RGM COLLEGE OF ENGINEERING AND TECHNOLOGY

AUTONOMOUS

Affiliated to JNTUA-Ananthapuramu, Approved by AICTE-New Delhi,
Accredited by NBA-New Delhi, Accredited by NAAC with A+ Grade-New Delhi
Nandyal – 518501, AP, India

B. Tech (Regular-Full time)
RGM-R-2023
Regulations, Course Structure & I Year Syllabus

(ESTD-1995)

Applicable for students admitted into
B.Tech (Regular) from 2023-2024
B.Tech (Lateral Entry Scheme) from 2024-25

RGM COLLEGE OF ENGINEERING AND TECHNOLOGY

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I B.TECH. SYLLABUS

INSTITUTE VISION

- To develop this rural based engineering college into an institute of technical education with global standards
- To become an institute of excellence which contributes to the needs of society
- To inculcate value-based education with noble goal of "Education for peace and progress"

INSTITUTE MISSION

- To build a world class undergraduate program with all required infrastructure that provides strong theoretical knowledge supplemented by the state of art skills
- To establish postgraduate programs in basic and cutting-edge technologies
- To create conductive ambiance to induce and nurture research
- To turn young graduates to success-oriented entrepreneurs
- To develop linkage with industries to have strong industry institute interaction
- To offer demand driven courses to meet the needs of the industry and society
- To inculcate human values and ethos into the education system for an all-round development of students

INSTITUTE QUALITY POLICY

- To improve the teaching and learning
- To evaluate the performance of students at regular intervals and take necessary steps for betterment
- To establish and develop centers of excellence for research and consultancy
- To prepare students to face the competition in the market globally and realize the responsibilities as true citizen to serve the nation and uplift the country's pride.

Program Outcomes (POs)

Engineering Graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

RGM COLLEGE OF ENGINEERING AND TECHNOLOGY

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I B.TECH. SYLLABUS

Academic Regulations (R23) for B. Tech (Regular-Full time)

(Effective for the students admitted into I year from the Academic Year **2023-24** onwards)

1) Award of B.Tech. Degree:

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

i) Pursues a course of study for not less than four academic years and not more than eight academic years. However, for the students availing Gap year facility this period shall be extended by two years at the most and these two years would in addition to the maximum period permitted for graduation (Eight years).

ii) Registers for 163 credits and secures all 163 credits.

b) **Award of B.Tech. degree with Minors/ Honors if he/she fulfils the following**:

i) Student secures additional 18 credits fulfilling all the requisites of a B.Tech. program i.e., 163 credits.
ii) Registering for Honors is optional.
iii) Minors / Honors is to be completed simultaneously with B.Tech. programme.

2) Students, who fail to fulfil 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) Admissions:

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

4) Program related terms:

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

Credit Definition:

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

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

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

5) 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.

6) Structure of the Undergraduate Programme:

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

S.No.	Category	Breakup of Credits (Total 163)	Percentage of total credits	AICTE Recommendation (%)
1.	Humanities and Social Science including Management (HM)	13.0	8 %	8 – 9%
2.	Basic Sciences (BS)	20.0	13 %	12 - 16%
3.	Engineering Sciences(ES)	23.5	14%	10 – 18%
4.	Professional Core (PC)	57.5	34 %	30 – 36%
5.	Electives – Professional (PE) & Open (OE); Domain Specific Skill Enhancement Courses (SEC)/Global Certification (GC)	33.0	21 %	19 - 23%
6.	Internships & Project work (PR)	16.0	10 %	8 – 11%
7.	Mandatory Courses (MC)	Non-credit	Non-credit	-

7) Course Classification:

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

S.No.	Broad Course Classification	Course Category	Description
1.	Foundation Courses	Foundation courses	Includes Mathematics, Physics and Chemistry; fundamental engineering courses; humanities, social sciences and management courses
2.	Core Courses	Professional Core	Includes subjects related to the

		Courses (PC)	parent discipline/department/ branch of Engineering
3.	Elective Courses	Professional Elective Courses (PE)	Includes elective subjects related to the parent discipline/department/ branch of Engineering
		Open Elective Courses (OE)	Elective subjects which include interdisciplinary subjects or subjects in an area outside the parent discipline/ department/ branch of Engineering
		Domain 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

8) 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 a three- week duration before the commencement of first semester. Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations etc., are included as per the guidelines issued by AICTE.

v. Health/wellness/yoga/sports and NSS /NSS /Scouts & Guides / Community service activities are made mandatory as credit courses for all the under graduate students.

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

vii. Design Thinking for Innovation & Tinkering Labs are made mandatory as credit courses for all the undergraduate students.

viii. A mandatory one-week workshop in domain specific after the end of V semester and it will be reflected in 6th semester for zero credits

ix. It is mandatory for every student to undertake a minimum of one industrial visit during any semester between the 5th and 8th semesters

x. Department should conduct one domain specific expert lecture in every semester from 5th semester onwards.

xi. Increased flexibility for students through an increase in the elective component of the curriculum, with 05 Professional Elective courses and 04 Open Elective courses.

xii. 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.

xiii. While choosing the electives, students shall ensure that they do not opt for the courses with syllabus contents similar to courses already pursued.

xiv. A pool of interdisciplinary/job-oriented/domain skill courses/GC 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.

xv. 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.

xvi. There shall also be mandatory full internship in the final semester of the programme along with the project work.

xvii. Undergraduate degree with Honors is introduced by the University for the students having good academic record.

xviii. 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.

xix. 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.

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

9) 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, 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) Evaluation of answer scripts shall be done by either Internal or External examiners appointed by the Principal. ***Not less than 50% of the subjects in each branch of B.Tech offered in any semester*** will be evaluated by external examiners.

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

iv) For all practical and main project etc. the HOD of the concerned dept. shall submit ***a panel of 4 external examiners from different institutes*** and one will be selected by the Chief Superintendent of the Examination for conducting of end examination.

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

vi) 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 (120 minutes duration) shall be evaluated for 30 marks of which 10 marks for objective paper, 15 marks for subjective paper and 5 marks for assignment.

ii) Objective paper shall contain for 05 short answer questions with 2 marks each or maximum of 20 bits for 10 marks. Subjective paper shall contain 3 either or type questions (totally six questions from 2 to 7) of which student has to answer one from each either-or type of questions. Each question carries 10 marks. The marks obtained in the subjective paper are reduced 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 either or type questions of equal weight age of 10 marks. Any fraction shall be rounded off to the next higher mark.

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

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

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

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

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

b) End Examination Evaluation:

End examination of theory subjects shall have the following pattern:

i) There shall be 6 questions and all questions are compulsory.

ii) Question I shall contain 10 compulsory short answer questions for a total of 20 marks such that each question carries 2 marks.

iii) In each of the long answer questions from 2 to 11, there shall be either or type questions of 10 marks each. Student shall answer any one question from each unit Each question may consist of one, two or more sub questions.

iv) The questions from 2 to 11 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 weight age 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**

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

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

e) The end examination shall be evaluated for 70 marks, conducted by the concerned laboratory teacher and a senior expert in the subject from the same department.

- Procedure: 20 marks
- Experimental work & Results: 30 marks
- Viva voce: 20 marks.

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

f) 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**

For the subject having design and/or drawing, (such as Engineering Graphics, Machine Drawing etc.) and estimation, the distribution shall be 30 marks for Internal evaluation (15 marks for day-to-day work and 25 marks for Internal tests (Reduced to 10 marks) and 5 marks for assignments) and 70 marks for End Examination. The question paper pattern will be similar to any theory subject. There shall be two internal tests in a semester, final mid semester marks shall be arrived at by considering the marks secured by the student in both the mid examinations with 80% weight age given to the better mid exam and 20% to the other.

The end examination pattern for Engineering Graphics is similar to other subject question paper pattern as explained in 9(b) End examination evaluation.

g) 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.

h) 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.

i) Revaluation of End Examination Scripts: Revaluation of End Examination scripts is allowed for theory subjects only by paying requisite fee.

j) Procedure for Revaluation: The script will be revaluated by an examiner appointed by the principal. The maximum of revaluation and regular end examination grade will be awarded for that subject. Student can apply for revaluation in a subject only once.

10) Skill oriented Courses:

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

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

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

iv) The Head of the Department shall identify a faculty member as coordinator for the course. A committee consisting of the Head of the Department, coordinator and a senior Faculty member nominated by the Head of the Department shall monitor the evaluation process. The marks/grades shall be assigned to the students by the above committee based on their performance.

v) The student shall be given an option to choose either the skill courses being offered by the college or to choose a certificate course being offered by industries/Professional bodies or any other accredited bodies. If a student chooses to take a Certificate Course offered by external agencies, the credits shall be awarded to the student upon producing the Course Completion Certificate from the agency. A committee shall be formed at the

level of the college to evaluate the grades/marks given for a course by external agencies and convert to the equivalent marks/grades.

vi) The recommended courses offered by external agencies, conversions and appropriate grades/marks are to be approved by the Institution at the beginning of the semester.

vii) If a student prefers to take a certificate course offered by external agency, the department shall mark attendance of the student for the remaining courses in that semester excluding the skill course in all the calculations of mandatory attendance requirements upon producing a valid certificate as approved by the Institute.

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

11) Massive Open Online Courses (MOOCs):

In accordance with the University Grants Commission (Credit Framework for Online Learning Courses through SWAYAM) Regulations, 2021, the University permits students to undertake up to 40% of the total courses offered in a specific programme in a semester through SWAYAM/ SWAYAM plus (www.swayam.gov.in) for credit transfer.

Students may pursue any course (i.e., core, electives or open courses) through SWAYAM / SWAYAM plus MOOCs. Completion of at least one MOOC (Massive Open Online Course) is mandatory for the award of the degree.

At the beginning of each semester, the institution shall notify the list of approved SWAYAM/ SWAYAM plus courses eligible for credit transfer. Students may register for an 8-week (2 credits) or 12-week (3 credits) SWAYAM / SWAYAM plus course with the approval of the Head of the Department (HoD). The HoD shall appoint a faculty mentor to monitor students' progress in the MOOC.

A student must complete at least 75% of the assignments and quizzes on the SWAYAM/ SWAYAM plus platform to be eligible for the end-semester examination. The end semester exam may be conducted by the National Testing Agency (NTA), the National Programme on Technology Enhanced Learning (NPTEL), or the institution during the regular end-term exams. Evaluation shall comprise 70% weightage for the end-semester examination and 30% for assignments and quizzes conducted by the SWAYAM/ SWAYAM plus course coordinator.

Students must earn a certificate by passing the SWAYAM/ SWAYAM plus examination and submit the same to the University to receive the credits as specified in the curriculum. Examination fees, if applicable, shall be borne by the student. Pass marks and grading will be as per the academic regulations. No relaxation is permitted. Credits will be awarded only after submission of the completion certificate.

Students who fail or are unable to appear in SWAYAM/ SWAYAM plus exams conducted by NTA/NPTEL may write the institution-conducted exam during the next subsequent semesters. Students who qualify through NTA/NPTEL

but miss institution registration for credit transfer may apply during the next supplementary notification.

Students who qualify in the proctored SWAYAM/ SWAYAM plus exams are eligible for direct credit transfer and are exempted from both internal and external assessments for the equivalent institution course.

In case of delays in result declaration by NTA/NPTEL, the institution shall issue revised marks memos once results are available.

The institution reserves the right to make amendments to these guidelines from time to time in alignment with UGC directives.

12) 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 University shall allow up to a maximum of 40% of the credits in a semester through MOOCs.

i) The institute shall offer credit mobility for MOOCs and give the equivalent credit weight age to the students for the credits earned through online learning courses.

ii) Student registration for the MOOCs shall be only through the respective department of the institution, it is mandatory for the student to share necessary information with the department.

iii) Credit transfer policy will be applicable to the Core, Professional & Open Elective courses only.

iv) The concerned department shall identify the courses permitted for credit transfer.

v) The University/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 institution shall ensure no overlap of MOOC exams with that of the institution examination schedule. In case of delay in results, the institution 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 department shall submit the following to the examination section of the institution:

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 institution from time to time.

13) Academic Bank of Credits (ABC):

The institution 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/Institution 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.

14) 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 / University shall be followed for carrying out and evaluation of Community Service Project and Industry Internship. In the final semester, the student should mandatorily register Full Semester Internship and undergo internship (onsite/virtual)

Evaluation of the summer internships shall be through the departmental committee. A student will be required to submit a summer internship/ Full Semester Internship report to the concerned department and appear for an oral presentation before the departmental committee comprising of Head of the Department, supervisor of the internship and a senior faculty member of the department. A certificate of successful completion from industry shall be included in the report. The oral presentation shall carry 50% weight age each. Summer internship shall be evaluated for 50 external marks whereas full semester internship will be evaluated for 100 marks. There shall be no internal marks for 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 University.

Full Semester Internship and Project work:

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

The project report shall be evaluated with an external examiner. The total marks for project work 200 marks and distribution shall be 60 marks for internal and 140 marks for external evaluation. The supervisor assesses the student for 30 marks (Report: 15 marks, Seminar: 15 marks). At the end of the semester, all projects shall be showcased at the department for the benefit of all students and staff and the same is to be evaluated by the departmental Project Review Committee consisting of supervisor, a senior faculty and HOD for 30 marks. The external evaluation of Project Work is a Viva-Voce Examination conducted in the presence of internal examiner and external examiner appointed by the University and is evaluated for 140 marks.

The college shall facilitate and monitor the student internship programs. Completion of internships is mandatory, if any student fails to complete internship, he/she will not be eligible for the award of degree. In such cases, the student shall repeat and complete the internship.

