outcomes
CO1	Apply the theoretical concepts and operating principles to derive mathematical models for circuits, Electrical machines and measuring instruments; calculations for the measurement of resistance, power and power factor.
CO2	Apply the theoretical concepts to obtain calculations for the measurement of resistance, power and power factor.
CO3	Plot and discuss the characteristics of various electron devices/instruments.
CO4	Design suitable circuits and methodologies for the measurement of various electrical parameters; Household and commercial wiring.
CO5	Understand the usage of electronic measuring instruments.
CO6	Plot and discuss the characteristics of various electron devices.

List of Experiments:

Part A-Basic Electrical Engineering

1. Verification of KCL and KVL **COs: CO1**
2. Verification of Superposition theorem **COs: CO1**
3. Measurement of Resistance using Wheat stone bridge **COs: CO1**
4. Magnetization Characteristics of DC shunt Generator **COs: CO1**
5. Measurement of Power and Power factor using Single-phase wattmeter **COs: CO2**
6. Verification of ohms law **COs: CO1**
7. Calculation of Electrical Energy for Domestic Premises **COs: CO3**

Part B: Basic Electronics Engineering

1. Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias. **COs: CO3**
2. Plot V – I characteristics of Zener Diode and its application as voltage Regulator **COs: CO3**
3. Implementation of half wave and full wave rectifiers **COs: CO3**
4. Plot Input & Output characteristics of BJT in CE and CB configurations **COs: CO3**
5. Frequency response of CE amplifier. **COs: CO3**
6. Simulation of RC coupled amplifier with the design supplied **COs: CO3**
7. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates

using ICs. **COs: CO2**

8. Verification of Truth Tables of S-R, J-K& D flip flops using respective ICs. **COs: CO2**

REFERENCE BOOKS:

1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, FirstEdition
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, ThirdEdition
4. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
5. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009
6. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education, 2009.

Engineering Workshop
I B.TECH- I SEMESTER (Common to All Branches)

Course Title : Engineering Workshop	Course Code: R24ES08
Teaching Scheme (L:T:P): 0:0:3	Credits: 1.5
Type of Course: Practical	
Continuous Internal Evaluation: 30 Marks	Semester End Exam: 70 Marks
Pre requisites:	

COURSE OVERVIEW:

- The Engineering Workshop Lab introduces students to essential hands-on skills across multiple trades, fundamental for understanding material manipulation, joining techniques, and assembly processes. Through eight core experiments, students learn woodworking, sheet metal fabrication, fitting, foundry molding, welding, electrical wiring, plumbing, and blacksmithing. These exercises build practical knowledge in creating structures, forming metal parts, achieving precision fits, casting molds, and assembling electrical and plumbing systems. This workshop lays a solid foundation for understanding and applying basic engineering processes, crucial for practical problem-solving and project execution in various engineering fields.

COURSE OBJECTIVES:

The objectives of this course are to

- Describe how different tools are used in home wiring, tin smiting, blacksmithing, carpentry, and fitting.

COURSE OUTCOMES:

CO#	Course Outcomes
CO1	Identify workshop tools and their operational capabilities. Practice on manufacturing of components using workshop trades including carpentry, fitting, sheet metal
CO2	Practice on manufacturing ofcomponents using workshop trades including foundry and welding.
CO3	Apply fitting operations in various applications and engineering knowledge for Plumbing, House Wiring Practice, and Making square rod and L-bend from the round rod in black smithy

COURSE CONTENT (SYLLABUS)

1. Wood Working

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

2. Sheet Metal Working

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

3. Fitting

a) V- fit
b) Dovetail fit

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

4. **Foundry Trade:** Preparation of Green Sand Moulds
   a) Single piece pattern
   b) Double piece pattern

5. **Welding Shop: Arc welding Practice**
   a) Lap joint
   b) Butt joint
6. **Electrical Wiring**
   a) Parallel and series connection
   b) Two-way switch connection
   c) Tube light connection
   d) Soldering of wires
7. **Plumbing**
   a) Prepare Pipe joint with coupling for 1 inch diameter
   b) Prepare Pipe joint with coupling for 1.5inch diameter
8. **Black smithy**
   a) Round rod to Square
   b) Round rod to S-Hook

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

REFERENCE BOOKS:

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

ONLINE RESOURCES:

1. https://youtube.com/playlist?list=PLzkMouYverALpuDJ4g4TiICc6_vLcS1Ny&si=YGrVJY8uB0tHy_iQ

E-BOOKS:

1. https://www.pdfdrive.com/workshop-processes-practices-and-materials-third-edition-d158706794.html
2. https://www.pdfdrive.com/introduction-to-basic-manufacturing-processes-and-workshop-e217530.html
3. https://www.pdfdrive.com/workshop-technology-e55714020.html

HEALTH AND WELLNESS, YOGA AND SPORTS
I B.TECH- I SEMESTER (Common to all Branches)

Course Title: **HEALTH AND WELLNESS, YOGA AND SPORTS**	Course Code: **R24MC01**
Teaching Scheme (L:T:P): 0:0:1	Credits: 0.5
Type of Course: Practical	
Continuous Internal Evaluation: 100 Marks	Semester End Exam: 0 Marks
Pre requisites: Prerequisites for courses in **Health and Wellness, Yoga, and Sports** can vary by institution and program. However, here's a general outline of common prerequisites and recommended qualifications for these types of courses.	

COURSE OVERVIEW:

Here's a general course overview for programs in **Health and Wellness**, **Yoga**, and **Sports**. Each area may have specific courses and focuses depending on the institution, but this will provide a foundational understanding of what to expect.

Health and Wellness

- **Overview**: This program focuses on promoting overall health, wellness strategies, and preventive health measures. It often includes the study of physical, mental, and social well-being.
- **Core Courses**:
  - **Introduction to Health and Wellness**: Basics of health concepts, wellness promotion, and lifestyle choices.
  - **Nutrition and Health**: Understanding dietary needs, nutritional guidelines, and the role of nutrition in health.
  - **Mental Health and Wellness**: Exploring psychological well-being, stress management, and mental health issues.
  - **Exercise Physiology**: The study of how physical activity affects the body and mind.
  - **Health Education and Promotion**: Strategies for promoting health within communities and organizations.
- **Practical Experience**: Some programs may include internships or fieldwork in health settings, community organizations, or wellness programs.

