# PROGRAM STRUCTURE
# AND
# SYLLABUS

## ELECTRICAL AND ELECTRONICS ENGINEERING

**For**

## B.Tech FOUR YEARS DEGREE PROGRAM

***(DR24 Applicable for batches admitted from 2024-2025)***


**D.N.R. COLLEGE OF ENGINEERING & TECHNOLOGY**

**(AUTONOMOUS)**

*(Approved by AICTE, New Delhi & Affiliated to JNTUK, Kakinada)*

(Accredited with A$^{++}$Grade by NAAC & Accredited by NBA (B.Tech-CSE, ECE & EEE))

BALUSUMUDI, BHIMAVARAM, W.G.Dist., A.P., PIN-534202

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# Vision & Mission of the Institute

## Vision of the Institution:

To evolve as a Quality Institution in Teaching, Innovative Research, Entrepreneurship and Consultation in Engineering & Technology, empower rural youth globally competent and self-disciplined technocrats.

## MissionoftheInstitution:

**IM1:** Inculcate technical knowledge, soft skills through student centric teaching & learning.

**IM2:** Strengthen industry institute interaction; provide solutions to the ever-changing requirements.

**IM3:** Implant entrepreneurial attitude and ethical values.

**IM4:** Create work culture towards learning, Research &Development.

**IM5:** Develop a unique practice that in stills responsibility and accountability among the stakeholders

# Vision & Mission of the Department

## Vision of the Department:

To be a recognized center for Electrical & Electronics Engineering, building ethical technocrats towards societal needs.

## Mission of the Department:

$DM_1$: Impart high quality technical education in a dynamic learning environment

$DM_2$: Develop Industry collaborations towards holistic development and industry ready.

$DM_3$: Motivate to practice latest technologies towards innovation, research& development.

## Program Educational Objectives (PEOs)

*Graduates of the Program will be*

| PROGRAMEDUCATIONALOBJECTIVES(PEOs) | |
|---|---|
| **PEO-1** | Be Successful professionals in multidisciplinary team to solve real life Problems with ethical values. |
| **PEO-2** | Demonstrate knowledge, Skills and Competence to identify, comprehend and solve the industrial and societal problems. |
| **PEO-3** | Adapt forever changing needs by collaborating with industries and Academia for Professional development, Research and higher studies. |

## Program Outcomes (POs)

*After successful completion of the Program, the graduates will be able to*

| PROGRAMOUTCOMES(POS) | | |
|---|---|---|
| 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 modeling 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 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. |

## Program Specific Outcomes (PSOs)

*After successful completion of the Program, the graduates will be able to*

| **PROGRAM SPECIFIC OUTCOMES (PSOS)** | |
|---|---|
| **PSO-1** | Identify and provide solutions in Drives and Power Systems. |
| **PSO-2** | Demonstrate renewable energy technologies for the growing energy demand. |

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# B. Tech (Regular-Full time)

(Effective for the students admitted into I year from
the Academic Year **2024-25** onwards)

**&**

# B.Tech.(Lateral Entry Scheme)

(Effective for the students admitted into II year through Lateral Entry
Scheme from the Academic Year **2025 - 26** onwards)

**D.N.R. COLLEGE OF ENGINEERING & TECHNOLOGY(Autonomous)**
**BALUSUMUDI, BHIMAVARAM, W.G. Dist., A.P., PIN-534 202**

# Academic Regulations (DR24) for B. Tech (Regular-Full time)

(Effective for the students admitted into I year from the Academic Year **2024-25** onwards)

DNR College of Engineering & Technology 2024 Regulations (DR24 Regulations) applicable to all programmes given hereunder. These regulations govern the B. Tech. programmes offered by all the Departments with effect from the students admitted into the programmes from academic year 2024-25.

## 1. Courses of Study

The following programmes of study are offered at present as specializations for the B. Tech. programmes in DNR College of Engineering & Technology, Bhimavaram.

| S.No. | Programme | Code | Short Name |
|---|---|---|---|
| 1 | Civil Engineering | 01 | CE |
| 2 | Electrical & Electronics Engineering | 02 | EEE |
| 3 | Mechanical Engineering | 03 | ME |
| 4 | Electronics & Communication Engineering | 04 | ECE |
| 5 | Computer Science & Engineering | 05 | CSE |
| 6 | Information Technology | 12 | IT |
| 7 | Artificial Intelligence and Data Science | 54 | B.Tech-AIDS |
| 8 | Artificial Intelligence and Machine Learning | 42 | CSE(AIML) |

## 2. Award of the Degree

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

i. Pursues a Programme of study for not less than four academic years and not more than eight academic years. However, for the students availing Gap year facility this period shall be extended by two years at the most and these two years would in addition to the maximum period permitted for graduation (Eight years).
ii. Registers for 160 credits and secures all 160 credits.