15) Guidelines for offering a Minor

The main objective of Minor in a discipline is to provide additional learning opportunities for academically motivated students and it is an optional feature of the B. Tech. programme. Students who are desirous of pursuing their special interest areas other than the chosen discipline of Engineering may opt for additional courses in minor specialization groups offered by a department other than their parent department and as defined by the respective department offering Minor program.

i) Minor is introduced in the curriculum of all B. Tech. programs offering a major degree and is applicable to all B. Tech (Regular and Lateral Entry) students admitted in Engineering & Technology.

ii) Minor programs shall be offered in emerging technologies by the respective departments or in collaboration with the relevant industries/agencies.

iii) A student shall earn additional 18 credits in the specified area to be eligible for the award of B.Tech. degree with Minor. This is in addition to the credits essential for obtaining the Undergraduate Degree in Major Discipline (i.e., 163 credits).

iv) A student shall study five theory courses each carrying three credits, along with either two laboratory courses of 1.5 credits each or a project course of three credits.

v) A student is permitted to register for a Minor offered by a department other than the parent department and as defined by the respective department offering Minor program.

vi) Minor in Quantum computing or Quantum Technologies can be studied by any branch of student.

vii) A student is permitted to register for Minor 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 their Minor from V Semester onwards.

viii) The courses offered under Minor can have theory as well as laboratory component. If a course comes with a lab component, that component is to be cleared separately

ix) The Concerned Principal of the college shall arrange separate class work and timetable of the courses offered under various Minor programs.

x) Courses that are used to fulfil the student's primary major may not be double counted towards the Minor. Courses with content substantially equivalent to courses in the student's primary major may not be counted towards the Minor.

xi) Students can complete the courses offered under Minor either in the college or in online platforms like SWAYAM/ SWAYAM plus with a minimum duration of 12 weeks for a 3-credit course and 8 weeks duration for a 2-credit course satisfying the criteria defined for credit mobility. If the courses under Minor are offered in conventional mode, then the teaching and evaluation procedure shall be similar to regular B. Tech courses.

xii) The attendance for the registered courses under Minor and regular courses offered for Major degree in a semester are to be considered separately.

xiii) A student shall maintain an attendance of 75% in all registered courses of Minor to be eligible for attending semester end examinations.

xiv) A student registered for Minor in a discipline shall pass in all subjects that constitute the requirement for the Minor degree programme. No class/ division (i.e., second class, first class and distinction, etc.) shall be awarded for **Minor** degree programme.

xv)If a student drops or is terminated from the Minor 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.

xvi)The **Minor** in a discipline will be mentioned in the degree certificate as Bachelor of Technology in XXX with Minor in YYY. For example, Bachelor of Technology in Mechanical Engineering with Minor in Machine Learning.

Enrolment into a Minor:

i) Students without any backlog subjects up to III semester will be permitted to register for a Minor.

ii) If a student is detained due to lack of attendance in either Major or Minor program, registration shall be cancelled

iii) Transfer of credits from a particular Minor to regular B. Tech. and vice-versa shall not be permitted

iv) Minor is to be completed simultaneously with Major degree program.

Registration for Minor:

i) The institution will announce specialization, eligibility and courses offered by the departments under Minor and seek registrations in IV Semester, after the results of III Semester are announced.

ii) 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 Minor.

iii) The selected students shall submit their willingness to the principal through his/her parent department which shall be forwarded to the concerned departments offering Minor. Both parent department and department offering minor shall maintain the record of student pursuing the Minor.

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

v) There is no fee for registration of subjects under Minor program offered in offline at the respective institutions.

16) Guidelines for offering Honors:

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

i. Honors is introduced in the curriculum of all B. Tech. programs offering a major degree and is applicable to all B. Tech (Regular and Lateral Entry) students admitted in Engineering & Technology.

ii. A student shall earn additional 18 credits for award of B.Tech.(Honors) degree from same branch/department/discipline registered for major degree. This is in addition to the credits essential for obtaining the Undergraduate degree in Major Discipline (i.e., 163 credits).

iii. A student shall study five theory courses each carrying three credits, along with either two laboratory courses of 1.5 credits each or a project course of three credits

iv. 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.

v. The concerned Principal of the college shall arrange separate class work and timetable of the courses offered under Honors program.

vi. Courses that are used to fulfil the student's primary major may not be double counted towards the Honors. Courses with content substantially equivalent to courses in the student's primary Major may not be counted towards the Honors. vii) Students can complete the courses offered under Honors either in the college or in online platforms like SWAYAM/SWAYAM Plus 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 in case of regular entry students and only III semester in case of lateral entry students. Students having 7 CGPA without any backlog subjects will be permitted to register for Honors.

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

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

v) Honors is 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.

17) Attendance Requirements

i) a) A student shall be eligible to appear for the external examinations if he/she acquires a minimum of 40% attendance in each subject and 75% of attendance in aggregate of all the subjects.

b) Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee.

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

iii) A stipulated fee shall be payable towards condonation of shortage of attendance to the 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 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.

18) Promotion Rules:

The following academic requirements must be satisfied in addition to the attendance requirements mentioned in section 16.

i) A student shall be promoted from first year to second year if he/she fulfils the minimum attendance requirement as per institute 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 fulfilment of academic regulations. In such case, he/she shall be in the academic regulations into which he/she is readmitted.

19) Grading:

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

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

Structure of Grading of Academic Performance

Range in which the marks in the subject fall	Assigned	Grade points
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):

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

$$SGPA = \Sigma(C_i \times G_i)/\Sigma C_i$$

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.

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

$$CGPA = \Sigma(C_i \times S_i)/\Sigma C_i$$

Where "Si" is the SGPA of the i^{th} semester and Ci 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 which the student is awarded Zero grade points will also be included.

Grade Point: It is a numerical weight allotted to each letter grade on a 10-point scale. Letter Grade: It is an index of the performance of students in a said course. Grades are denoted by the letters S, A, B, C, D and F.

Award of Class:

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

Class Awarded	CGPA Secured
First Class with Distinction	≥ 7.5
First Class	≥ 6.5 < 7.5
Second Class	≥ 5.5 < 6.5
Pass Class	≥ 5.0 < 5.5

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

20) 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 withheld in such cases.

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

22) Gap Year Concept:

Gap year concept for Student Entrepreneur in Residence is introduced and outstanding students who wish to pursue entrepreneurship / become entrepreneur are allowed to take a break of one year at any time after II year to pursue full-time entrepreneurship programme/to establish start-ups. This period may be extended to two years at the most and these two years would not be counted for the time for the maximum time for graduation. The principal of the respective college shall forward such proposals submitted by the students to the University. An evaluation committee constituted by the University 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

23) Transitory Regulations

Discontinued, detained, or failed candidates are eligible for readmission as and when the semester is offered after fulfilment of academic regulations. Candidates who have been detained for want of attendance or not fulfilled academic requirements or who have failed after having undergone the course in earlier regulations or have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered, subject 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, subject to Section 2 and they will follow the academic regulations into which they are readmitted.

24) Minimum Instruction Days for a Semester:

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

25) Medium of Instruction:

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

26) Student Transfers:

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

27) Exam Hall Culture

- Students are not permitted to use mobile phones in the examination halls.

- Any attempt by any student to influence the examiners, faculty and staff or Controller of Examinations for undue favours in the exams, and bribing them either for marks or attendance will be treated as malpractice case and the student can be debarred from the college.
- When a student absents himself/herself, he/she is treated as to have appeared and obtained zero marks in that course(s) and Grading is done accordingly.
- When a student's answer book is confiscated for any kind of attempted or suspected malpractice, the decision of the examination committee is final.

28) Rules of Discipline

- Use of mobile phones with camera, in the campus is strictly prohibited.
- Students shall behave and conduct themselves in a dignified and courteous manner in the campus/Hostels.
- Students shall not bring outsiders to the institution or hostels.
- Students shall not steal, deface, damage or cause any loss to the institution property.
- Students shall not collect money either by request or coercion from others within the campus or hostels.
- Students shall not resort to plagiarism of any nature/extent. Use of material, ideas, figures, code or data without appropriate acknowledgement or permission of the original source shall be treated as cases of plagiarism. Submission of material, verbatim or paraphrased, that is authored by another person or published earlier by oneself shall also be considered as cases of plagiarism.
- Use of vehicles by the students inside the campus is prohibited.
- Any conduct which leads to lowering of the esteem of the organization is prohibited.
- Any student exhibiting prohibited behaviour shall be suspended from the institute. The period of suspension and punishment shall be clearly communicated to the student. The student shall lose the attendance for the suspended period.
- Dress Code Boys: All the boy students should wear formal dresses. Wearing T-shirts and other informal dresses in the campus is strictly prohibited.
- Girls: All the girls students shall wear saree/Churidar with dupatta.

29) 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 Vice-Chancellor is final.

v) The Universities/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 Universities/institute.

vi) In the case of any doubt or ambiguity in the interpretation of the guidelines given, the decision of the Vice-Chancellor / Head of the institution is final.

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RGM COLLEGE OF ENGINEERING AND TECHNOLOGY

AUTONOMOUS

I B.TECH. SYLLABUS

FOR B.TECH. (LATERAL ENTRY SCHEME)

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

1) Award of the Degree:

a) Award of the B.Tech. Degree / B.Tech. Degree with a Minor if he/she fulfils the following:
   i) Pursues a course of study for not less than three academic years and not more than six academic years. However, for the students availing Gap year facility this period shall be extended by two years at the most and these two years would in addition to the maximum period permitted for graduation (Six years).
   ii) Registers for **123** credits and secures all **123** credits.

b) Award of B.Tech. degree with Honors if he/she fulfils the following:
   i) Student secures additional **18** credits fulfilling all the requisites of a B.Tech. program i.e., **123** credits.
   ii) Registering for Minor / Honors is optional.
   iii) Minor/Honors is to be completed simultaneously with B.Tech. programme.

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

3) Minimum Academic Requirements:

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

i) A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, practical, design, drawing subject or project if he secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the mid semester evaluation and end examination taken together.

ii) A student shall be promoted from III year to IV year if he/she fulfils the academic requirements of securing 40% of the credits (any decimal fraction should be rounded off to lower digit) in the subjects that have been studied up to V semester.

iii) 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 fulfilment 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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I B.TECH. SYLLABUS

B.TECH. - COURSE STRUCTURE – R23

(Applicable from the academic year 2023-24 onwards)

INDUCTION PROGRAMME

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

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I B.TECH. SYLLABUS

R23 – I B.TECH COURSE STRUCTURE

Branch	I Semester	Credits	II Semester	Credits
Group A CSE-07 CSE DS-04 CSE CY-02 Total - 13	Communicative English [BS&H]	2	Engineering Physics [BS&H]	3
	Chemistry [BS&H]	3	Differential Equations & Vector Calculus-[BS&H]	3
	Linear Algebra & Calculus [BS&H]	3	Basic Electrical and Electronics Engineering [Engineering Science]	3
	Basic Civil & Mechanical Engineering [Engineering Science]	3	Engineering Graphics[Engineering Science]	3
	Introduction to Programming [Engineering Science]	3	IT Workshop[Engineering Science]	1
	Communicative English Lab-[BS&H]	1	Professional Core (Data Structures) [Engineering Science]	3
	Chemistry Lab- [BS&H]	1	Engineering Physics Lab[BS&H]	1
	Engineering Workshop [Engineering Science]	1.5	Electrical and Electronics Engineering Workshop[Engineering Science]	1.5
	Computer Programming Lab [Engineering Science]	1.5	Professional Core Lab (DS Lab) [Engineering Science]	1.5
	Health and Wellness Yoga and Sports- [BS&H]	0.5	NSS/NCC/Scouts & Guides /Community Service- [BS&H]	0.5
Total Credits		19.5	Total Credits	20.5
Group B CE-02 EEE-02 Mech-02 ECE-04 CSE AIML-04 Total - 14	Engineering Physics [BS&H]	3	Communicative English [BS&H]	2
	Linear Algebra & Calculus [BS&H]	3	Engineering Chemistry [BS&H](CE, Mech)/ Chemistry (EEE,ECE)	3
	Basic Electrical & Electronics Engineering [Engineering Science]	3	Differential Equations & Vector Calculus[BS&H]	3
	Engineering Graphics [Engineering Science]	3	Basic Civil & Mechanical Engineering	3
	Introduction to Programming [Engineering Science]	3	Professional Core (EM/ECA/NWA) [Engineering Science]	3
	IT Workshop [Engineering Science]	1	Communicative English Lab[BS&H]	1
	Engineering Physics Lab [BS&H]	1	Engineering Chemistry Lab[BS&H](CE, Mech) /Chemistry Lab(EEE,ECE)	1
	Electrical & Electronics Engineering Workshop [Engineering Science]	1.5	Engineering Workshop [Engineering Science]	1.5
	Computer Programming Lab [Engineering Science]	1.5	Professional Core lab (EM&BP/EM/ECA/NWA) [Engineering Science]	1.5
	NSS/NCC/Scouts & Guides /Community Service- [BS&H]	0.5	Health and wellness, Yoga and Sports[BS&H]	0.5
Total Credits		**20.5**	**Total Credits**	**19.5**

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I B.TECH. SYLLABUS

GROUP A: CSE-07, CSE (DS)-04, CSE (CY)-02 [TOTAL-13]

B.Tech. – I Year I Semester

S.No.	Category	Title	L/D	T	P	Credits
1	BS&H	Communicative English	2	0	0	2
2	BS&H	Chemistry	3	0	0	3
3	BS&H	Linear Algebra & Calculus	3	0	0	3
4	Engineering Science	Basic Civil & MechanicalEngineering	3	0	0	3
5	Engineering Science	Introduction to Programming	3	0	0	3
6	BS&H	Communicative English Lab	0	0	2	1
7	BS&H	Chemistry Lab	0	0	2	1
8	Engineering Science-Lab	Engineering Workshop	0	0	3	1.5
9	Engineering Science-Lab	Computer Programming Lab	0	0	3	1.5
10	BS&H	Health and Wellness Yoga andSports	-	-	1	0.5
		Total	**14**	**00**	**11**	19.5

GROUP B: CE-02, EEE-02, ME-02, ECE-04, CSE (AIML)-04 [TOTAL-14]

B.Tech. – I Year I Semester

S.No.	Category	Title	L/D	T	P	Credits
1	BS&H	Engineering Physics.	3	0	0	3
2	BS&H	Linear Algebra & Calculus.	3	0	0	3
3	Engineering Science	Basic Electrical & Electronics Engineering.	3	0	0	3
4	Engineering Science	Engineering Graphics.	1	0	4	3
5	Engineering Science	Introduction to Programming.	3	0	0	3
6	Engineering Science	IT Workshop.	0	0	2	1
7	BS&H	Engineering Physics Lab.	0	0	2	1
8	Engineering Science-Lab	Electrical & Electronics Engineering Workshop.	0	0	3	1.5
9	Engineering Science-Lab	Computer Programming Lab.	0	0	3	1.5
10	BS&H	NSS/NCC/Scouts & Guides /Community Service.	-	-	1	0.5
		Total	**13**	**00**	**15**	**20.5**

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I B.TECH. SYLLABUS

GROUP A: CSE-07, CSE (DS)-04, CSE (CY)-02 [TOTAL-13]