1. Yoga

- **Overview**: Yoga programs typically cover the physical, mental, and spiritual aspects of yoga practice. They can be geared toward practitioners or those looking to teach.
- **Core Courses**:
  - **Yoga Philosophy**: Study of the history and philosophy of yoga, including key texts and principles.
  - **Asana Practice**: Detailed exploration of yoga postures (asanas), including alignment, modifications, and variations.
  - **Meditation and Pranayama**: Techniques for breath control and meditation practices.
  - **Anatomy for Yoga**: Understanding the human body in relation to yoga practice, focusing on anatomy and physiology.
  - **Teaching Methodology**: Instruction on how to teach yoga classes, including class planning, communication skills, and sequencing.
- **Practical Experience**: Teaching practice sessions, observation of experienced teachers, and peer teaching.

Sports

- **Overview**: Sports programs often encompass a broad understanding of physical education, sports science, coaching, and athletic training.
- **Core Courses**:
  - **Introduction to Sports Science**: Overview of the key principles in sports science, including biomechanics and exercise physiology.
  - **Coaching Principles**: Theories and techniques related to effective coaching and athlete development.
  - **Sport Psychology**: Understanding the mental aspects of sports performance and strategies for enhancing motivation and focus.
  - **Exercise and Sport Nutrition**: Nutrition principles specifically tailored for athletes and active individuals.
  - **Sport Management**: Insights into the business side of sports, including marketing, finance, and event management.

COURSE OBJECTIVES:

The objectives of this course are to:

The main objective of introducing this course is 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:

CO#	Course Outcomes
CO1	Understand the importance of yoga and sports for Physical fitness and sound health.
CO2	Demonstrate an understanding of health-related fitness components.
CO3	Compare and contrast various activities that help enhance their health.
CO4	Assess current personal fitness levels.
CO5	Develop Positive Personality

COURSE CONTENT (SYLLABUS)

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:

i) Organizing health awareness programmes in community
ii) Preparation of health profile
iii) 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.
ii) Practicing general and specific warm up, aerobics
iii) Practicing cardiorespiratory fitness, treadmill, run test, 9 min walk, skipping and running.

Reference Books:

1. Gordon Edlin, Eric Golanty. Health and Wellness, 14th Edn. Jones & Bartlett Learning, 2022

2. T.K.V.Desikachar. The Heart of Yoga: Developing a Personal Practice

3. Archie J.Bahm. Yoga Sutras of Patanjali, Jain Publishing Company, 1993

4. Wiseman, John Lofty, SAS Survival Handbook: The Ultimate Guide to Surviving Anywhere Third Edition, William Morrow Paperbacks, 2014

5. The Sports Rules Book/ Human Kinetics with Thomas Hanlon. -- 3rd ed. Human Kinetics, Inc.2014

General Guidelines:

1. Institutes must assign slots in the Timetable for the activities of Health/Sports/Yoga.

2. Institutes must provide field/facility and offer the minimum of five choices of as many as Games/Sports.

3. Institutes are required to provide sports instructor / yoga teacher to mentor the students.

Differential Equations and Vector Calculus
I B.TECH- II SEMESTER (Common to all Branches)

Course Title: **Differential Equations and Vector Calculus**	Course Code: R**24BS04**
Teaching Scheme (L:T:P): 3:0:0	Credits: 3
Type of Course: Lecture	
Continuous Internal Evaluation: 30 Marks	Semester End Exam: 70 Marks
Pre requisites: To succeed in Differential Equations and Vector Calculus, you'll need a strong foundation in several key areas of mathematics. Here are the typical prerequisites: Calculus I (Single-variable Calculus), Calculus II (Single-variable Calculus, continuation), Calculus III (Multivariable Calculus), Linear Algebra.	

COURSE OVERVIEW:

This course is often taken after completing Calculus I, II, and III, and Linear Algebra. It combines methods and applications of differential equations with essential topics in vector calculus, as used in fields like physics, engineering, and applied mathematics.

COURSE OBJECTIVES:

The objectives of this course are to:

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

COURSE OUTCOMES:

CO#	Course Outcomes
CO1	Solve the first order differential equations related to various engineering fields.
CO2	Model engineering problems as higher order differential equations and solve analytically.
CO3	Identify solution methods for partial differential equations that model physical processes.
CO4	Interpret the physical meaning of different operators such as gradient, curl and divergence.
CO5	Estimate the work done against a field, circulation and flux using vector calculus.

COURSE CONTENT (SYLLABUS)

UNIT- I: Differential equations of first order and first degree **10 Hours**

Formation of differential equations, order, degree, separation of variables (only Review). 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 (RL and LC). **COs-CO1**

Self-Learning Topic: Mixed tank problems

UNIT- II: Higher order Linear differential equations with Constant Coefficients **10 Hours**

Definitions, homogenous and non-homogenous, complimentary function, particular integral $\left(e^{ax}, \sin ax, \cos ax, \text{Polynomial in } x, e^{ax}V(x), xV(x)\right)$, general solution, Wronskian, method of variation of parameters.

Applications: L-C-R Circuit problems **COs-CO2**

Self-Learning Topic: Simple Harmonic motion

UNIT–III: Partial Differential Equations **10 Hours**

Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solution of first order linear equations using Lagrange's method. Homogenous Linear Partial differential equations with constant coefficients. **COs-CO3**

Self-Learning Topic: Method of Separation of Variables

UNIT- IV: Vector differentiation **10 Hours**

Vector, Scalar, dot product, cross product, unit vector, equation of a line passing through two points (Review only)

Scalar and vector point functions, vector operator del, del applies to scalar point function-Gradient, del applied to vector point function – Divergence and Curl, Vector Identities

Application: Scalar Potential **COs-CO4**

Self-Learning Topic: Equation of tangent plane and Normal plane.

UNIT-V: Vector integration **10 Hour**

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).

COs-CO5

Self-Learning Topic: Application of above theorems.

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, 2018.

Reference Books:

1. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2018.
2. Michael Green berg, Advanced Engineering Mathematics, 9th edition, Pearson edn
3. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 14/e, Pearson Publishers, 2018.
4. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 5/e, Alpha Science
5. International Ltd., 2021 (9th reprint).
6. B.V. Ramana, Higher Engineering Mathematics, McGraw Hill Education, 2017.

Web References:

1. http://onlinecourses.nptel.ac.in
2. https://nptel.ac.in/courses/111105121
3. https://onlinecourses.nptel.ac.in/noc24_ma86/course

ENGG PHYSICS
I B.TECH- II SEMESTER (Common to ECE,EEE,MEC)

Course Title: Engg.Physics	Course Code: **R24BS02**
Teaching Scheme (L:T:P): 3:0:0	Credits: 3
Type of Course: Lecture	
Continuous Internal Evaluation: 30 Marks	Semester End Exam: 70 Marks
Pre requisites:	

COURSE OVERVIEW:

An *Engineering Physics* course is typically designed to bridge the gap between theoretical physics principles and engineering applications, providing students with a solid foundation to analyze and solve complex engineering problems.

COURSE OBJECTIVES:

The objectives of this course are to

1. bridge the gap between the physics in school at 10+2 level and UG level engineering courses.
2. identify the importance of the optical phenomenon i.e. interference and diffraction related to its engineering applications.
3. understand the mechanism of emission of light, utilization of lasers as coherent light sources for low and high energy applications.
4. enlightening the periodic arrangement of atoms in crystalline solids and classify various crystal systems.
5. explain the significant concepts of dielectric and magnetic materials that leads to potential applications in the emerging micro devices.
6. enlightenment of the concepts of quantum mechanics and to provide fundamentals of de-Broglie matter waves and the importance of free electron theory for metals.
7. understand the physics of semiconductors and identify the type of semiconductor using Hall effect.

COURSE OUTCOMES:

CO#	Course Outcomes
CO1	Analyze the intensity variation of light due to interference, diffraction and classify various types of lasers.
CO2	Identify various crystal systems and analyze the crystalline structure.
CO3	Summarize various types of polarization of dielectrics and classify the magnetic materials.
CO4	Explain fundamentals of quantum mechanics and apply to one dimensional motion of particles.
CO5	Outline the properties of charge carriers in semiconductors

COURSE CONTENT (SYLLABUS)

UNIT-I Wave Optics **12 Hours**

Interference: Introduction - Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colors in thin films- Newton's Rings- Determination of wavelength and refractive index
Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit- Fraunhofer diffraction due to N Slits -Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative).
Lasers: Introduction–Characteristics of laser – Spontaneous and Stimulated emissions of radiation – Population inversion – Lasing action - Pumping mechanisms – Ruby laser –He-Ne laser-Applications of lasers. **COs – CO1**

Self-Learning Topics: Interference in thin films due to Transmission of light

UNIT-II Crystallography and X-ray diffraction **12 Hours**

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. **COs– CO2**

Self-Learning Topics: Effect of crystallite size on diffracted X-Ray intensity.

UNIT-III Magnetic and Dielectric Materials **12 Hours**

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.
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–dielectric loss. **COs– CO3**

Self-Learning Topics: Frequency dependence of polarization.

UNIT-IV Quantum Mechanics and Free electron theory **12 Hours**

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 - Fermi energy. **COs– CO4**

Self-Learning Topics: Density of states, Origin of energy bands in solids

UNIT-V Semiconductors **8 Hours**

Semiconductors: Formation of energy bands – classification of crystalline solids - Intrinsic semiconductors:– Fermi level – Extrinsic semiconductors- P-Type semiconductors- N-Type semiconductors- principle of operation and characteristics of P-N Junction diode - Drift and diffusion currents –Einstein's equation - Hall effect and its applications. **COs – CO5**

Self-Learning Topics: Zener diode, Solar cells

TEXT BOOKS:

1. "ATextbook of EngineeringPhysics"by M.N. Avadhanulu, P.G.Kshirsagar-S.Chand Publications, 2017.
2. "Engineering Physics" byD. K. Bhattacharya and PoonamTandon,Oxfordpress (2015).
3. "Engineering Physics"byR.KGaur.and S.LGupta.,-Dhanpat Rai publishers, 2012.

REFERENCE BOOKS:

1. Engineering Physics - B.K. Pandey and S. Chaturvedi, Cengage Learning.
2. The Principles of Quantum Mechanics, P. A. M. Dirac, fourth Edition (Oxford University Press,Oxford, 1958).
3. Physics-Resnick, Halliday, Krane, Fifth edison, Volume-1, Wiley student edition.
4. Engineering Physics - Dr.R. Swapna, Scientific International Publishing House.
5. Concepts of Modern Physics. Arthur Beiser, Tata McGraw-Hill, New Delhi (2010).
6. Engineering Physics" - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press.
7. Engineering Physics - M.R. Srinivasan, New Age international publishers (2009).

ONLINE RESOURCES:

Web References:

1. https://www.ebooksdirectory.com/
2. http://www.sciencedirect.com/Science
3. https://onlinecourses.nptel.ac.in/
4. https://www.link.springer.com/physics/
5. https://www.loc.gov/rr/scitech/selected-internet/physics.html

E-BOOKS:

1. https://www.ebooksdirectory.com/

COMMUNICATIVE ENGLISH
I B.TECH- II SEMESTER (Common to ECE,EEE&MECH)

Course Title: **COMMUNICATIVE ENGLISH**	Course Code: **R24HS01**
Teaching Scheme (L:T:P): **2 0 0**	Credits: 2
Type of Course: Lecture	
Continuous Internal Evaluation: 30 Marks	Semester End Exam: 70 Marks
Pre requisites: To excel in a *Communicative English* course, certain foundational skills and prerequisites are helpful such as Basic Grammar Knowledge, **Listening Skills,** Basic Vocabulary, Reading Comprehension, Confidence in Speaking, Writing Skills.	

COURSE OVERVIEW:

A *Communicative English* course is designed to develop students' proficiency in spoken and written English through practical and interactive learning methods. The course focuses on improving students' ability to communicate effectively in real-life situations, emphasizing both fluency and accuracy.

COURSE OBJECTIVES:
The objectives of this course are to:

1. To identify the English Communication Skills among the first year B.Tech students and to initiate measures to bridge the gap.
2. To enlighten the students on the necessity of cultivating good language habits through practising LSRW skills.
3 To explain them various topics of grammar and the importance of being grammatically correct in speech and writing.
4 To make them practise Phonetics and impart the nuances of fine speech.
5 To instruct them about the various types of format related to writing letters, paragraph, emails, essays and reports.
6 To make them appreciate English text and deepen their comprehension through reading of textual and non-detailed topics.

COURSE OUTCOMES:

CO#	**Course Outcomes**
CO1	To utilize the text, online resources, and other social, and real time situations with an aim to practice Communicative English
CO2	To apply grammatical knowledge for speaking, and writing purposes
CO3	To analyze and practice various devices of speech for effective conversation and presentations
CO4	Appraising the language competence of the learners and suggesting remedial action
CO5	To make the learners practice writing tasks which are relevant for job training and academic purposes.

COURSE CONTENT (**SYLLABUS**)

UNIT-I **12 Hours**

Lesson: HUMAN VALUES: A Power of a Plate of Rice by Ifeoma Okoye (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

Vocabulary: Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words. **COs-C01**

Self learning topics : The Great Indian Scientists-Biography of CV Raman

UNIT-II **10 Hours**

Lesson: NATURE: Night of the Scorpion by Nissim Ezekiel (Indian and contemporary)

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. **COs-C02**

Self learning Topics : Seven Ages of Man by William Shakespeare.