B.Tech. – I Year II Semester

S.No.	Category	Title	L/D	T	P	Credits
1	BS&H	Engineering Physics.	3	0	0	3
2	BS & H	Differential Equations & Vector Calculus.	3	0	0	3
3	Engineering Science	Basic Electrical and Electronics Engineering.	3	0	0	3
4	Engineering Science	Engineering Graphics.	1	0	4	3
5	Engineering Science	IT Workshop.	0	0	2	1
6	Professional Core	Professional Core (Data Structures).	3	0	0	3
7	BS&H	Engineering Physics Lab.	0	0	2	1
8	Engineering Science-Lab	Electrical and Electronics Engineering Workshop.	0	0	3	1.5
9	Professional Core-Lab	Professional Core Lab (DS Lab).	0	0	3	1.5
10	BS&H	NSS/NCC/Scouts & Guides /Community Service.	-	-	1	0.5
		Total	**13**	**0**	**15**	**20.5**

GROUP B: CE-02, EEE-02, ME-02, ECE-04, CSE (AIML)-04 [TOTAL-14]

B.Tech. – I Year II Semester

S.No.	Category	Title	L	T	P	Credits
1	BS&H	Communicative English	2	0	0	2
2	BS & H	Chemistry/ Engineering Chemistry	3	0	0	3
3	BS&H	Differential Equations & Vector Calculus	3	0	0	3
4	Engineering Science	Basic Civil & Mechanical Engineering	3	0	0	3
5	Professional Core	Professional Core (EM/ECA/NWA)	3	0	0	3
6	BS&H	Communicative English Lab	0	0	2	1
7	BS&H	Chemistry/ Engineering Chemistry Lab	0	0	2	1
8	Engineering Science-Lab	Engineering Workshop	0	0	3	1.5
9	Professional Core-Lab	Professional Core lab (EM/ECA/NWA)	0	0	3	1.5
10	BS&H	Health and wellness, Yoga and Sports	-	-	1	0.5
		Total	**14**	**0**	**11**	**19.5**

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I B.Tech,

L	T	C
2	0	2

(A0003231) COMMUNICATIVE ENGLISH

(**For Branches**: CE, EEE, ME, ECE, CSE, CSE (DS), CSE (CS) & CSE (AIML))

Course Objectives:

- The main objective of introducing this course, C*ommunicative English,* is to facilitate effective listening, Reading, Speaking and Writing skills among the students. It enhances the same in their comprehending abilities, oral presentations, reporting useful information and providing knowledge of grammatical structures and vocabulary. This course helps the students to make them effective in speaking and writing skills and to make them industry-ready

Course Outcomes:

- Understand the context, topic, and pieces of specific information from social ortransactional dialogues.
- Apply grammatical structures to formulate sentences and correct word forms.
- Analyze discourse markers to speak clearly on a specific topic in informal discussions.
- Evaluate reading/listening texts andto write summaries based on global comprehension of these texts.
- Create a coherent paragraph, essay, and resume.

Mapping of COs & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1						2		3	2	3		2			
CO2									2	3		2			
CO3						2			2	3		2			
CO4						2			2	2		2			
CO5								1	1	3		2			

UNIT-I

Lesson: HUMAN VALUES: Gift of Magi (Short Story)

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions – **Listing to TED Talks**

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 – Book Review – **The Monk Who Sold his Ferrari**.

Writing: Mechanics of Writing - Capitalization, Spellings, Punctuation, **Pre-writing Techniques** - Parts of Sentences.

Grammar: Parts of Speech, Basic Sentence Structures-forming questions.

Vocabulary: Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words

UNIT-II

Lesson: NATURE: The Brook by Alfred Tennyson (Poem)

Listening: Answering a series of questions about main ideas and supporting ideas after listening to audio texts – **Listening Techniques – Chinese Pictograph.**

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 – **SQR3 Techniques**.

Writing: Structure of a Paragraph - Paragraph writing (specific topics) - **Compare and Contrast**.

Grammar; Cohesive devices - linkers, use of articles and zero articles, prepositions.
Vocabulary: Homonyms, Homophones, Homographs

UNIT-III
Lesson: BIOGRAPHY: Elon Musk
Listening: Listening for global comprehension and summarizing what is listened to – Sample listening from- **IELTS (International English Language Testing System)**
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 – Sample Reading - **CHANDRAYAAN-3**
Writing: Summarizing, Note-making, paraphrasing
Grammar: Verbs - tenses; subject-verb agreement;
Vocabulary: Compound words, Collocations

UNIT-IV
Lesson: INSPIRATION: The Toys of Peace by Saki
Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.
Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.
Reading: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data
Writing: Letter Writing - Official Letters, Resumes - **Report Writing** - Email Writing
Grammar: Reporting verbs, Direct & Indirect speech, Active & Passive Voice
Vocabulary: Words often confused, Jargons - **Idioms & Phrases**

UNIT-V
Lesson: MOTIVATION: The Power of Intrapersonal Communication (An Essay)
Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.
Speaking: Formal oral presentations on topics from academic contexts - **Preparation of Slides**
Reading: Reading comprehension - **Sample Reading on Engineering in Society by Sarah Bell**
Writing: Writing 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 Jargon

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

REFERENCE BOOKS:
1) Dubey, Sham Ji & Co. English for Engineers, Vikas Publishers, 2020.
2) Bailey, Stephen. Academic writing: A Handbook for International Students. Routledge, 2014.
3) Murphy, Raymond. English Grammar in Use, Fourth Edition, Cambridge University Press, 2019.

4) Lewis, Norman. Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary. Anchor, 2014.
5) Practical English usage by Michall Swan, Oxford University Press.
6) The Definitive guide to IELTS Avademy writing, Oxford University Press 2019.
7) 4000 Essential English words, Book & 2nd Edition by Paul Nation, 2009.

WEB RESOURCES:

GRAMMAR:

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

VOCABULARY

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

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I B.TECH. SYLLABUS

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(A0073231) COMMUNICATIVE ENGLISH LAB

(**For Branches:** CE, EEE, ME, ECE, CSE, CSE (DS), CSE (CS) & CSE (AIML))

COURSE OBJECTIVE:

- 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 will get trained in the basic communication skills and also make them ready to face job interviews.

COURSE OUTCOMES:

- Understand the different aspects of the English language proficiency with emphasis on LSRW skills.
- Apply communication skills through various language learning activities.
- Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
- Evaluate and exhibit professionalism in participating in debates and group discussions.
- Create effective resonate and prepare themselves to face interviews in future.

MAPPING OF COs & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1						1		1	2	2		1			
CO2								1	1	3		1			
CO3						1			1	2		2			
CO4						1			2	2		1			
CO5								1	1	2		1			

CALL: Computer Assessed Language Learning

ICS: Interactive Communication Skills

LIST OF TOPICS:

1. **Introduction to Phonetics**, Vowels & Consonants - CALL
2. Neutralization/Accent Rules - **EPD** - CALL
3. **Self-Introduction**, Communication Skills & JAM - ICS
4. Role Play or Conversational Practice - ICS
5. E-mail Writing and **Email Etiquettes** - ICS
6. Resume Writing, Cover letter, SOP - CALL
7. Group Discussions - methods & practice - ICS
8. Debates - Methods & Practice - ICS
9. PPT Presentations/ Poster Presentation/ **Describing Object** - ICS
10. Interview Skills & **MOCK Interviews** - ICS

SUGGESTED SOFTWARE:

- Walden Infotech
- Young India Films

REFERENCE BOOKS:

1. Meenakshi Raman, Sangeeta-Sharma. Technical Communication. Oxford Press.2018.
2. Grant Taylor: English Conversation Practice, Tata McGraw-Hill Education India, 2016
3. Hewing's, Martin. Cambridge Academic English (B2). CUP, 2012.
4. T. Balasubramanyam, A Textbook of English Phonetics for Indian

Students,(3rd Ed)Trinity Press.
5. E.Suresh Kumar, P.Srihari, A Hand Book for English Language Laboratories, Cambridge University Press India Pvt. Ltd., 2009.

Web Resources:

SPOKEN ENGLISH:

1. www.esl-lab.com
2. www.englishmedialab.com
3. www.englishinteractive.net
4. https://www.britishcouncil.in/english/online
5. http://www.letstalkpodcast.com/
6. https://www.youtube.com/c/mmmEnglish_Emma/featured
7. https://www.youtube.com/c/ArnelsEverydayEnglish/featured
8. https://www.youtube.com/c/engvidAdam/featured
9. https://www.youtube.com/c/EnglishClass101/featured
10. https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists
11. https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw

VOICE & 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

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(A0001231) ENGINEERING PHYSICS

(For Branches: CE, EEE, ME, ECE, CSE, CSE (DS), CSE (CS) & CSE (AIML))

COURSE OBJECTIVES:

Understanding of the fundamental concepts/laws in physics by explaining and discussing the physics as well as their relevance to everyday events and circumstances in a broad interdisciplinary context.

This course enables the students:

- To identify the importance of the optical phenomenon like interference, diffraction etc,
- To enlighten the periodic arrangement of atoms in crystalline solids.
- To illustrate the phenomena of quantum mechanics and derive Schrodinger
- To introduce novel concepts of dielectric and magnetic materials
- To develop novel electronic devices with the knowledge on semiconductors.

COURSE OUTCOMES:

- Analyze the signal interference and diffraction effects
- Familiarize with the basics of crystals and assess their structures.
- Classify various types of polarization of dielectrics and magnetic materials.
- Understand fundamentals of quantum mechanics and apply to the motion of particles in energy bands of solids.
- Identify the type of semiconductor using Hall effect

MAPPING OF COs & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		2	1	1							1
CO2	3	2	1	2	2							
CO3	2	3	1	2	2							1
CO4	2	3	2	1	2		1					
CO5	2	2	3	2	1							1

UNIT I Wave Optics

Interference: Introduction - Principle of superposition –Interference of light – **Types of interference** - Interference in thin films (Reflection Geometry) - **Its path difference** - applications - Colors in thin films- Newton's Rings **experiment** - Determination of wavelength and refractive index.

Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit & N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative). **Engineering applications of diffraction**.

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

UNIT II Crystallography and X-ray diffraction

Crystallography:

Crystal and amorphous solids, Lattice, Space lattice, Basis, Unit Cell and lattice parameters – Bravais Lattices – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC – **packing fraction of Diamond - Calculation of lattice constant**.

Directions and planes of a crystal - Miller indices – separation between successive (hkl) planes. X-ray diffraction: Bragg's law - X-ray Diffractometer – crystal structure determination by Laue's and powder methods.

UNIT III Dielectric and 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 - complex dielectric constant – Frequency dependence of polarization – dielectric loss - **Applications of dielectrics.**

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

UNIT IV Quantum Mechanics and Free electron theory

Quantum Mechanics: Dual nature of matter – **de Broglie's wavelength** - 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 – **Energies, wave functions and probability densities of the particle**.

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 – **Sources of electrical resistivity** - Fermi-Dirac distribution - Density of states - Fermi energy.

UNIT V Semiconductors

Semiconductors: Formation of energy bands – classification of crystalline solids - Intrinsic semiconductors: Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors: density of charge carriers – dependence of Fermi energy on carrier concentration and temperature –

Drift and diffusion currents – Einstein's equation - Hall effect and its applications. **Working principle of a p-n junction diode with its band diagram – Working principle of a solar cell**.

Textbooks:

1) M. N. Avadhanulu, P.G. Kshirsagar & TVS Arun Murthy" A Text book of Engineering Physics"- S. Chand Publications, 11th Edition 2019.
2) R. K. Gaur and S.C. Gupta, "Engineering Physics", Dhanpat Rai Publications, New Delhi.

References:

1) Engineering Physics - B.K. Pandey and S. Chaturvedi, Cengage Learning.
2) Engineering Physics - Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.
3) Engineering Physics" - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press.
4) Engineering Physics - M.R. Srinivasan, New Age international publishers (2009).
5) "Concepts of Modern Physics", Arthus Beiser, Tata Mc Graw Hill Publications, New Delhi.
6) "Physics Volume – II", Resnick, Halliday and Krane, Wiley, New Delhi.
7) "Elements of Solid-State Physics", J.P. Srivastava, PHI, 4th eds. New Delhi.
8) "Semiconductor Devices: Physics and Technology" S. M. Sze, 2nd eds. Wiley.
9) "Solid State Electronic Devices" Ben G. Streetman, Sanjay Kumar Banerjee, 6th eds. Phi Learning.

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I B.TECH. SYLLABUS

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(A0071231) ENGINEERING PHYSICS LAB

(**For Branches**: CE, EEE, ME, ECE, CSE, CSE (DS), CSE (CS) & CSE (AIML))

COURSE OBJECTIVES:

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

COURSE OUTCOMES: The students will be able to

- Operate optical instruments like travelling microscope and spectrometer.
- Estimate the wavelengths of different colors using diffraction grating.
- Plot the intensity of the magnetic field of circular coil carrying current with distance.
- Evaluate dielectric constant and magnetic susceptibility for dielectric and magnetic materials respectively.
- Calculate the band gap of a given semiconductor.
- Identify the type of semiconductor using Hall Effect.

List of Experiments:

1) Determination of radius of curvature of a given plano convex lens by Newton's rings.
2) Determination of wavelengths of different spectral lines in mercury spectrum using diffraction grating in normal incidence configuration.
3) Verification of Brewster's law
4) Determination of dielectric constant using charging and discharging method.
5) Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
6) Determination of wavelength of Laser light using diffraction grating.
7) Estimation of Planck's constant using photoelectric effect.
8) Determination of the resistivity of semiconductors by four probe methods.
9) Determination of energy gap of a semiconductor using p-n junction diode.
10) Magnetic field along the axis of a current carrying circular coil by Stewart Gee's Method.
11) Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall Effect.
12) Determination of temperature coefficients of a thermistor.
13) Determination of acceleration due to gravity and radius of Gyration by using a compound pendulum.
14) Determination of magnetic susptibility by Kundt's tube method.
15) Determination of rigidity modulus of the material of the given wire using Torsional pendulum.
16) Sonometer: Verification of laws of stretched string.
17) Determination of young's modulus for the given material of wooden scale by non-uniform bending (or double cantilever) method.
18) Determination of Frequency of electrically maintained tuning fork by Melde's experiment.
19) **Determination of particle size using laser**.
20) **Determination of Dispersive power of a prism using spectrometer.**
21) **Study of Solar cell I-V characteristics and determine its Fill Factor (FF).**

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

REFERENCES:

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

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(A0004231) CHEMISTRY

(For Branches: EEE, ECE, CSE, CSE (DS), CSE (CS) & CSE (AIML))

C**OURSE OBJECTIVES:**

- To familiarize engineering chemistry and its applications
- To train the students on the principles and applications of electrochemistry and polymers
- To introduce about the applications of instrumental methods in characterization ofmaterials

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

- Compare the materials of construction for battery and electrochemical sensors.
- Explain the preparation, properties, and applications of thermoplastics & thermosetting &elastomers conducting polymers.
- Explain the principles of spectrometry, SLC in separation of solid and liquid mixtures.
- Apply the principle of Band diagrams in the application of conductors and semiconductors.
- Summarize the concepts of Instrumental methods.

MAPPING OF COs & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	1	-	-	-	2	-	1	-	-	1	-	-	-
CO2	1	2	-	-	1	1	-	1	-	-	-	-	-	-	-
CO3	2	-	-	1	-	-	1	1	-	-	-	-	-	-	-
CO4	1	2	-	1	1	2	-	1	-	1	-	-	-	-	-
CO5	2	1	-	2	1	-	-	1	-	1	-	1	-	-	-

UNIT I STRUCTURE AND BONDING MODELS:

Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of Ψ and Ψ2, particle in one dimensional box, molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules – energy level diagrams of O2 and CO, etc. π-molecular orbitals of butadiene and benzene, calculation of bond order. **Crystal field theory and its salient features – splitting in octahedral and tetrahedral geometry.**

UNIT II MODERN ENGINEERING MATERIALS

Semiconductors – Introduction, basic concept, application

Super conductors - Introduction basic concept, applications.

Super capacitors: Introduction, Basic Concept-Classification – Applications.

Nano materials: Introduction, classification, properties and applications of Fullerenes, carbon nano tubes and Graphene's nanoparticles. **Preparation methods – Sol-gel method, Chemical reduction method.**

UNIT III ELECTROCHEMISTRY AND APPLICATIONS

Introduction – Conductance, Specific conductance, Equivalent Conductance and molar conductance – Determination of equivalent conductance by Wheatstone bridge method, Electrochemical cell, Nernst equation, cell potential calculations and numerical problems, potentiometry- potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations).

Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples Primary cells – Zinc-air battery, Secondary cells –lithium-ion batteries- working of the batteries including cell reactions; Fuel cells, hydrogen-

oxygen fuel cell– working of the cells. Polymer Electrolyte Membrane Fuel cells (PEMFC).

UNIT IV POLYMER CHEMISTRY

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, **Copolymerization** with specific examples and mechanisms of polymer formation.

Plastics –Thermo and Thermosetting plastics, Preparation, properties and applications of – PVC, Teflon, Bakelite, Nylon-6,6, **Nylon 11**, carbon fibres.

Elastomers – Buna-S, Buna-N, **Butyl Rubber, Thiokol** – preparation, properties and applications.

Conducting polymers – polyacetylene, polyaniline, – mechanism of conduction and applications. Bio-Degradable polymers - Poly Glycolic Acid (PGA), Polyl Lactic Acid (PLA).

UNIT V INSTRUMENTAL METHODS AND APPLICATIONS

Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. UV-Visible Spectroscopy, electronic transition, Absorption and Intensity Shifts, Instrumentation,

Applications of UV-Visible Spectroscopy, IR spectroscopies, fundamental modes and selection rules, Instrumentation. **Applications of IR Spectroscopy**, Chromatography-Basic Principle, Classification-HPLC: Principle, Instrumentation and Applications.

TEXTBOOKS:

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

REFERENCE BOOKS:

1) Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.
2) J.D. Lee, Concise Inorganic Chemistry, 5th Edition, Wiley Publications, Feb.2008
3) Textbook of Polymer Science, Fred W. Billmayer Jr, 3rd Edition.

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I B.TECH. SYLLABUS

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(A0074231) CHEMISTRY LAB

(For Branches: EEE, ECE, CSE, CSE (DS), CSE (CS) & CSE (AIML))

COURSE OBJECTIVES:

- Verify the fundamental concepts with experiments.

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

- Determine the cell constant and conductance of solutions.
- Prepare advanced polymer Bakelite materials.
- Measure the strength of an acid present in secondary batteries.
- Analyse the IR spectra of some organic compounds.
- Calculate strength of acid in Pb-Acid battery.

MAPPING OF COs & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	-	1	-	-	-	-	2	-	-	1	-	-	-
CO2	1	1	2	-	2	1	1	1	-	-	1	-	-	-	-
CO3	2	1	-	-	1	-	2	-	1	-	-	1	-	-	-
CO4	1	3	2	1	2	-	1	-	-	1	-	1	-	-	-
CO5	2	2	1	-	2	1	-	-	2	1		1	-	-	-

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) Determination of Strength of an acid in Pb-Acid battery
6) Preparation of a Bakelite
7) Verify Lambert-Beer's law
8) Wavelength measurement of sample through UV-Visible Spectroscopy
9) Identification of simple organic compounds by IR
10) Preparation of nanomaterials by precipitation method
11) Estimation of Ferrous Iron by Dichrometry
12) Measurement of 10Dq by spectrophotometric method
13) **Estimation of Copper by using Standard EDTA solution**
14) **Estimation of Magnesium by using Standard EDTA solution**

REFERENCE:

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

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(A0006232) ENGINEERING CHEMISTRY

(For Branches: CE & ME)

COURSE OBJECTIVES:

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

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

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

MAPPING OF COS & POS:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	1	-	-	-	2	-	1	-	-	1	-	-	-
CO2	1	2	-	-	1	1	-	1	-	-	-	-	-	-	-
CO3	2	-	-	1	-	-	1	1	-	-	-	-	-	-	-
CO4	1	2	-	1	1	2	-	1	-	1	-	-	-	-	-
CO5	2	1	-	2	1	-	-	1	-	1	-	1	-	-	-

UNIT I Water Technology

Soft and hardwater, **Sources of water, Hardness of water- Types of Hardness of water, Units of Hardness**, Estimation of hardness of water by EDTA Method, Estimation of dissolved Oxygen - Boiler troubles –Priming, foaming, scale and sludge, Caustic embrittlement, Industrial water treatment – Specifications for drinking water, Bureau of Indian Standards(BIS) and World health organization(WHO) standards, Ion-exchange processes - desalination of brackish water, reverse osmosis (RO) and electrodialysis.

UNIT II Electrochemistry and Applications

Introduction – Conductance, Specific conductance, Equivalent Conductance and molar conductance – Determination of equivalent conductance by Wheatstone bridge method, Electrodes –electrochemical cell, Nernst equation, cell potential calculations.

Primary cells – Zinc-air battery, Secondary cells – Nickel-Cadmium (NiCad), and lithium ion batteries- working principle of the batteries including cell reactions; Fuel cells-Basic Concepts, the principle and working of hydrogen-oxygen Fuel cell.

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

UNIT III Polymers and Fuel Chemistry

Introduction to polymers, functionality of monomers, Mechanism of chain growth, step growth polymerization.

Thermoplastics and Thermo-setting plastics-: Preparation, properties and applications of poly styrene. **Teflon, Polyethylene**, PVC, **Nylon 6**, Nylon 6:6, **Nylon 11** and Bakelite.

Elastomers – Preparation, properties and applications of Buna S, Buna N, Thiokol rubbers. Fuels – Types of fuels, calorific value of fuels, numerical problems based on calorific value; Analysis of coal (Proximate and Ultimate analysis), Liquid Fuels, refining of petroleum, Octane and Cetane number- alternative fuels- propane, methanol, ethanol and bio fuel-bio diesel.

UNIT IV Modern Engineering Materials

Composites- Definition, Constituents, Classification- Particle, Fibre and Structural reinforced composites, properties and Engineering applications

Refractories- Classification, Properties, Factors affecting the refractory materials and Applications, **Reasons for the failure of the refractory materials**.

Lubricants - Classification, Functions of lubricants, Mechanism, Properties of lubricating oils –Viscosity, Viscosity Index, Flash point, Fire point, Cloud point, saponification and Applications. Building materials- Portland cement, constituents, Setting and Hardening of cement.

UNIT V Surface Chemistry and Nanomaterials

Introduction to surface chemistry, **Adsorption - Types of adsorption, Adsorption of gases on solids and its applications,** adsorption isotherm (Freundlich and Langmuir), BET equation (no derivation) Colloids - stabilization of colloids by stabilizing agents, applications of colloids, micelle formation, synthesis of colloids (Braggs Method), stabilization of nanometals and nanometal oxides by stabilizing agents, preparation of nanometals and metal oxides by chemical and biological methods, applications of nanomaterials – catalysis, medicine, sensors, etc.

TEXT BOOKS:

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

REFERENCE BOOKS:

1) H.F.W. Taylor, Cement Chemistry, 2/e, Thomas Telford Publications, 1997.
2) D.J. Shaw, Introduction to Colloids and Surface Chemistry, Butterworth-Heineman, 1992.
3) Textbook of Polymer Science, Fred W. Billmayer Jr, 3rd Edition

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I B.TECH. SYLLABUS

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(A0076232) ENGINEERING CHEMISTRY LAB

(**For Branches**: CE & ME)

COURSE OBJECTIVES:

- To verify the fundamental concepts with experiments

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

- Determine the cell constant and conductance of solutions.
- Prepare advanced polymer materials.
- Determine the physical properties like surface tension, adsorption and viscosity.
- Estimate the Iron and Calcium in cement.
- Calculate the hardness of water.

MAPPING OF COs & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	-	1	-	-	-	-	2	-	-	1	-	-	-
CO2	1	1	2	-	2	1	1	1	-	-	1	-	-	-	-
CO3	2	1	-	-	1	-	2	-	1	-	-	1	-	-	-
CO4	1	3	2	1	2	-	1	-	-	1	-	1	-	-	-
CO5	2	2	1	-	2	1	-	-	2	1		1	-	-	-

LIST OF EXPERIMENTS:

1) Determination of Hardness of a groundwater sample.
2) Estimation of Dissolved Oxygen by Winkler's method
3) Determination of Strength of an acid in Pb-Acid battery
4) Preparation of a polymer (Bakelite)
5) Preparation of nanomaterials by precipitation method.
6) Determination of Viscosity of lubricating oil by Redwood Viscometer 1
7) Determination of Viscosity of lubricating oil by Redwood Viscometer 2
8) **Estimation of Copper by using Standard EDTA solution**
9) **Estimation of Magnesium by using Standard EDTA solution**
10) Determination of percentage of Iron in Cement sample by colorimetry
11) Estimation of Calcium in port land Cement
12) Adsorption of acetic acid by charcoal
13) Determination of percentage Moisture content in a coal sample
14) Determination of Calorific value of gases by Junker's gas Calorimeter

REFERENCE:

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

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I B.TECH. SYLLABUS

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(A0002231) LINEAR ALGEBRA & CALCULUS

(**For Branches**: CE, EEE, ME, ECE, CSE, CSE (DS), CSE (CS) & CSE (AIML))

COURSE OBJECTIVES:

- To familiarize the concepts of matrices and mean value theorems and their applications in engineering.
- To equip the students to solve various application problems in engineering through evaluation of multiple integrals etc.,
- To equip the students with standard concepts and tools of mathematics to handle various real-world problems and their applications.

COURSE OUTCOMES: At the end of the course, the student will be able to

- Develop a matrix algebra technique that is needed by engineers for practical applications.
- Familiarize with functions of several variables which is useful in optimization.
- Learn important tools of calculus in higher dimensions.
- Familiarize with double and triple integrals of functions of several variables in two and three dimensions.
- Identify the applications of advanced calculus & Linear algebra in electro-magnetic theory and in telecommunication engineering.

MAPPING OF COS & POS:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	2	-	-	-	-	-	-	-
CO2	3	1	2	2	1	-	-	-	-	-	-	-
CO3	2	2	2	2	1	-	-	-	-	-	-	-
CO4	3	2	1	3	2	-	-	-	-	-	-	-
CO5	2	3	2	1	2	-	-	-	-	-	-	-

UNIT I: MATRICES

Introduction to Matrices - Elementary transformations - Rank of a matrix by echelon form, normal form and **PAQ 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 **(Rank test)** - Gauss Seidel Iteration Method.

UNIT II: LINEAR TRANSFORMATION AND ORTHOGONAL TRANSFORMATION

Eigenvalues- Eigenvectors and their properties-Diagonalization of a matrix- Cayley-Hamilton Theorem (without proof) - finding inverse and powers of a matrix by Cayley-Hamilton Theorem.

Quadratic forms and Nature of the Quadratic Forms- Reduction of Quadratic form to canonical form - **Similar Transformation** and Orthogonal Transformation.

UNIT III: CALCULUS

Mean Value Theorems: Rolle's Theorem- Lagrange's mean value theorem with their geometrical interpretation – Inequalities by using Lagrange's mean value theorem- Problems on the above theorems.

Cauchy's mean value theorem - Taylor's and Maclaurin's theorems with remainders (without proof) - **Simple examples of Taylor's and Maclaurin's Series.**

UNIT IV: PARTIAL DIFFERENTIATION AND APPLICATIONS (MULTI VARIABLE CALCULUS)

Functions of several variables - Partial derivatives- total derivatives-chain rule-change of variables- Taylor's and Maclaurin's series expansion of functions of two variables.

Jacobians-maxima and minima of functions of two variables- **Lagrange method of Multipliers with three variables only**.

UNIT V: MULTIPLE INTEGRALS (MULTI VARIABLE CALCULUS)

Double integrals-Evaluation of Double integrals (Cartesian and Polar) - change of order of integration-Evaluation of triple integrals-Change of variables to polar, cylindrical and spherical coordinates.

Finding areas (by double integrals) and volumes (by double integrals and triple integrals).

TEXTBOOKS:

1) B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2) Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2018.
3) **T.K.V. Iyengar, B. Krishna Gandhi, Mathematical Methods, S. Chand & Company**.

REFERENCE BOOKS:

1) R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 5/e, Alpha Science International Ltd., 2021 (9th reprint).
2) George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 14/e, Pearson Publishers, 2018.
3) Glyn James, Advanced Modern Engineering Mathematics, 5/e, Pearson publishers, 2018.
4) Michael Greenberg, Advanced Engineering Mathematics, 9th edition, Pearson edn.
5) H. K Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand, 2021.
6) **G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002**.