UNIT-III **12 Hours**

Lesson: BIOGRAPHY: Steve Jobs

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, Collocations **COs-C03**

Self learning topics: Elon Musk

UNIT-IV **8 Hours**

Lesson: INSPIRATION: The Knowledge Society by APJ Abdul Kalam (Ignited minds)

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 and Resumes

Grammar: Reporting verbs, Direct & Indirect speech, Active & Passive Voice

Vocabulary: Words often confused, Jargons **COs-C04**

Self learning Topics: The writings of Sudha Murthy- "The day I stopped drinking milk"

UNIT-V **10 Hours**

Lesson: MOTIVATION: The Power of Intra personal Communication (An Essay)

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

test comprehension.
Speaking: Formal Oral Presentation topics from academic contexts
Reading: Reading comprehension.
Writing: Writings structured essays on specific topics.
Grammar: Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject-verb agreement)
Vocabulary: Technical Jargons **COs-C05**
Self learning Topics: Body Language (Allan Pease)

Textbooks:

1. Pathfinder: Communicative English for Undergraduate Students, 1st Edition,Orient BlackSwan, 2023 (Units 1,2,3 &5)
2. Empowering English by Cengage Publications, 2023
3. The Great Indian Scientists-Cengage Publications
4. English Essentials- Maruthi Publications.(Unit 4)

Reference Books:

1. P. Elian : A Hand book of English for Engineers and Technologists,
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. English for Engineers by Shyam Ji Dubey- Vikas Publishing House

Web References:

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
7. https://www.youtube.com/c/DailyVideoVocabulary/videos
8. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA

BASIC CIVIL AND MECHANICAL ENGINEERING
I B.TECH- II SEMESTER (Common to ALL BRANCHES)

Course Title: Basic Civil and Mechanical Engineering	Course Code: R24ES01
Teaching Scheme (L:T:P): 3:0:0	Credits: 3
Type of Course: Lecture	
Continuous Internal Evaluation: 30 Marks	Semester End Exam: 70 Marks
Pre requisites:	

COURSE OVERVIEW:

- Basic Civil and Mechanical Engineering course provides a broad foundation for all engineering disciplines, equipping students with a holistic understanding of the principles, design methods, and innovations shaping each branch, fostering interdisciplinary knowledge and skills.
- This introductory course covers fundamental concepts in Civil and Mechanical Engineering, emphasizing their roles in society and diverse applications. In Civil Engineering, students explore various disciplines, including structural, transportation, water resources, and environmental engineering, along with essential materials and construction techniques, surveying, and advancements in sustainable practices.
- The Mechanical Engineering segment introduces students to core sectors such as energy, manufacturing, and automotive, along with basic design principles and engineering materials. Key topics include thermal engineering, power cycles, IC engines, and power plant operations, as well as principles in manufacturing, CNC, 3D printing, and robotics. This course provides a foundational understanding of both fields, preparing students for more specialized study and practical applications in engineering.

COURSE OBJECTIVES:

The objectives of this course are to

1. **Understand the Role of Civil Engineers**: Familiarize students with the roles and responsibilities of civil engineers in society and the various sub-disciplines within civil engineering.
2. **Construction Materials**: Provide knowledge about different construction materials such as cement, aggregates, bricks, concrete, steel, soil, stones and their applications in building construction.
3. **Transportation Engineering**: Offer insights into the importance of transportation engineering for national economic development and the fundamentals of highway pavements, harbor, tunnel airport and railway engineering.
4. **Water Resources and Environmental Engineering**: Cover the basics of water sources, water quality specifications, hydrology, rainwater harvesting, and water storage structures, emphasizing their importance in environmental sustainability.
5. **Scope and Importance of Mechanical Engineering**: Familiarize students with the scope and significance of mechanical engineering in various sectors, including energy, manufacturing, automotive, aerospace and marine industries.
6. **Engineering Materials and Manufacturing Processes**: Explain different engineering materials and various manufacturing processes and computational manufacturing.
7. **Thermal Engineering**: Provide an overview of thermal engineering principles, including the working of boilers, IC engines, and power plants, and introduce concepts related to electric and hybrid vehicles.
8. **Mechanical Power Transmission Systems**: Describe different mechanical power transmission systems such as belt drives, chain drives, gear drives, and their applications.
9. **Basics of Robotics**: Introduce the basics of robotics, including joints, links, configurations, and applications, along with advancements in robotics technology.

COURSE OUTCOMES:

CO#	Course Outcomes
CO1	Understand the role of civil engineers in various disciplines, the scope of each discipline, and the materials used in building construction and principles of surveying.
CO2	Describe the fundamentals of transportationengineering, water resources, and environmental engineering, including highway pavements, water quality, hydrology, and water storage structures.
CO3	Understand and apply different manufacturing processes and engineering materials, including their applications, and basic mechanical design principles.
CO4	Explain the basics of thermal engineering, including working principles of engines, power plants, and related thermal cycles, along with their applications.
CO5	Describe the working of different mechanical power transmission systems and the basics of robotics and their applications.

COURSE CONTENT (**SYLLABUS**)

UNIT -I:

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, Building Construction and Planning, Construction Materials Cement, Aggregate, Bricks, Cement Concrete- Steel, soils and stones. Introduction to Prefabricated construction Techniques.

Surveying: Objectives of Surveying, Horizontal Measurements, Angular Measurements, Introduction to Bearings Simple problems on bearings-Contour mapping.

Self-Learning Topic: Advancements in Prefabricated Construction Techniques

UNIT-II:

Transportation Engineering: Importance of Transportation in Nation's economic development, Types of Highway Pavements, Flexible Pavements and Rigid Pavements, Simple Differences. Basics of Harbor, Tunnel, Airport, and Railway Engineering

Water Resources and Environmental Engineering: Introduction, Sources of water, Quality of water, Specifications, Introduction to Hydrology, Rainwater Harvesting, Water Storage and Conveyance Structures (Simple introduction to Dams and Reservoirs).

Self-Learning Topic: Sustainable Transportation Engineering

UNIT-III:

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.

Basic Mechanical Design Principles: Fundamentals of Mechanical Design- Introduction to the design process, understanding design requirements, and conceptual design, Design of Simple Machine Components - Design considerations for basic machine components like shafts, bearings, gears, and fasteners.

Engineering Materials – Metals - Ferrous and Non-ferrous, Ceramics, Composites, Smart materials**.**

Self-Learning Topics: Sustainable Engineering Practices, Advancements in Smart Materials.

UNIT-IV:

Thermal Engineering–Working principle of Boilers

Cycles- Otto cycle, Diesel cycle, Refrigeration and air-conditioning cycles,
Engines-IC engines, 2-Stroke and 4-Strokeengines, SI/CI Engines,
Power plants – Working principle of Steam, Diesel, Hydro, Nuclear power plants, Introduction to Electric and Hybrid Vehicles.
Self-Learning Topics: Advanced Engine Technologies, Thermodynamics in Renewable Energy Systems.

UNIT-V:
Manufacturing Processes: Principles of Casting, Forming, joining processes,
Computational Manufacturing: Introduction to CNCmachines,3Dprinting and Smart manufacturing.
Machining– Conventional & Non-Conventional,
Mechanical Power Transmission-Belt Drives, Chain, Rope drives, Gear Drives and their applications.
Introduction to Robotics-Joints & links, configurations, and applications of robotics.
Self-Learning Topics: Additive Manufacturing Technologies, Innovations in Mechanical Power Transmission

TEXT BOOKS:

1. Basic Civil and Mechanical Engineering, by Ommi Srikanth, M.Sreenivasa Reddy S. Chand Publications
2. Internal Combustion Engines by V.Ganesan, By Tata McGraw Hill publications (India) Pvt. Ltd.
3. A Text 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.

REFERENCE BOOKS:

1. Appuu Kuttan K K, 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 Mc graw Hill publications (India)Pvt. Ltd.
4. G.Shanmugam and M.S.Palanisamy,BasicCivilandtheMechanical Engineering, Tata Mc graw Hill publications (India) Pvt. Ltd.

ONLINE RESOURCES:

1. https://www.youtube.com/playlist?list=PLyqSpQzTE6M_SM0Lrnzk2dJFwElh0Ebhu
2. https://nptel.ac.in/courses/105101087
3. https://archive.nptel.ac.in/courses/105/105/105105110/
4. https://archive.nptel.ac.in/courses/112/105/112105125/
5. https://www.youtube.com/watch?v=-cr5vfV4YAI
6. https://nptel.ac.in/courses/112105266
7. https://archive.nptel.ac.in/courses/112/104/112104301/

NETWORK ANALYSIS
I B.TECH- II SEMESTER (ECE)

Course Title: Network Analysis	Course Code: R24ECPC01
Teaching Scheme (L:T:P): 3:0:0	Credits: 3
Type of Course: Lecture	
Continuous Internal Evaluation: 30 Marks	Semester End Exam: 70 Marks
Pre requisites: KVL, KCL, Nodal and Mesh analysis	

COURSE OVERVIEW:

- This course will build on the basic principles of electrical theories. The course will introduce classification of electrical elements, transformation techniques and reduction techniques of active and passive networks. Also it includes steady state analysis and transient analysis of AC and DC circuits and circuit analysis techniques such as nodal analysis, mesh analysis, linearity and superposition techniques, it includes solution for complex networks, like Thevenin and Norton Theorems. The course also includes magnetic circuits and two port networks.

COURSE OBJECTIVES:

The objectives of this course are to

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

COURSE OUTCOMES:

CO#	Course Outcomes
CO1	Understand basic electrical circuits with nodal and mesh analysis
CO2	To impart Knowledge on applying appropriate theorem for electrical circuit analysis
CO3	Explain phasor diagrams for R, R-L, R-C and R-L-C circuits and Teach Concept of Resonance
CO4	Find Transient response and steady response of a network
CO5	Analyze the behavior of magnetically coupled circuits, two port network and calculate various parameters of two port network

COURSE CONTENT (SYLLABUS)

UNIT -I: INTRODUCTION TO ELECTRICAL CIRCUITS

Electric Charge, Electric current, Voltage, Ohm's law, Classification of circuit elements, Current and Voltage division rules, Network Reduction Techniques in both Series and Parallel Combination of Elements, Source Transformation Techniques, Nodal Analysis and Mesh Analysis in both A.C. and D.C. Networks with Dependent and Independent Sources, Problem Solving.

COs – CO1

Self-Learning Topics: Basic Components of R,L,C,KCL & KVL laws

UNIT-II: **NETWORK THEOREMS (with AC & DC)**

Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Reciprocity Theorem, Millliman's Theorem and Compensation Theorem., Problem Solving.

COs – CO2

Self-Learning Topics: Tellegen's Theorem

UNIT-III: STEADY STATE ANALYSIS OF AC CIRCUITS & RESONANCE

AC circuit analysis for R, L, C, series R-L, R-C, and R-L-C circuits and their respective phasor diagrams, Active, Reactive, Apparent and complex powers, power factor, Average, Effective values, Peak factor, and Form factor of various AC waveforms and functions ,Impedance concept, phase angle, series R-L, R-C,

R-L-C circuits problem solving.

Resonance: Series Resonance: Q-factor, selectivity and bandwidth, expression for half power frequencies; Parallel resonance: Q-factor, selectivity and bandwidth, Basic Types of Active & Passive Filters.

COs – CO3

Self-Learning Topics: Realization of RLC Networks & Practical applications of Resonance

UNIT-IV: **TRANSIENTS**

Transients: First order differential equations, Definition of time constants, R-L circuit, R-C circuit with DC excitation, evaluating initial conditions procedure, second order differential equations, homogeneous, non-homogenous, problem-solving using R-L-C elements with DC excitation and AC excitation

COs – CO4

Self-Learning Topics: Complex and Polar Form of Representation, Transient Response of RC Circuit for Impulse Input

UNIT-V: **COUPLED CIRCUITS**

Analysis of Magnetically coupled circuits, Series aiding, series opposing, parallel aiding and parallel opposing, and Dot convention

TWO-PORT NETWORKS - Z, Y, h, ABCD parameters of two port networks, Parallel Connection of Two Port Networks, Cascading of Two Port Networks, Series Connection of Two Port Networks, Problem Solving

COs – CO5

Self-Learning Topics: Inverse Transmission and Inverse Hybrid Parameters

TEXT BOOKS:

1. Network Analysis – ME Van Valkenburg, Prentice Hall of India, revised 3rd Edition, 2019.
2. Engineering Circuit Analysis by William H. Hayt, Jack Kemmerly, Jamie Phillips, Steven M. Durbin, 9th Edition 2020.
3. Network lines and Fields by John. D. Ryder 2nd Edition, PHI

REFERENCE BOOKS:

1. D. Roy Choudhury, Networks and Systems, New Age International Publications, 2013.
2. Joseph Edminister and Mahmood Nahvi, Electric Circuits, Schaum's Outline Series, 7th Edition, Tata McGraw Hill Publishing Company, New Delhi, 2017
3. Fundamentals of Electric Circuits by Charles K. Alexander and Matthew N.O. Sadiku, McGraw-Hill Education.