E-RESOURCES AND DIGITAL MATERIAL:

1) **https://onlinecourses.swayam2.ac.in/aic22_ts31/preview**
2) **https://onlinecourses.nptel.ac.in/noc23_ma88/preview**

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(A0005232) DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

(For Branches: CE, EEE, ME, ECE, CSE, CSE (DS), CSE (CS) & CSE (AIML))

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

- Solve the differential equations related to various engineering fields.
- Identify solution methods for partial differential equations that model physical processes.
- Interpret the physical meaning of different operators such as gradient, curl and divergence.
- Estimate the work done against a field, circulation and flux using vector calculus.
- Apply the concept of vector integration to solve many problems in field theory, Electromagnetic theory and transmission lines.

MAPPING OF CO'S & PO'S:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	3	1	2	-	-	-	-	-	-	-
CO2	3	2	2	2	1	-	-	-	-	-	-	-
CO3	2	2	1	2	1	-	-	-	-	-	-	-
CO4	3	2	2	1	2	-	-	-	-	-	-	-
CO5	2	1	2	1	3	-	-	-	-	-	-	-

UNIT I: Differential equations of first order and first degree

Formation of ODEs - Solution of ODEs - 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 (L – R & C – R circuits).

UNIT II: Linear differential equations of higher order (Constant Coefficients)

Definitions- homogenous and non-homogenous- complimentary function (C.F)-general solution,-particular integral(P.I) **with RHS term of the type**, e^{ax}, $\sin ax$, $\cos ax$, **Polynomials in x,** $e^{ax}V(x)$, $xV(x)$.

Wronskean - method of variation of parameters-Simultaneous linear equations-Applications to L-C-R Circuit problems and Simple Harmonic motion.

UNIT III: Partial Differential Equations

Introduction - formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions-solutions of first order linear equations using Lagrange's method.

Homogeneous Linear Partial differential equations with constant coefficients-**Method of separation of variables.**

UNIT IV: Vector differentiation

Introduction of Vector differentiation - Scalar and vector point functions-vector operator del,-Del applied to scalar point functions, - Gradient - **Directional derivatives**

Del applied to vector point functions-Divergence and Curl- vector identities – **Del applied twice to point functions**.

UNIT V: Vector integration

Line integral-circulation, work done-surface integral, flux-volume integral.
Green's theorem in the plane (without proof)- Stoke's theorem (without proof)- Divergence theorem (without proof) - **Verification of Green's, Stoke's and Gauss Theorems**.

TEXT BOOKS:

1) Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2018.
2) B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.
3) **T.K.V. Iyengar, B. Krishna Gandhi, A Text Book of Engineering Mathematics, Vol – I, S. Chand & Company**.

REFERENCE BOOKS:

1) Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2018.
2) Micheael Greenberg, 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 International Ltd., 2021 (9th reprint).
5) B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education, 2017.
6) **N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008**.

e-Resources and Digital Material:

1) **https://onlinecourses.nptel.ac.in/noc23_ma86/preview**
2) **https://onlinecourses.nptel.ac.in/noc23_ma90/preview**

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(A0101231) BASIC CIVIL AND MECHANICAL ENGINEERING
(**For Branches**: CE, EEE, ME, ECE, CSE, CSE (DS), CSE (CS) & CSE (AIML))

BASIC CIVIL ENGINEERING

Course Objectives:
- Get familiarized with the scope and importance of Civil Engineering sub-divisions.
- Introduce the preliminary concepts of surveying.
- Acquire preliminary knowledge on Transportation and its importance in nation's economy.
- Get familiarized with the importance of quality, conveyance and storage of water.
- Introduction to basic civil engineering materials and construction techniques..

Course Outcomes: On completion of the course, the student should be able to:
- Understand various sub-divisions of Civil Engineering and to appreciate their role in ensuring better society.
- Know the concepts of surveying and to understand the measurement of distances, angles and levels through surveying.
- Realize the importance of Transportation in nation's economy and the engineering measures related to Transportation.
- Understand the importance of Water Storage and Conveyance Structures so that the social responsibilities of water conservation will be appreciated.
- Understand the basic characteristics of Civil Engineering Materials and attain knowledge on prefabricated technology.

MAPPING OF COs & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	-	-	2	-	-	-	1	-	1
CO2	3	2	1	-	-	2	-	-	-	1	-	1
CO3	3	2	1	-	2	2	-	-	-	1	-	1
CO4	3	2	1	-	-	2	2	-	-	1	-	1
CO5	3	2	1	-	-	2	-	-	-	1	-	1

PART A: BASIC CIVIL ENGINEERING

UNIT I

Basics of Civil Engineering: Role of Civil Engineers in Society- Various Disciplines of Civil Engineering- Structural Engineering- Geo-technical Engineering- Transportation Engineering - Hydraulics and Water Resources Engineering - Environmental Engineering -Scope of each discipline- Building Construction and Planning- Construction Materials-Cement - Aggregate - Bricks - Cement concrete- Steel-Introduction to Prefabricated construction Techniques. **Building Bye laws: Floor Area ratio, Carpet area, Built up area, super built up area, Standard Dimensions of Residential Building**

UNIT II

Surveying: Objectives of Surveying- Horizontal Measurements: Instruments used in chain survey and its Functions - Vertical Measurements: Component parts of Levelling instrument and its Functions - Angular Measurements: Components of Prismatic Compass and its Functions- Levelling instruments used for levelling- Introduction to Bearings-Simple problems on levelling(finding out the R. L.) and bearings(Whole Circle Bearing System and Reduced Bearing)-Contour mapping.- **Global Positioning System (GPS) and its applications**.

UNIT III

Transportation Engineering: Importance of Transportation in Nation's economic development- Types of Highway Pavements- Flexible Pavements and Rigid Pavements (structure of pavement, function of pavement components) - Simple Differences. Basics of Harbour, Tunnel, Airport, and Railway Engineering.

Water Resources and Environmental Engineering:

Introduction, Sources of water- Quality of water- Specifications- Introduction to Hydrology–Rain water Harvesting - Water Storage and Conveyance Structures (Simple introduction to Dams and Reservoirs). - **Cross drainage works: Simple introduction to Aqueduct, Siphon Aqueduct, Super passage and Canal Siphon.**

Textbooks:

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

Reference Books:

1) Surveying, Vol- I and Vol-II, S.K. Duggal, Tata McGraw Hill Publishers 2019. Fifth Edition.
2) Hydrology and Water Resources Engineering, Santosh Kumar Garg, Khanna Publishers, Delhi. 2016
3) Irrigation Engineering and Hydraulic Structures - Santosh Kumar Garg, Khanna Publishers, Delhi 2023. 38th Edition.
4) Highway Engineering, S.K.Khanna, C.E.G. Justo and Veeraraghavan, Nemchand and Brothers Publications 2019. 10th Edition.
5) Indian Standard DRINKING WATER — SPECIFICATION IS 10500-2012.

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PART B: BASIC MECHANICAL ENGINEERING

COURSE OBJECTIVES: The students after completing the course are expected to;

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

COURSE OUTCOMES: On completion of the course, the student should be able to;

- Understand the different manufacturing processes.
- Explain the basics of thermal engineering and its applications.
- Describe the working of different mechanical power transmission systems and power plants.
- Describe the basics of robotics and its applications.

MAPPING OF COs & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	-	-	2	-	-	-	1	-	1
CO2	3	2	1	-	-	2	-	-	-	1	-	1
CO3	3	2	1	-	2	2	-	-	-	1	-	1
CO4	3	2	1	-	-	2	2	-	-	1	-	1
CO5	3	2	1	-	-	2	-	-	-	1	-	1

UNIT I

Introduction to Mechanical Engineering: Role of Mechanical Engineering in Industries and Society- Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, Marine sectors, **Bio-medical Engineering and Infrastructure development**.

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

UNIT II

Manufacturing Processes: Principles of Casting, Forming, joining processes, Machining, **Non-conventional machining**, Introduction to CNC machines, 3D printing, and Smart manufacturing.

Thermal Engineering – working principle of Boilers, Otto cycle, Diesel cycle, **Rankine Cycle**, Refrigeration and air-conditioning cycles, IC engines, 2-Stroke and 4-Stroke engines, SI/CI Engines, **CRDI Engine**, Components of Electric and Hybrid Vehicles.

UNIT III

Power plants – working principle of Steam, Diesel, Hydro, Nuclear power plants.

Mechanical Power Transmission – Belt Drives, Chain, Rope drives, Gear Drives, **Electromagnetic drives** and their applications.

Introduction to Robotics - Joints & links, configurations, **grippers** and applications of robotics.

(Note: The subject covers only the basic principles of Civil and Mechanical Engineering systems. The evaluation shall be intended to test only the fundamentals of the subject)

TEXTBOOKS:

1) Internal Combustion Engines by V.Ganesan, By Tata McGraw Hill publications (India) Pvt. Ltd.

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

REFERENCE BOOKS:

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

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I B.TECH. SYLLABUS

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(A0102232) ENGINEERING MECHANICS
(For Branch: ME and CE**)**

COURSE OBJECTIVES:
- To get familiarized with different types of force systems.
- To draw accurate free body diagrams representing forces and moments acting on a body to analyze the equilibrium of system of forces.
- To teach the basic principles of center of gravity, centroid and moment of inertia and determine them for different simple and composite bodies.
- To apply the Work-Energy method to particle motion.
- To understand the kinematics and kinetics of translational and rotational motion of rigid bodies.

COURSE OUTCOMES: On Completion of the course, the student should be able to;
- Understand the fundamental concepts in mechanics and determine the frictional forces for bodies in contact.
- Analyze different force systems such as concurrent, coplanar and spatial systems and calculate their resultant forces and moments.
- Calculate the centroids, center of gravity and moment of inertia of different geometrical shapes.
- Apply the principles of work-energy and impulse-momentum to solve the problems of rectilinear and curvilinear motion of a particle.
- Solve the problems involving the translational and rotational motion of rigid bodies.

MAPPING WITH COs & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	-	-	-	-	-	-	1	-	1
CO2	3	2	1	1	-	-	-	-	-	1	-	1
CO3	3	2	1	-	-	-	-	-	-	1	-	1
CO4	3	2	1	1	-	-	-	-	-	1	-	1

UNIT I

Introduction to Engineering Mechanics – Basic Concepts, **system of units**, Scope and Applications.

Systems of Forces: Coplanar Concurrent Forces - Components in Space – Resultant - Moment of Force and its Application - Couples and Resultant of Force Systems.

Friction: Introduction, limiting friction, **angle of friction** and impending motion, Coulomb's laws of dry friction, coefficient of friction, Cone of Static friction.

UNIT II

Equilibrium of Systems of Forces: Free Body Diagrams, Lami's Theorm, Equations of Equilibrium of Coplanar Systems, Graphical method for the equilibrium, Triangle law of forces, converse of the law of polygon of forces, condition of equilibrium, Equations of Equilibrium for Spatial System of forces, Numerical examples on spatial system of forces using vector approach, Analysis of plane trusses - **method of joints**.

Principle of virtual work with simple examples.

UNIT III

Centroid: Centroids of simple figures (from basic principles) - Centroids of Composite Figures.

Centre of Gravity: Centre of gravity of simple body (from basic principles), Centre of gravity of composite bodies, Pappu's theorems.

Area Moments of Inertia: Definition– Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia.

Mass Moment of Inertia: Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, Mass Moment of Inertia of composite bodies, **Radius of gyration**.

UNIT IV

Rectilinear and Curvilinear motion of a particle: Kinematics and Kinetics – D'Alembert's Principle - Work Energy method and applications to particle motion - **Principle of Impulse**, Impulse Momentum method.

UNIT V

Rigid body Motion: Kinematics and Kinetics of translation, Rotation about fixed axis and plane motion, **kinetic energy of a particle**, Work Energy method and Impulse Momentum method.

TEXT BOOKS:

1) Engineering Mechanics, S. Timoshenko, D. H. Young, J.V. Rao, S. Pati., , McGraw Hill Education 2017. 5th Edition.
2) Engineering Mechanics by S.S. Bhavikatti. 7th Edition, New age International Publications, 2019.

REFERENCE BOOKS:

1) Engineering Mechanics, P.C.Dumir- S.Sengupta and Srinivas V veeravalli , University press. 2020. First Edition.
2) Engineering Mechanics, Statics and Dynamics, Rogers and M A. Nelson., McGraw Hill Education. 2017. First Edition.
3) Engineering Mechanics, Statics and Dynamics, I.H. Shames., PHI, 2002. 4th Edition.
4) Engineering Mechanics, Volume-I: Statics, Volume-II: Dynamics, J. L. Meriam and L. G. Kraige., John Wiley, 2008. 6th Edition.
5) Introduction to Statics and Dynamics, Basudev Battachatia, Oxford University Press, 2014. Second Edition.
6) Engineering Mechanics: Statics and Dynamics, Hibbeler R.C., Pearson Education, Inc., New Delhi, 2022, 14th Edition.

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(A0371231) ENGINEERING WORKSHOP
(For Branches: CE, EEE, ME, ECE, CSE, CSE (DS), CSE (CS) & CSE (AIML))

COURSE OBJECTIVES:
- To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills.

COURSE OUTCOMES:
- Identify workshop tools and their operational capabilities.
- Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding.
- Apply fitting operations in various applications.
- Apply basic electrical engineering knowledge for House Wiring Practice

MAPPING OF Cos & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	1	2	2	1	-	-	-	2	-	2	1	1	-	-
CO2	-	-	-	-	2	1	-	-	2	2	2	-	2	-	-
CO3	-	-	-	-	2	1	-	-	2	2	2	-	2	-	-
CO4	-	-	-	-	2	1	-	-	2	2	2	-	2	-	-

SYLLABUS

1) **Demonstration**: Safety practices and precautions to be observed in workshop.
2) **Wood Working:** Familiarity with different types of woods and tools used in wood working and make following joints.
   a) Half – Lap joint b) Mortise and Tenon joint c) Corner Dovetail joint or Bridle joint
3) **Sheet Metal Working**: Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets.
   a) Tapered tray b) Conical funnel c) Elbow pipe d) Brazing
4) **Fitting:** Familiarity with different types of tools used in fitting and do the following fitting exercises.
   a) V-fit b) Dovetail fit c) Semi-circular fit d) Bicycle tire puncture and change of two-wheeler tyre
5) **Electrical Wiring**: Familiarity with different types of basic electrical circuits and make the following connections.
   a) Parallel and series b) Two-way switch c) Godown lighting d) Tube light
   e) Three phase motor f) Soldering of wires
6) **Foundry Trade:** Demonstration and practice on Moulding tools and processes, Preparation of Green Sand Moulds for given Patterns.
7) **Welding Shop**: Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint.
8) **Plumbing:** Demonstration and practice of Plumbing tools, Preparation of Pipe joints with coupling for same diameter and with reducer for different diameters.

TEXTBOOKS:

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.

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(A0301231) ENGINEERING GRAPHICS

(**For Branches**: CE, EEE, ME, ECE, CSE, CSE (DS), CSE (CS) & CSE (AIML))

COURSE OBJECTIVES:

- To enable the students with various concepts like dimensioning, conventions and standards related to Engineering Drawing
- To impart knowledge on the projection of points, lines and plane surfaces
- To improve the visualization skills for better understanding of projection of solids
- To develop the imaginative skills of the students required to understand Section of solids and Developments of surfaces.
- To make the students understand the viewing perception of a solid object in Isometric and Perspective projections.

COURSE OUTCOMES:

- Understand the principles of engineering drawing, including engineering curves, scales, orthographic and isometric projections.
- Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views.
- Understand and draw projection of solids in various positions in first quadrant.
- Explain principles behind development of surfaces.
- Prepare isometric and perspective sections of simple solids.

MAPPING WITH COs& POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	2	3	-	-	2	2	3	2	-	3	2	3	2
CO2	3	2	3	2	3	-	-	2	2	3	-	-	3	2	2	2
CO3	3	2	2	1	3	-	-	2	2	3	-	1	1	2	2	2
CO4	3	2	2	2	3	-	-	2	2	3	1	-	1	2	3	2

UNIT I

Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing regular polygons by general methods - **Semi-circle method and inscribe circle method**.

Curves: construction of ellipse by general method and concentric circle method, parabola and hyperbola by general method, Cycloids, Involutes, 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 of a point situated in any one of the four quadrants.

Projections of Straight Lines: Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane. Projections of Straight Line Inclined to both the reference planes, **finding the true length and true inclination**.

Projections of Planes: regular planes Perpendicular to both reference planes, parallel to one reference plane and inclined to the other reference plane; plane inclined to both the reference planes.

UNIT III

Projections of Solids: Types of solids: Polyhedra and Solids of revolution - **Practical applications**. 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.

UNIT IV

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

Development of Surfaces: Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone, **frustum of cone and pyramid.**

UNIT V

Conversion of Views: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views, **Isometric scale and Isometric projection**.

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

TEXT BOOK:

1) N. D. Bhatt, Engineering Drawing, Charotar Publishing House, 2016.

REFERENCE BOOKS:

1) Engineering Drawing, K.L. Narayana and P. Kannaiah, Tata McGraw Hill, 2013.
2) Engineering Drawing, M.B.Shah and B.C. Rana, Pearson Education Inc, 2009.
3) Engineering Drawing with an Introduction to AutoCAD, Dhananjay Jolhe, Tata McGraw Hill, 2017.

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(A0171232) ENGINEERING MECHANICS & BUILDING PRACTICES LAB

(For Branch: CE)

Course Objectives: The students completing the course are expected to:

- Verify the Law of Parallelogram of Forces and Lami's theorem.
- Determine the coefficients of friction of Static and Rolling friction and Centre of gravityof different plane Lamina.
- Understand the layout of a building, concepts of Non-Destructive Testing and differentAlternative Materials.

Course Outcomes: On completion of the course, the student should be able to:

- Evaluate the coefficient of friction between two different surfaces and between the inclined plane and the roller.
- Verify Law of Parallelogram of forces and Law of Moment using force polygon and bell crank lever.
- Determine the Centre of gravity different configurations and study of safety practices in construction industry.
- Understand the Quality Testing and Assessment Procedures and principles of Non- Destructive Testing.

MAPPING OF COs & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	1	-	-	-	3	1	-	1
CO2	3	2	-	-	1	-	-	-	3	1	-	1
CO3	3	2	-	-	1	-	-	-	3	1	-	1
CO4	3	2	-	-	1	-	-	-	3	1	-	1

Students have to perform any 12 of the following Experiments:

1. To study various types of tools used in construction**.(Tape, Tapi, Tube leveling, Plumb bob, Sprit leveling, Concrete mixture machine)**
2. Forces in Pin Jointed Trusses
3. Experimental Proof of Lami's Theorem
4. Verification of Law of Parallelogram of Forces.
5. Determination of Center of Gravity of different shaped Plane Lamina.
6. Determination of coefficient of Static and Rolling Friction.
7. Verification of Law of Moment using Rotation Disc Apparatus and Bell Crank Lever
8. **Layout plan of a building**
9. Study of Alternative Materials like M-sand, Fly ash, Sea Sand etc.
10. **Conducting Green audit of a building or Industry or Organization**
11. Field-Visit to understand the Quality Testing and Assessment Procedures-report.
12. Safety Practices in Construction industry
13. Demonstration and principles of Non-Destructive Testing - using Rebound Hammer &UPV
14. Study of Plumbing, **Wiring, Carpentry, Welding etc.** in buildings.
15. **Water Absorption test for Brick**.

References:

1. S. Timoshenko, D. H. Young, J.V. Rao, S. Pati., Engineering Mechanics, 5th Edition, McGraw Hill Education.
2. Hibbeler R.C., Engineering Mechanics: Statics and Dynamics, 14th Edition, Pearson Education, Inc., New Delhi, 2022

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(A0372232) ENGINEERING MECHANICS LAB
(For Branch: ME)

COURSE OBJECTIVES: The students completing the course are expected to;
- Verify the Law of Parallelogram and Triangle of Forces.
- Determine the coefficients of friction of Static and Rolling friction and Centre of gravity of different plane Lamina.
- Analyse the system of Pulleys and Moment of Inertia of Compound Pendulum and Flywheel.

COURSE OUTCOMES:
- Evaluate the coefficient of friction between two different surfaces and between the inclined plane and the roller.
- Verify Law of Polygon of forces and Law of Moment using force polygon and bell crank lever.
- Determine the Centre of gravity and Moment of Inertia of different configurations.
- Verify the equilibrium conditions of a rigid body under the action of different force systems.

MAPPING WITH COs & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	2	2	-	-	-	-	-	2	-	1	-	-	-
CO2	3	3	3	3	2	-	-	-	-	-	2	-	2	-	-	-
CO3	3	3	2	3	2	-	-	-	-	-	3	-	1	-	-	-
CO4	3	2	2	3	2	-	-	-	-	-	2	-	2	-	-	-

Students have to perform any 10 of the following Experiments:

LIST OF EXPERIMENTS:

1) Verification of Law of Parallelogram of Forces.
2) Verification of Law of Triangle of Forces.
3) Verification of the Law of polygon for coplanar-concurrent forces acting on a particle in equilibrium and to find the value of unknown forces considering particle to be in equilibrium using universal force table.
4) Determination of coefficient of Static and Rolling Frictions
5) Determination of Centre of Gravity of different shaped Plane Lamina.
6) Verification of the conditions of equilibrium of a rigid body under the action of coplanar non concurrent, parallel force system with the help of a simply supported beam.
7) Study of the systems of pulleys and draw the free body diagram of the system.
8) Determine the acceleration due to gravity using a compound pendulum.
9) Determine the Moment of Inertia of the compound pendulum about an axis perpendicular to the plane of oscillation and passing through its centre of mass.
10) Determine the Moment of Inertia of a Flywheel.
11) Verification of Law of Moment using Rotation Disc Apparatus and Bell Crank Lever.
12) Experimental verification of LAMI'S Theorem

13) Determination of efficiency of a Simple Screw Jack.
14) Determination of efficiency of a Simple Wheel and Axial
15) Determination of efficiency of a Simple Wheel & Differential Axel
16) Determination of efficiency of a Worm & Worm Wheel

REFERENCES:

1) S. Timoshenko, D. H. Young, J.V. Rao, S. Pati., Engineering Mechanics, 5th Edition, McGraw Hill Education.
2) Hibbeler R.C., Engineering Mechanics: Statics and Dynamics, 14th Edition, Pearson Education, Inc., New Delhi, 2022.

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(A0201231) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

(**For Branches**: CE, EEE, ME, ECE, CSE, CSE (DS), CSE (CS) & CSE (AIML))

COURSE OBJECTIVES

- To expose to the field of electrical & electronics engineering, laws and principles of electrical/ electronic engineering and to acquire fundamental knowledge in the relevant field

COURSE OUTCOMES: After the completion of the course students will be able to

- Understand the basic electrical circuits, AC and DC machines.
- Analyze different electrical circuits, performance of AC and DC machines.
- Explain the theory, construction, and operation of electronic devices.
- Apply the concept of science and mathematics to explain the working of diodes, transistors, and their applications.
- Analyze small signal amplifier circuits to find the amplifier parameters.

MAPPING WITH COs & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	3	-	2	-	-	-	2	-	-	2	3	2	-
CO2	3	-	3	-	-	2	-	-	-	-	2	-	3	2	-
CO3	3	2	-	-	-	-	3	-	-	-	-	-	3	2	-
CO4	-	3	-	-	-	-	2	-	-	-	-	-	3	2	-
CO5	3	3	2	-	-	2	3	-	-	-	-	-	3	2	-

PART A: BASIC ELECTRICAL ENGINEERING

UNIT I DC & AC Circuits

DC Circuits: Electrical circuit elements (R, L and C), **Classification of electrical sources (Independent and dependent sources)** Ohm's Law and its limitations, KCL & KVL, series, parallel, series-parallel circuits, **Voltage Division and Current Division Rule** ,Super Position theorem, Simple numerical problems.

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

UNIT II Machines and Measuring Instruments

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

Important Laws:- Right Hand Thumb rule, Fleming's Right Hand rule, Fleming's Left Hand rule, Lenz's law

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

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, **Phospheric acid Fuel Cell**.

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

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.

TEXT BOOKS:

1) Basic Electrical Engineering by D C Kulshreshtha, Tata McGraw Hill, First Edition 2019.
2) Basic Electrical Engineering by S. N. Singh, PHI Publishers, 2011
3) Fundamentals of Electrical Engineering by Rajendra Prasad, PHI publishers, Third Edition, 2014.

REFERENCE BOOKS:

1) Principles of Power Systems by V.K. Mehtha, S.Chand Technical Publishers, 2020.
2) A textbook of Electrical Technology by B.L. Theraja, S. Chand and Company, reprint edition, 2014.
3) S. K. Bhatacharya, Basic Electrical and Electronics Engineering, Second Edition, Person Publications, 2018.

PART B: BASIC ELECTRONICS ENGINEERING

UNIT I SEMICONDUCTOR DEVICES

Introduction - Evolution of electronics - Vacuum tubes to nano electronics - **Types of semiconductors (Intrensic, Extrensic-P type, N-type)** Characteristics of PN Junction Diode - Zener Effect - Zener Diode and its Characteristics. Bipolar Junction Transistor - CB, CE, CC Configurations and Characteristics, **Definitions of α, β and γ, Necessity of biasing and biasing techniques** - Elementary - Treatment of Small Signal Amplifier.

UNIT II BASIC ELECTRONIC CIRCUITS AND INSTRUMENTTAION

Rectifiers and power supplies: Block diagram description of a dc power supply, **working of half wave rectifier, center tap full wave rectifier**, working of a full wave bridge rectifier, capacitor filter, **Inductor filter, L-Section and π-section filters** (no analysis), working of simple zener voltage regulator. **Amplifiers:** Block diagram of Public Address system, Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response, Concept of voltage divider biasing. Electronic Instrumentation: Block diagram of an electronic instrumentation system.

UNIT III DIGITAL ELECTRONICS

Number Systems:- Binary , decimal and their conversion.

Logic gates including Universal Gates, BCD codes, Excess-3 code, Gray code, Hamming code. Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Truth Tables and Functionality of Logic Gates – NOT, OR, AND, NOR, NAND, XOR and XNOR Integrated Circuits (ICs). Simple combinational circuits– Half and Full Adders. Introduction to sequential circuits, Flip flops, Registers and counters.

TEXT BOOKS:

1. R. L. Boylestad& Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
2. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009
3. David A.Bell, Electronic Divices and Circuits, 5th Edition, Oxford Higher Education

REFERENCE BOOKS:

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

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(A0271231) ELECTRICAL AND ELECTRONICS ENGINEERING WORKSHOP
(**For Branches**: CE, EEE, ME, ECE, CSE, CSE (DS), CSE (CS) & CSE (AIML))

COURSE OBJECTIVES:
- To impart knowledge on the fundamental laws & theorems of electrical circuits, functions of electrical machines and energy calculations.
- To impart knowledge on the principles of digital electronics and fundamentals of electron devices.

COURSE OUTCOMES: At the end of the course, the student will be able to
- Get an exposure to common electrical & electronic components and their ratings.
- Understand the usage of common electrical & electronic measuring instruments.
- Understand the basic characteristics of electrical machines and perform energy calculations.
- Plot and discuss the characteristics of various electron devices.
- Explain the operation of a digital circuit.

MAPPING WITH COs & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	-	2	-	2	-	2	-	-	2	3	2	-
CO2	3	-	3	-	-	2	3	-	-	-	2	-	3	2	-
CO3	3	2	-	-	-	-	3	-	-	-	-	-	3	2	-
CO4	-	3	-	-	-	-	2	-	-	-	-	-	3	2	-
CO5	3	3	2	-	-	2	3	-	-	-	-	-	3	2	-

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

PART A: ELECTRICAL ENGINEERING WORKSHOP

LIST OF EXPERIMENTS:

1) **Resistor color coding.**
2) **Verification of Resistors in series and parallel**
3) Verification of KCL and KVL
4) Verification of Superposition theorem
5) Measurement of Resistance using Wheat stone bridge
6) Magnetization Characteristics of DC shunt Generator
7) Measurement of Power and Power factor using Single-phase wattmeter
8) Measurement of Earth Resistance using Megger
9) Calculation of Electrical Energy for Domestic Premises

REFERENCES:

1) Basic Electrical Engineering by D C Kulshreshtha, Tata McGraw Hill, First Edition 2019.
2) Basic Electrical Engineering by S. N. Singh, PHI Publishers, 2011
3) Fundamentals of Electrical Engineering by Rajendra Prasad, PHI publishers, Third Edition, 2014.