ONLINE RESOURCES:

1 .https://nptel.ac.in/courses/108105053
2. https://nptel.ac.in/courses/108108076

E-BOOKS:

https://www.pdfdrive.com/basic-electronics-for-scientists-and-engineers-e28939124.html

COMMUNICATIVE ENGLISH LAB
I B.TECH- II SEMESTER (Common to ECE,EEE&MECH)

Course Title: **COMMUNICATIVE ENGLISH LAB**	Course Code: **R24HS02**
Teaching Scheme (L:T:P): **0 0 2**	Credits: 1
Type of Course: Practical	
Continuous Internal Evaluation: 30 Marks	Semester End Exam: 70 Marks
Pre requisites: To excel in a *Communicative English* course, certain foundational skills and prerequisites are helpful such as Basic Grammar Knowledge, **Listening Skills,** Basic Vocabulary, Reading Comprehension, Confidence in Speaking, Writing Skills.	

COURSE OVERVIEW:

A *Communicative English* course is designed to develop students' proficiency in spoken and written English through practical and interactive learning methods. The course focuses on improving students' ability to communicate effectively in real-life situations, emphasizing both fluency and accuracy.

COURSE OBJECTIVES:
The objectives of this course are to:

The main objective of introducing this course, Communicative English Laboratory, is to expose the students to a variety of self-instructional, learner friendly modes of language learning. Students undergo training in basic communication skills to make them into confident communicators in all situations.

COURSE OUTCOMES:

CO#	Course Outcomes
CO1	Understand and recognize the various facets of English language ability with a focus on the four basic skills- namely -LSRW abilities.
CO2	Implement various activities for language learners to practise communication skills.
CO3	To enhance listening and speaking comprehension, analyze the sounds, stress, rhythm, intonation, and syllable division of English speech.
CO4	Assess the professionalism of students when taking part in group discussions, debates, JAM sessions, Presentations and Interviews.
CO5	Equipping oneself with Interview Skills and a range of Soft Skills for life and career.

COURSE CONTENT (**SYLLABUS**)

Week1:

1. To explain and guide the students in decoding the sounds of English.
2. List all the consonant sounds and vowel sounds in English

Week2:

1. What is a syllable and describe the syllable structure.
2. Define stress, functional stress and various rules of stress.
3. What is connected speech?

Week3:

1. What is Intonation and mention the various pitch movements like rise, fall, fall-rise or rise-fall?
2. What is connected speech?

Week4:

1. To equip students to speak in English language confidently without any inhibitions.
2. Why are majority of the companies conducting JAM session as a preliminary interview?
3. What are the key skills tested in JAM round?

Week5:

1. To help students learn and understand different functions of language like greeting, asking
2. For information, giving information, meetings, requests, exchanging dialogues in formal and informal contexts.
3. Introduce yourself and others, give instructions and directions

Week 6:

1. To help the students understand and work on the digital age connector for personal correspondence, business communication, etc.
2. Write about email etiquette.
3. Draft an email to the HR Manager of Wipro Technologies requesting to consider your application for the post of Software Engineer.

Week 7:

1. To update students about the importance of Resume, the various types and the essentials of an effective resume
2. Draft a resume for a software post in reputed organization.

Week 8:

1. To educate students about the various styles of writing formal letters.
2. What is a cover letter? What are the different types of cover letters?
3. Write a job application letter for any post of your choice in a reputed company?

Week 9:

1. To help students know the importance of an SOP in their professional advancements?
2. What is an SOP and what are the different kinds and parts of an SOP?
3. Prepare an SOP to apply for a Master's Programme in any University of your choice.

Week 10:

1. To educate and guide the students about presentation skills and its importance in the technical evolving world.
2. To inform explain students about the importance of body language in various personal and professional forums
3. To help students to present papers, PPT's in seminars, workshops, conferences, research projects, interviews, etc.

Week 11:

1. To help students to give effective PPT's in various academic and professional platforms.
2. Describe various aspects that make PPT more effective.
3. Make a PPT on any topic of your choice and present it to the class.

Week 12:

1. To foster, creative, critical thinking skills, analytical skills and problem solving skills.
2. Suggest a few tips for preparing a poster.
3. Prepare posters from or outside your curriculum.

List of Activities:

1. Sounds of English (Vowels and Consonants) **COs: CO1,CO2**
2. Neutralization and Accent Rules **COs: CO1,CO2**
3. Improving communication skills /JAM. **COs: CO3,CO4**
4. Letter Writing and E-mail Writing **COs: CO1,CO2**
5. Cover letters and Resume Writing **COs: CO1,CO2**
6. Statement of Purpose. **COs: CO1,CO2**

7. Debates **COs: CO4:CO5**
8. Presentation skills- PPT and Poster **COs: CO4:CO5**
9. Group Discussions , types and practice **COs: CO4,CO5**
10. Interview skills – Mock interviews **COs: CO4,CO5**

Reference Books:

1. Prof. M. Hari Prasad, Prof. Vijaya Babu, Prof. Padmaja Kalapala, Skill Craft – A Communicative English Laboratory Workbook, Maruthi Publications first Edition, 2023
2. Meenakshi Ramana, Sangeeta-Sharma, 4thEdition, Technical Communication, Oxford Press, 2022.
3. Grant Taylor: English Conversation Practice, 1st Edition, Tata ,Mc Graw-Hill Education India, 2001.
4. Hewing,s, Martin, Cambridge Academic English(B2), Cambridge University Press,2012.
5. T. Balasubramanyam, A Textbook of English Phonetics for Indian Students, 3rd Edition, Trinity, 2022.
6. Dr. ShaliniSharma's Body Language Your Success Mantra, S. Chand publications 2010.
7. Sunitha Mishra and C.Murali Krishna's Communication Skills for Engineers Pearson Education Edition 2009.