Note: Minimum Six Experiments to be performed.

PART B: ELECTRONICS ENGINEERING WORKSHOP

LIST OF EXPERIMENTS:

1) **Study of C.R.O**.
2) Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.
3) Plot V – I characteristics of Zener Diode and its application as voltage Regulator.
4) Implementation of half wave and full wave rectifiers
5) Plot Input & Output characteristics of BJT in CE and CB configurations
6) Frequency response of CE amplifier.
7) Simulation of RC coupled amplifier with the design supplied
8) Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs.
9) Verification of Truth Tables of S-R, J-K& D- & **T-** flip flops using respective ICs.

TOOLS / EQUIPMENT REQUIRED:

DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices.

REFERENCES:

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

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

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(A0202232) ELECTRICAL CIRCUIT ANALYSIS -I

COURSE OBJECTIVES:

- To develop an understanding of the fundamental laws and elements of electrical circuits.
- To develop the ability to apply circuit analysis to DC and AC circuits.

COURSE OUTCOMES: At the end of the course, student will be able to

- Examine various electrical networks in presence of active and passive elements.
- Analyze magnetic circuit with various dot conventions.
- Calculate the parameters of R, L, C network with sinusoidal excitation.
- Calculate the parameters of R, L, network with variation of any one of the parameters i.e R, L, C and f.
- Solve Electrical networks by using principles of network theorems.

MAPPING WITH Cos & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	2	2	-	2	-	2	-	-	2	3	2	-
CO2	3	2	3	2	3	2	3	-	-	-	2	-	3	2	-
CO3	2	3	2	3	2	-	3	-	-	-	-	-	3	2	-
CO4	3	2	2	3	2	-	2	-	-	-	-	-	3	2	-
CO5	2	3	3	2	3	2	3	-	-	-	-	-	3	2	-

UNIT I Introduction to Electrical Circuits

Basic Concepts of passive elements of R, L, C and their V-I relations, **Types of electrical elements.** Sources (dependent and independent), Kirchoff's laws, Network reduction techniques (series, parallel, series - parallel, star-to-delta and delta-to-star transformation), **Open circuits, Short Circuits**, source transformation technique, nodal analysis and mesh analysis to DC networks with dependent and independent voltage and current sources, **Super Mesh analysis and Super nodal analysis,** node and mesh analysis.

UNIT II Magnetic Circuits

Basic definition of MMF, flux, **flux density, magntic field strength , relationship between magnetic field strength and magnetic flux density** and reluctance, analogy between electrical and magnetic circuits, Faraday's laws of electromagnetic induction – **dynamically induced emf, statically induced emf , self-induced emf , mutual induced emf , Lenz's Law** concept of self and mutual inductance, Dot convention – coefficient of coupling and composite magnetic circuit, analysis of series and parallel magnetic circuits.

UNIT III Single Phase Circuits

Characteristics of periodic functions, Average value, R.M.S. value, form factor, **Peak factor,** representation of a sine function, concept of phasor, phasor diagrams, node and mesh analysis.

Steady state analysis of R, L and C circuits to sinusoidal excitations-response of pure resistance, inductance, capacitance, series RL circuit, series RC circuit, series RLC circuit, **Power triangle and impedance triangle of Series RL, RC and RLC circuit.** Parallel RL circuit, parallel RC circuit.

UNIT IV Resonance and Locus Diagrams

Series Resonance: Characteristics of a series resonant circuit, Q-factor, selectivity and bandwidth, expression for half power frequencies.

Parallel resonance: Q-factor, selectivity and bandwidth. **Tank circuit**
Locus diagram: RL, RC, RLC with R, L and C variables.

UNIT V Network theorems (DC & AC Excitations)

Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem, Reciprocity theorem, Millman's theorem and compensation theorem, **Tellegen's theorem.**

TEXT BOOKS:

1. Engineering Circuit Analysis by William Hayt and Jack E. Kemmerley, Mc GrawHill Company, 6th edition.
2. Network Analysis: Van Valkenburg; Prentice-Hall of India Private Ltd

REFERENCE BOOKS:

1. Fundamentals of Electrical Circuits by Charles K. Alexander and Mathew N.O. Sadiku, Mc Graw Hill Education (India)
2. Linear Circuit Analysis by De Carlo, Lin, Oxford publications
3. Electric Circuits – (Schaum's outlines) by Mahmood Nahvi& Joseph Edminister, Adapted by Kuma Rao, 5th Edition – Mc Graw Hill.

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(A0272232) ELECTRICAL CIRCUITS LAB

(For Branch: EEE)

COURSE OBJECTIVES:

The objective of laboratory is to impart hands on experience in verification of circuit laws and theorems, measurement of circuit parameters, study of circuit characteristics. It also gives practical exposure to the usage of different circuits with different condition.

COURSE OUTCOMES: At the end of the course, student will be able to

1. Determine self, mutual inductances and coefficient of coupling values, parameters of choke coil.
2. Draw locus diagrams of RL, RC series circuits and examine series and parallel resonance.
3. Apply Thevenin's, Norton's, Thevenin's, superposition theorem, maximum power transfer, compensation, reciprocity and Millman's Theorems to compare practical results obtained with theoretical calculations.

MAPPING WITH Cos & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	2	-	-	-	-	2	2	2	3	3	2	-
CO2	3	2	2	2	-	-	-	-	3	2	2	2	3	2	-
CO3	3	2	3	2	-	-	-	-	2	3	2	3	3	2	-

LIST OF EXPERIMENTS:

(Any 10 of the following experiments are to be conducted)

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

REFERENCES:

1. Engineering Circuit Analysis by William Hayt and Jack E. Kemmerley, Mc GrawHill Company, 6th edition.
2. Network Analysis: Van Valkenburg; Prentice-Hall of India Private Ltd .

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(A0401232) NETWORK ANALYSIS
(**For Branch**: ECE)

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

COURSE OUTCOMES: At the end of this course students will demonstrate the ability to
- Understand basic electrical circuits with nodal and mesh analysis.
- Analyze the circuit using Network simplification theorems.
- Infer and evaluate Transient response and Steady state response of a network.
- Analyze electrical networks in the Laplace domain.
- Compute the parameters of a two-port network.

MAPPING OF COs & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	2	1	-	-
CO2	3	2	-	-	-	-	-	-	2	1	-	1
CO3	2	3	2	-	-	-	-	-	2	2	-	2
CO4	3	3	2	-	-	-	-	-	2	2	-	2
CO5	2	3	2	-	-	-	-	-	2	2	-	2

UNIT I

Types of circuit components, Types of Sources and Source Transformations, **Independent and dependent source transformations with examples**, Mesh analysis and Nodal analysis, problem solving with resistances only including dependent sources also. Principal of Duality with examples.

Network Theorems: Thevenin's, Norton's, Milliman's, Reciprocity, Compensation, Substitution, Superposition, Max Power Transfer, Tellegens - problem solving using dependent sources also.

UNIT II

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, Response as related to s-plane rotation of roots.

Laplace transform: introduction, Laplace transformation, basic theorems, problem solving using Laplace transform, partial fraction expansion, Heaviside's expansions, problem solving using Laplace transform, **Problems in S-domain**.

UNIT III

Steady State Analysis of A.C Circuits: Impedance concept, phase angle, series R-L, R-C, R-L- C circuits problem solving. Complex impedance and phasor notation for R-L, R-C, R-L-C problem solving using mesh and nodal analysis, Star-Delta

conversion, problem solving using Laplace transforms also, **Applications of AC Circuits: phase shifters**.

UNIT IV

Resonance: Introduction, Definition of Q, Series resonance, Bandwidth of series resonance, Parallel resonance, general case-resistance present in both branches, anti-resonance at all frequencies, **Effect of frequency on R, XL, XC, ZT in series resonant circuit.**

Coupled Circuits: Coupled Circuits: Self-inductance, Mutual inductance, Coefficient of coupling, analysis of coupled circuits, Natural current, Dot rule of coupled circuits, conductively coupled equivalent circuits- problem solving.

UNIT V

Two-port Networks: Relationship of two port networks, Z-parameters, Y-parameters, Transmission line parameters, h- parameters, Relationships Between parameter Sets, Parallel & series connection of two port networks, cascading of two port networks, problem solving using dependent sources also, **Conditions for reciprocity and symmetry in two-port networks**.

Image and iterative impedances. Image and iterative transfer constants. Insertion loss. Attenuators and pads. Lattice network and its parameters. Impedance matching networks.

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.

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(A0471232) NETWORK ANALYSIS AND SIMULATION LAB

(For Branch: ECE)

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

- Verify Kirchoff's laws and network theorems.
- Measure time constants of RL & RC circuits.
- Analyze behavior of RLC circuit for different cases.
- Design resonant circuit for given specifications.
- Characterize and model the network in terms of all network parameters.

MAPPING OF COs & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2							2	1			3	1	
CO2	2	3							3	2		2	3	1	
CO3	3	2							2	1		1	3	1	
CO4	3	3	2						3	1		1	3	1	
CO5	2	3							2	2		2	2	2	1

The following experiments need to be performed using both Hardware and simulation Software.

The experiments need to be simulated using software and the same need to be verified usingthe hardware.

1. Study of components of a circuit and Verification of KCL and KVL.
2. Verification of mesh and nodal analysis for AC circuits
3. Verification of Superposition, Thevenin's & Norton theorems for AC circuits
4. Verification of maximum power transfer theorem for AC circuits
5. Verification of Tellegen's theorem for two networks of the same topology.
6. Study of DC transients in RL, RC and RLC circuits
7. To study frequency response of various 1st order RL & RC networks
8. To study the transient and steady state response of a 2nd order circuit by varying itsvarious parameters and studying their effects on responses
9. Find the Q Factor and Bandwidth of a Series and Parallel Resonance circuit.
10. Determination of open circuit (Z) and short circuit (Y) parameters
11. Determination of hybrid (H) and transmission (ABCD) parameters
12. To measure two port parameters of a twin-T network and study its frequency response.

HARDWARE REQUIREMENTS:

- Regulated Power supplies, Analog/Digital Function Generators, Digital Multimeters, Decade Resistance Boxes/Rheostats, Decade Capacitance Boxes, Ammeters (Analog or Digital), Voltmeters (Analog or Digital), Active & Passive Electronic Components

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.

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I B.TECH. SYLLABUS

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(A0501231) INTRODUCTION TO PROGRAMMING

(**For Branches**: CE, EEE, ME, ECE, CSE, CSE (DS), CSE (CS) & CSE (AIML))

COURSE OBJECTIVES:

- To introduce students to the fundamentals of computer programming.
- To provide hands-on experience with coding and debugging.
- To foster logical thinking and problem-solving skills using programming.
- To familiarize students with programming concepts such as data types, controlstructures, functions, and arrays.
- To encourage collaborative learning and teamwork in coding projects.

COURSE OUTCOMES: A student after completion of the course will be able to

- Understand basics of computers, the concept of algorithm and algorithmic thinking.
- Develop the ability to analyze a problem, develop an algorithm to solve it.
- Proficiently use the C programming language to implement various algorithms.
- Understand more advanced features of C language.
- Develop problem-solving skills and the ability to debug and optimize the code.

MAPPING OF COs & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	-	-	1	-	-	-	-	-	-	-
CO2	3	3	3	3	2	1	1	-	2	1	1	-
CO3	3	2	-	1	-	-	-	-	-	-	-	-
CO4	2	-	-	2	1	-	-	-	-	-	-	-
CO5	3	3	3	2	2	-	-	1	2	1	1	-

UNIT I INTRODUCTION TO PROGRAMMING AND PROBLEM SOLVING

History of Computers, Basic organization of a computer: ALU, input-output units, memory, program counter, Introduction to Programming Languages, Basics of a Computer Program- Algorithms, flowcharts (Using Dia Tool), pseudo code. Primitive Data Types, Variables, and Constants, Basic Input and Output, Operations, Type Conversion, and Casting, **Operators**.

Problem solving techniques: Algorithmic approach, characteristics of algorithm, Problem solving strategies: Top-down approach, Bottom-up approach, Time and space complexities ofalgorithms.

UNIT II CONTROL STRUCTURES

Simple sequential programs Conditional Statements (if, if-else, **nested if, else-if ladder**, switch).

Loops (for, while, do-while) Break and Continue.

UNIT III ARRAYS AND STRINGS

Arrays indexing, memory model, programs with array of integers, two dimensional arrays.

Introduction to Strings, **String I/O functions, String handling functions**.

UNIT IV FUNCTIONS

Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, modifying parameters inside functions using pointers, arrays as parameters, **Recursion**.

Scope and Lifetime of Variables, **storage classes**.

UNIT V USER DEFINED DATA TYPES, FILE HANDLING, POINTERS

User-defined data types-Structures and Unions, pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers. **Self-referential structures, dynamic memory allocation functions.** Basics of File Handling, **command line arguments, preprocessor directives**.

Note: The syllabus is designed with C Language as the fundamental language of implementation**.**

TEXTBOOKS:

1. "The C Programming Language" by Brian W. Kernighan and Dennis M. Ritchie
2. Schaum's Outline of Programming with C by Byron S Gottfried (1996), McGraw-HillEducation (ISBN:978-0070240353)

REFERENCE BOOKS:

1. Balagurusamy, E. (2008). Computing fundamentals and C Programming. McGraw-HillEducation.
2. Programming in C Rema Theraja-2nd edition 2016
3. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAG.

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(A0571231) COMPUTER PROGRAMMING LAB

(For Branches: CE, EEE, ME, ECE, CSE, CSE (DS), CSE (CS) & CSE (AIML))

COURSE OBJECTIVES:

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

COURSE OUTCOMES: Student should be able to:

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

MAPPING OF COs & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	-	-	-	-	-	-	-	-	-
CO2	3	3	1	1	-	-	-	1	-	-	-	1
CO3	2	3	3	2	1	-	-	-	1	-	-	-
CO4	3	3	3	2	1	-	-	-	1	1	2	-

UNIT I

WEEK 1

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

Suggested Experiments/Activities:

Tutorial 1: Problem-solving using Computers.

Lab1: Familiarization with programming environment

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

WEEK 2

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

Suggested Experiments /Activities:

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

Lab 2: Converting algorithms/flow charts into C Source code.
Developing the algorithms/flowcharts for the following sample programs

i) Sum and average of 3 numbers

ii) Conversion of Fahrenheit to Celsius and vice versa
iii) Simple interest calculation

WEEK 3
Objective: Learn how to define variables with the desired data-type, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.

Suggested Experiments/Activities:

Tutorial 3: Variable types and type conversions:
Lab 3: Simple computational problems using arithmetic expressions.
i) Finding the square root of a given number
ii) Finding compound interest
iii) Area of a triangle using heron's formulae
iv) Distance travelled by an object

UNIT II

WEEK 4
Objective: Explore the full scope of expressions, type-compatibility of variables & constants and operators used in the expression and how operator precedence works.

Suggested Experiments/Activities:
Tutorial4: Operators and the precedence and as associativity:
Lab4: Simple computational problems using the operator' precedence and associativity
i) Evaluate the following expressions.
   a. A+B*C+(D*E) + F*G
   b. A/B*C-B+A*D/3
   c. A+++B---A
   d. J= (i++) + (++i)
ii) Find the maximum of three numbers using conditional operator
iii) Take marks of 5 subjects in integers, and find the total, average in float

WEEK 5
Objective: Explore the full scope of different variants of "if construct" namely if-else, null- else, if-else if*-else, switch and nested-if including in what scenario each one of them can be used and how to use them. Explore all relational and logical operators while writing conditionals for "if construct".

Suggested Experiments/Activities:

Tutorial 5: Branching and logical expressions:
Lab 5: Problems involving if-then-else structures.
i) Write a C program to find the max and min of four numbers using if-else.
ii) Write a C program to generate electricity bill.
iii) Find the roots of the quadratic equation.
iv) Write a C program to simulate a calculator using switch case.
v) Write a C program to find the given year is a leap year or not.

WEEK 6
Objective: Explore the full scope of iterative constructs namely while loop, do-while loop and for loop in addition to structured jump constructs like break and continue including wheneach of these statements is more appropriate to use.

Suggested Experiments/Activities:

Tutorial 6: Loops, while and for loops
Lab 6: Iterative problems e.g., the sum of series

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

UNIT III

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

Suggested Experiments/Activities:

Tutorial 7: 1 D Arrays: searching.
Lab 7: 1D Array manipulation, linear search

i) Find the min and max of a 1-D integer array.
ii) Perform linear search on1D array.
iii) The reverse of a 1D integer array
iv) Find 2's complement of the given binary number.
v) Eliminate duplicate elements in an array.

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

Suggested Experiments/Activities:

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

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

UNIT IV

WEEK 9: Objective: Explore the Functions, sub-routines, scope and extent of variables, doing some experiments by parameter passing using call by value. Basic methods of numerical integration

Suggested Experiments/Activities:

Tutorial 9: Functions, call by value, scope and extent,
Lab 9: Simple functions using call by value, solving differential equations using Eulers theorem

i) Write a C function to calculate NCR value
ii) Write a C function to find the length of a string

iii) Write a C function to transpose of a matrix
iv) Write a C function to demonstrate numerical integration of differential equations using Euler'smethod

WEEK 10:
Objective: Explore how recursive solutions can be programmed by writing recursive functions that can be invoked from the main by programming at-least five distinct problems that have naturally recursive solutions.

Suggested Experiments/Activities:

Tutorial 10: Recursion, the structure of recursive calls
Lab 10: Recursive functions
i) Write a recursive function to generate Fibonacci series
ii) Write a recursive function to find the lcm of two numbers
iii) Write a recursive function to find the factorial of a number
iv) Write a C Program to implement Ackermann function using recursion
v) Write a recursive function to find the sum of series.

WEEK 11:
Objective: Explore the basic difference between normal and pointer variables, Arithmetic operations using pointers and passing variables to functions using pointers

Suggested Experiments/Activities:

Tutorial 11: Call by reference, dangling pointers
Lab 11: Simple functions using Call by reference, Dangling pointers
i) Write a C program to swap two numbers using call by reference
ii) Demonstrate Dangling pointer problem using a C program
iii) Write a C program to copy one string into another using pointer
iv) Write a C program to find no of lowercase, uppercase, digits and other characters using pointers.

UNIT V

WEEK12:
Objective: Explore pointers to manage a dynamic array of integers, including memory allocation & value initialization, resizing changing and reordering the contents of an array and memory de-allocation using malloc (), calloc (), realloc () and free () functions. Gainexperience processing command-line arguments received by C

Suggested Experiments/Activities:

Tutorial 12: Pointers, structures and dynamic memory allocation
Lab12: Pointers and structures, memory dereference.
i) Write a C program to find the sum of a 1D array using malloc()
ii) Write a C program to find the total, average of n students using structures
iii) Enter n students data using calloc() and display failed students list
iv) Read student name and marks from the command line and display the student details alongwith the total.
v) Write a C program to implement realloc()

WEEK 13:
Objective: Experiment with C Structures, Unions, bit fields and self-referential structures (Singlylinked lists) and nested structures

Suggested Experiments/Activities:

Tutorial 13: Bitfields, Self-Referential Structures, Linked lists

Lab13: Bitfields, linked lists

Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the samewithout using bit- fields

i) Create and display a singly linked list using self-referential structure.
ii) Demonstrate the differences between structures and unions using a C program.
iii) Write a C program to shift/rotate using bitfields.
iv) Write a C program to copy one structure variable to another structure of the same type.

WEEK14:

Objective: To understand data files and file handling with various file I/O functions. Explore thedifferences between text and binary files.

Suggested Experiments/Activities:

Tutorial 14: File handling

Lab 14: File operations

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

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(A0502232) DATA STRUCTURES

(**For Branches**: CSE, CSE (DS), CSE (CS) & CSE (AIML))

COURSE OBJECTIVES:

- Understand the significance of linear data structures in problem-solving and basic time/space complexity analysis.
- Create and manage linked lists to efficiently organize and manipulate data, emphasizing memory efficiency.
- Implement and apply stacks to manage program flow and solve problems involving expression evaluation and backtracking.
- Utilize queues to model real-world scenarios, such as process scheduling and breadth- first search algorithms and understand the versatility of deques and prioritize data management using priority queues.
- Explore basic concepts of hashing and apply it to solve problems requiring fast data retrieval and management.

COURSE OUTCOMES: At the end of the course, Student will be able to

- Explain the role of linear data structures in organizing and accessing data efficiently in algorithms.
- Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation.
- Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems.
- Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between deques and priority queues, and apply them appropriately to solve data management challenges.
- Recognize scenarios where hashing is advantageous, and design hash-based solutions for specific problems.

MAPPING OF COs & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	-	-	-	-	-	-	-	-	1
CO2	3	3	3	2	1	-	-	-	2	1	2	1
CO3	3	3	3	2	1	-	-	-	-	1	-	-
CO4	3	2	2	2	-	-	-	-	-	1	-	-
CO5	2	3	2	2	1	-	-	1	2	-	2	1

UNIT I

Introduction to Linear Data Structures: Definition and importance of linear data structures, Abstract data types (ADTs) and their implementation.

Overview of time and space complexity analysis for linear data structures.

UNIT II

Linked Lists: Singly linked lists: representation and operations, **implementation of Singly linked list.**

Doubly linked lists and circular linked lists, Comparing arrays and linked lists, Applications of linked lists.

UNIT III

Stacks: Introduction to stacks: properties and operations, Implementing stacks using arrays and linked lists.

Applications of stacks in expression evaluation, **converting infix to postfix expression, backtracking, reversing list etc.**

UNIT IV

Queues: Introduction to queues: properties and operations, Implementing queues using arrays and linked lists, Applications of queues in breadth-first search, scheduling, etc., **circular queue**.

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

UNIT V

Hashing: Brief introduction to hashing and hash functions, Collision resolution techniques: **Linear probing, quadratic probing**, chaining and open addressing, Hash tables: basic implementation and operations.

Applications of hashing in unique identifier generation, caching, etc.

TEXT BOOKS:

1) Data Structures and algorithm analysis in C, Mark Allen Weiss.
2) Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Dinesh Mehta.

REFERENCE BOOKS:

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

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(A0572232) DATA STRUCTURES LAB

(**For Branches**: CSE, CSE (DS), CSE (CS) & CSE (AIML))

COURSE OBJECTIVES:

- Understand the significance of linear data structures in problem-solving and basic time/space complexity analysis.
- Create and manage linked lists to efficiently organize and manipulate data, emphasizing memory efficiency.
- Implement and apply stacks to manage program flow and solve problems involving expression evaluation and backtracking.
- Utilize queues to model real-world scenarios, such as process scheduling and breadth- first search algorithms and understand the versatility of deques and prioritize data management using priority queues.
- Explore basic concepts of hashing and apply it to solve problems requiring fast data retrieval and management.

COURSE OUTCOMES: At the end of the course, Student will be able to:

- Implement, analyse and evaluate the searching and sorting algorithms
- Code, debug and demonstrate the working nature of different types of data structures and their applications
- Apply data structures like stacks, queues in linear data structure.
- Choose the appropriate data structure for solving real world problems

MAPPING OF COs & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	3	-	-	-	-	1	-	-	-	2
CO2	-	3	3	1	-	-	-	-	-	-	-	2
CO3	2	2	1	-	-	-	-	-	-	-	-	-
CO4	2	1	3	1	3	-	-	-	-	-	-	2

LIST OF EXPERIMENTS:

Exercise 1: Array Manipulation

i) Implement basic operations on arrays: insertion, deletion, searching.
ii) Create a program to find the maximum and minimum elements in an array.
iii) Write a program to reverse an array.

Exercise 2: Linked List Implementation

i) Implement a singly linked list and perform insertion and deletion operations.
ii) Develop a program to reverse a linked list iteratively and recursively.
iii) Solve problems involving linked list traversal and manipulation.

Exercise 3: Linked List Applications

i) Create a program to detect and remove duplicates from a linked list.
ii) Implement a linked list to represent polynomials and perform addition.
iii) Implement a double-ended queue (deque) with essential operations.

Exercise 4: Double Linked List Implementation

i) Implement a doubly linked list and perform various operations to understand its properties and applications.
ii) Implement a circular linked list and perform insertion, deletion, and traversal.

Exercise 5: Stack Operations

i) Implement a stack using arrays and linked lists.

ii) Write a program to evaluate a postfix expression using a stack.
iii) Implement a program to check for balanced parentheses using a stack.

Exercise 6: Queue Operations

i) Implement a queue using arrays and linked lists.
ii) Develop a program to simulate a simple printer queue system.
iii) Solve problems involving circular queues.

Exercise 7: Stack and Queue Applications

i) Use a stack to evaluate an infix expression and convert it to postfix.
ii) Create a program to determine whether a given string is a palindrome or not.
iii) Implement a stack or queue to perform comparison and check for symmetry.

Exercise 8: Hashing

i) Implement a hash table with collision resolution techniques.
ii) Write a program to implement a simple cache using hashing.

TEXT BOOKS:

1) Data Structures and algorithm analysis in C, Mark Allen Weiss.
2) Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Dinesh Mehta.

REFERENCE BOOKS:

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

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(A3271231) IT WORKSHOP

(**For Branches**: CE, EEE, ME, ECE, CSE, CSE (DS), CSE (CS) & CSE (AIML))

COURSE OBJECTIVES:

- To introduce the internal parts of a computer, peripherals, I/O ports, connecting cables
- To teach basic command line interface commands on Linux.
- To teach the usage of Internet for productivity and self-paced life-long learning
- To introduce Compression, Multimedia and Antivirus tools and Office Tools such as Word processors, Spread sheets and Presentation tools.

COURSE OUTCOMES:

- Perform Hardware troubleshooting.
- Understand Hardware components and inter dependencies.
- Safeguard computer systems from viruses/worms.
- Document/ Presentation preparation.
- Perform calculations using spreadsheets.

PC Hardware

Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Task 3: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Internet & World Wide Web

Task1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Task 3: Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

Task 4: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

LaTeX and WORD

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

Task 2: Using La TeX and Word to create a project certificate. Features to be covered: - Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing. Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

Task 3: Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering. Changing Text Direction, Cell alignment, Footnote, Hyperlink. Symbols, Spell Check, Track Changes.

Task 4: Creating a Newsletter: Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

Excel

Excel Orientation: The mentor needs to tell the importance of MS office or equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel-Accessing, overview of toolbars, saving excel files, Using help and resources.

Task 1: Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text

Task 2: Calculating GPA - Features to be covered:- Cell Referencing, Formulae in excel - average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function,

LOOKUP/VLOOKUP

Task 3: Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

Power point

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.

AI Tools-ChatGPT

Task 1: Prompt Engineering: Experiment with different types of prompts to see how the model responds. Try asking questions, starting conversations, or even providing incomplete sentences to see how the model completes them.

Ex: Prompt: "You are a knowledgeable Al. 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."

Task 3: Code Generation: Test the model's ability to generate code by giving it partial code snippets and asking it to complete them. You can also ask the model to explain programming concepts or help you debug code.

Ex:Prompt: "Complete the following Python code to swap the values of two variables: \npython\na5\nb= 10\ntemp = ana bnb = temp\n"

Task 4: Language Translation: Experiment with translation tasks by providing a sentence in one language and asking the model to translate it into another language. Compare the output to see how accurate and fluent the translations are.

Ex:Prompt: "Translate the following English sentence to French: 'Hello, how are you doing today?""

Task 5: Summarization: Provide a long piece of text, such as an article or a blog post, and ask the model to summarize it. Compare the model's summary with the original text to assess its ability to condense information effectively.

Ex: Prompt: "Summarize the article titled 'Ramayanam' in 3-4 sentences."

Task 6: Futuristic Predictions: Have fun by asking the model to predict future technological advancements, societal changes, or even hypothetical scenarios. Compare its responses with your own ideas.

• Ex:Prompt: "Predict how artificial intelligence will transform everyday life in the next 20 years."

Task 7: Technical Explanations: Challenge the model with technical questions from different domains. Ask it to explain scientific concepts, mathematical theorems, or complex algorithms in simple terms.

Ex: Prompt: "Explain the concept of neural networks in machine learning, including their layers and the process of backpropagation."

REFERENCE BOOKS:

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

RGM COLLEGE OF ENGINEERING AND TECHNOLOGY

AUTONOMOUS

I B.TECH. SYLLABUS

ACTION FOR IMPROPER CONDUCT IN EXAMINATIONS

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

		candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or After the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the Examiners or writes to the Examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the Chief Superintendent/Assistant–Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.

	misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not The candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.

10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of Internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the Principal or College Academic committee for further action to award suitable punishment.	