Suggested software:

- English Wordsworth –Language Lab- Wordsworth Software

Web References for:
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/ArnelsEverydayEnglish/featured
7. https://www.youtube.com/c/engvidAdam/featured
8. . https://www.youtube.com/c/EnglishClass101/featured
9. https://www.ted.com/watch/ted-ed
10. http://www.edest.org/

Voice & 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

ENGG PHYSICS LAB
I B.TECH- II SEMESTER (Common to ECE,EEE,MEC)

Course Title: Engg.Physics lab	Course Code: **R24BS03**
Teaching Scheme (L:T:P): 0:0:2	Credits: 1
Type of Course: Practical	
Continuous Internal Evaluation: 30 Marks	Semester End Exam: 70 Marks
Pre requisites:	

COURSE OVERVIEW:

To succeed in an *Engineering Physics Lab* course, certain foundational skills and knowledge are necessary for effective participation and understanding. Here are the key prerequisites:

6. Basic Physics Knowledge
7. Mathematics Skills
8. Measurement and Unit Conversions
9. Basic Laboratory Skills
10. Problem-Solving and Analytical Skills
11. Familiarity with Safety Practices
12. Basic Computing Skills

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

CO#	Course Outcomes
CO1	Demonstrate the modern engineering physics Techniques and tools in real times applications in engineering studies.
CO2	Develop the laboratory skills in handling of electrical and optical instruments.
CO3	Conduct experiment Independently and In team to record the measurements
CO4	Compare the experimental results with standard values and estimate errors

COURSE CONTENT (SYLLABUS)

List of Experiments

11. Determination of radius of curvature of a given plano convex lens by Newton'sring;s method.
12. Determination of wavelengths of different spectral lines in mercury spectrum using diffraction grating in normal incidence configuration.
13. Determination of thickness of thin object by air wedge method
14. Determination of wavelength of Laser Source by diffraction gratting.

15. Determination of rigidity modulus of the material of the given wire using Torsional pendulum.
16. Magnetic field along the axis of a current carrying circular coil by Stewart & Gee's Method.
17. Determination of dispersive power of the prism.
18. Determination of acceleration due to gravity and radius of Gyration by using Compound pendulum.
19. Determination of energy gap of a semiconductor using p-n junction diode.
20. Determination of dielectric constant using charging an discharging method.
21. Sonometer: Verification of laws of stretched string.
22. Estimation of Planck's constant using photoelectric effect.
23. Study the variation of B versus H by magnetization the magnetic material (B-H curve)
24. Determination of frequency of electrically maintained tunning fork by Melde's experiment.
25. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.
26. Determination of the resistivity of semiconductor by four probe method.
27. Determination of young's modulus for the given material of wooden scale by non- uniform bending (or double cantilever) method .
18. Determination of magnetic suseptibility by Kundt's tube method

REFERENCE BOOKS:

1.S. Balasubramanian, M.N.Srinivasan "A Text Book of Practical Physics"-S ChandPublishers,2017.
2 .J.Raja Gopalam Patnaik, "Physics Laboratory Manual for Undergraduate Students "Paramount Book Disributors 2023.

ONLINE RESOURCES:

Web References:

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

IT Workshop
I B.TECH- II SEMESTER (Common to ECE,EEE & MECH)

Course Title: **IT Workshop Lab**	Course Code**: R24ES04**
Teaching Scheme (L:T:P): **0 0 3**	Credits: 1.5
Type of Course: Practical	
Continuous Internal Evaluation: 30 Marks	Semester End Exam: 70 Marks
Pre requisites: an IT workshop for engineering students: **Familiarity with hand tools, equipment, and machines, Computer skills.**	

COURSE OVERVIEW:

1. To understand computer programming and its roles in problem solving.
2. To understand and develop well-structured programs using C language.

COURSE OBJECTIVES:

The objectives of this course are to:

1. To assemble and disassemble a computer.
2. To solve hardware and software problems.
3. To learn about Networking of computers and use Internet facility for Browsing and Searching.
4. To develop project documentation using MS word
5. To work with various productivity tools including Excel, PowerPoint.
6. To work with different online repositories such as GITHUB, AI CHATBOT.

COURSE OUTCOMES:

CO#	Course Outcomes
CO1	Perform Hardware troubleshooting and Perform Hardware troubleshooting
CO2	Apply different way of hooking the PC on to the internet from home and Workplace.
CO3	Design word documents by learning word processing and Create presentations by using different styles and using AI Tools-Chat GPT and GITHUB

COURSE CONTENT (**SYLLABUS**)

PC Hardware & Software Installation **9 Hours**

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 peripheral and submit it 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. Lab instructor should verify the installation and follow it up with a Viva. **COs-CO1**

Internet &World Wide Web **6 Hours**

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. **COs-CO2**

MS WORD **6 Hours**

Task 1: 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 2: 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 **6 Hours**

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, and 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

POWER POINT **6 Hours**

Task 1: Students will be working on basic power point utilities and tools which help them create basic power point presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in 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.**Cos-CO3**

AI TOOLS – Chat GPT **6 Hours**

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 new reality."

Explore – GITHUB **6 Hours**

Task 1: Students should understand GITHUB and should possess accounts in it.
Task 2: Students should explore different repositories available in GITHUB and student should Create his/ her own simple repositories.
Task 3: Students should take simple experiments /presentations and upload them in their GITHUB Account.
Task 4: Students should understand how GITHUB Enterprise Cloud is used and also explore the GIT and GIT HUB resources. **COs-CO3**

Reference Books:

1. Comdex Information Technology course tool kit, Vikas Gupta, WILEY Dream tech, 2003
2. The Complete Computer upgrade and repair book, Cheryl A Schmidt, WILEY Dream tech, 2013, 3rd edition
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education, 2012, 2nd edition
4. PC Hardware - A Handbook, Kate J. Chase, PHI (Microsoft)
5. IT Essentials PC Hardware and Software Companion Guide, David Anfins on and Ken Quamme. – CISCO Press, Pearson Education, 3rd edition
6. IT Essentials PC Hardware and Software Labs and Study Guide, Patrick Regan–CISCOPress, Pearson Education, 3rd edition
7. **"Microsoft Word 2021: A Beginner's Guide"**by Steve Lambert.
8. **"Excel 2021: A Comprehensive Guide"**by Chris Benham.
9. **"Microsoft PowerPoint 2021: A Beginner's Guide"** by Steve Lambert
10. GITHUB Quick Start Tutoria

NETWORK ANALYSIS & SIMULATION LABORATORY
I B.TECH- II SEMESTER (ECE)

Course Title: Network Analysis & Simulation Lab	Course Code: R24ECPC02
Teaching Scheme (L:T:P): 0:0:3	Credits: 1.5
Type of Course: Practical	
Continuous Internal Evaluation: 30 Marks	Semester End Exam: 70 Marks
Pre requisites: Understanding of Circuit Components, Breadboard connections.	

COURSE OVERVIEW:
This course deals practical approach of basic concepts of electrical engineering, such as DC circuits, AC circuits and reduction techniques, It also includes DC transients, Resonance circuit and two-port networks.

COURSE OBJECTIVES:
1. To gain hands on experience in verifying Kirchhoff's laws and network theorems
2. To analyze transient behavior of circuits
3. To study resonance characteristics
4. To determine 2-port network parameters

COURSE OUTCOMES:

CO#	Course Outcomes
CO1	Demonstrate fundamental circuit laws, network theorems, and node and mesh analysis of electrical circuits.
CO2	Design resonance circuit for given specifications**.**
CO3	Measure time constants of RL & RC circuits**.**

List of Experiments:
1. Study of components of a circuit and Verification of KCL and KVL. **COs: CO1**
2. Verification of mesh analysis for AC circuits **COs: CO1**
3. Verification of nodal analysis for AC circuits **COs: CO1**
4. Verification of Superposition theorem. **COs: CO1**
5. Verification of maximum power transfer theorem for AC circuits **COs: CO1**
6. Verification of Thevenin's & Norton theorems for AC circuits **COs: CO1**
7. verification of reciprocity theorem **COs: CO1**
8. Find the Q Factor and Bandwidth of a Series Resonance circuit **COs: CO2**
9. Find the Q Factor and Bandwidth of a Parallel Resonance circuit. **COs: CO2**
10. Study of DC transients in RL,circuit. **COs: CO3**
11. Study of DC transients in RC circuits **COs: CO3**
12. Study of DC transients in RLC circuit **COs: CO3**
13. Determination of open circuit (Z) and short circuit (Y) parameters **COs: CO1**
14. Determination of hybrid (H) and transmission (ABCD) parameters **COs: CO1**

NOTE: Any 10 experiments are to be conducted

HARDWARE REQUIREMENTS:
Regulated Power supplies, Analog/Digital Function Generators, Digital Millimeters, Decade Resistance Boxes/Rheostats, Decade Capacitance Boxes, Ammeters (Analog or Digital), Voltmeters (Analog or Digital), Active & Passive Electronic Components,Variac

SOFTWARE REQUIREMENTS:
Multisim/ Pspice /Equivalent simulation software tool, Computer Systems with required specifications.

REFERENCES:
1. Network Analysis – ME Van Valkenburg, Prentice Hall of India, revised 3rd Edition, 2019.
2. Engineering Circuit Analysis by William H. Hayt, Jack Kemmerly, Jamie Phillips, Steven M. Durbin, 9th Edition 2020

NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE
I B.TECH- II SEMESTER (Common to all Branches)

Course Title: **NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE**	Course Code: **R24MC02**
Teaching Scheme (L:T:P): 3:0:0	Credits: 0.5
Type of Course: Lecture	
Continuous Internal Evaluation: 100 Marks	Semester End Exam: 0 Marks
Pre requisites: Prerequisites for programs related to **NSS (National Service Scheme)**, **NCC (National Cadet Corps)**, **Scouts and Guides**, and **Community Service** can vary by institution and specific program. However, here are general guidelines and common prerequisites for each: National Service Scheme (NSS), National Cadet Corps (NCC), Scouts and Guides, Community Service Programs.	

COURSE OVERVIEW:

Here's a general course overview for programs related to NSS (National Service Scheme)**,** NCC (National Cadet Corps)**,** Scouts and Guides**, and** Community Service**. Each program focuses on different aspects of personal development, leadership, and community engagement.**

1. National Service Scheme (NSS)

- **Overview**: NSS is a voluntary program aimed at fostering a sense of social responsibility and community service among students. It emphasizes the importance of personal and community development.
- **Core Components**:
  - **Community Service Projects**: Participation in various community development activities, such as health camps, environmental awareness programs, and literacy initiatives.
  - **Workshops and Seminars**: Educational sessions on social issues, health, hygiene, and community development strategies.
  - **Leadership Development**: Training sessions focused on leadership skills, teamwork, and effective communication.
  - **Camps and Activities**: Organizing and participating in camps, rallies, and other events that promote social awareness and civic responsibility.

2. National Cadet Corps (NCC)

- **Overview**: NCC is a youth development movement that aims to develop character, discipline, leadership, and a spirit of adventure among young people.
- **Core Components**:
  - **Military Training**: Basic training in drill, weapons handling, and military tactics, combined with emphasis on discipline and teamwork.
  - **Adventure Activities**: Participation in activities such as trekking, mountaineering, and camping to foster adventure skills and resilience.
  - **Community Service**: Involvement in social service initiatives and community development projects.
  - **Leadership and Management Skills**: Training sessions focused on leadership, communication, and management, preparing cadets for future responsibilities.

3. Scouts and Guides

- **Overview**: Scouts and Guides programs promote personal development, leadership skills, and community service among young people through various outdoor and indoor activities.

- **Core Components**:
  - **Skill Development**: Learning practical skills such as first aid, navigation, and survival skills.
  - **Community Projects**: Engaging in community service projects and environmental conservation efforts.
  - **Outdoor Activities**: Camping, hiking, and other outdoor adventures that promote teamwork, resilience, and a love for nature.
  - **Values and Ethics**: Education on values such as integrity, respect, and service, aligning with the principles of scouting.

4. Community Service Programs

- **Overview**: Community service programs are designed to engage individuals in volunteer work that benefits their communities, fostering civic responsibility and social awareness.
- **Core Components**:
  - **Volunteer Projects**: Participation in various service projects, such as assisting in local shelters, food banks, environmental clean-ups, and educational initiatives.
  - **Skill-Building Workshops**: Workshops on leadership, teamwork, and project management to enhance volunteers' capabilities.
  - **Awareness Campaigns**: Engaging in campaigns to raise awareness about social issues, such as health, education, and the environment.
  - **Reflection and Evaluation**: Opportunities to reflect on experiences, discuss challenges, and evaluate the impact of their service.

COURSE OBJECTIVES:

The objectives of this course are to:

The objective of introducing this course is to impart discipline, character, fraternity, teamwork, social consciousness among the students and engaging them in selfless service.

COURSE OUTCOMES:

CO#	Course Outcomes
CO1	Understand the importance of discipline, character and service motto.
CO2	Solve some societal issues by applying acquired knowledge, facts, and techniques.
CO3	Explore human relationships by analyzing social problems.
CO4	Determine to extend their help for the fellow beings and downtrodden people
CO5	Develop leadership skills and civic responsibilities.

COURSE CONTENT (SYLLABUS)

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.

i) Recycling and environmental pollution article writing competition.
ii) Organising Zero-waste day.
iii) Digital Environmental awareness activity via various social media platforms.
iv) Virtual demonstration of different eco-friendly approaches for sustainable living.
v) 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

Reference Books:

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.