**b. Award of B.Tech. degree with Honors:** A student will be declared eligible for the award of the B.Tech with Honors if he/she fulfills the following:

i. Student secures additional 15 credits fulfilling all the requisites of a B.Tech. program i.e., 160 credits.
ii. Registering for Honors is optional.
iii. Honors is to be completed simultaneously with B.Tech. programme.

3. Students, who fail to fulfill all the academic requirements for the award of the degree within eight academic years from the year of their admission, shall forfeit their seat in B.Tech. course and their admission stands cancelled. This clause shall be read along with clause 2 a) i).

4. **Admissions**

Admission to the B. Tech Program shall be made subject to the eligibility, qualifications and specialization prescribed by the A.P. State Government/JNTUK 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.

5. **Program related terms**

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

**Credit Definition:**

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

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

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

6. **Semester/Credits:**

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

**b.** 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.

**c.** Regular courses may also be offered during the summer on a fast-track mode to enable students to do additional courses or complete backlogs in a course work.

**d.** The college can decide on the courses to be offered in the summer term depending on the availability of the faculty and the number of students.

## 7. Structure of the Undergraduate Programme

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

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

## 8. Course Classification:

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

| S.No. | Broad Course Classification | Course Category | Description |
|---|---|---|---|
| 1. | Foundation Core Courses | Foundation courses | Includes Mathematics, Physics and Chemistry; fundamental engineering courses; humanities, social sciences and management courses |
| 2. | Core Courses | Professional Core Courses (PC) | Includes courses related to the parent discipline/department/branch of Engineering |
| 3. | Elective Courses | Professional Elective Courses (PE) | Includes elective courses related to the parent discipline/department/ branch of Engineering |
| | | Open Elective Courses (OE) | Elective courses 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 courses of developing desired attitude among the learners |

## 9. Programme Pattern

i. Total duration of the of B. Tech (Regular) Programme is four academic years.
ii. Each academic year of study is divided into two semesters.
iii. Minimum number of instruction days in each semester is 90 days.
iv. There shall be mandatory student induction program for freshers, 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 /NCC /Scouts & Guides / Community service activities are made mandatory as credit courses for all the undergraduate students.
vi. Courses like Environmental Sciences, Indian Constitution, Technical Paper Writing & IPR are offered as non-credit mandatory courses for all the undergraduate students.
vii. Design Thinking for Innovation & Tinkering Labs are made mandatory as credit courses for all the undergraduate students.
viii. Increased flexibility for students through an increase in the elective component of the curriculum, with 05 Professional Elective courses and 04 Open Elective courses.
ix. Professional Elective Courses, include the elective courses relevant to the chosen specialization/branch. Proper choice of professional elective courses can lead to students specializing in emerging areas within the chosen field of study.
x. A total of 04 Open Electives are offered in the curriculum. A student can complete the requirement for B.Tech. Degree with a Minor within the 160 credits by opting for the courses offered through various verticals/tracks under Open Electives.
xi. While choosing the electives, students shall ensure that they do not opt for the courses with syllabus contents similar to courses already pursued.
xii. A pool of interdisciplinary/job-oriented/domain skill courses which are relevant to the industry are integrated into the curriculum of all disciplines. There shall be 05 skill-oriented courses offered during III to VII semesters. Among the five skill courses, four courses shall focus on the basic and advanced skills related to the domain/interdisciplinary courses and the other shall be a soft skills course.
xiii. Students shall undergo mandatory summer internships, for a minimum of eight weeks duration at the end of second and third year of the programme. The internship at the end of second year shall be community oriented and industry internship at the end of third year.
xiv. There shall also be mandatory full internship in the final semester of the programme along with the project work.
xv. Undergraduate degree with Honors is introduced by the College for the students having good academic record.
xvi. The College shall take measures to implement Virtual Labs (https://www.vlab.co.in) which provide remote access to labs in various disciplines of Engineering and will help student in learning basic and advanced concept through remote experimentation. Student shall be made to work on virtual lab experiments during the regular labs.
xvii. Each Department shall assign a faculty advisor/mentor after admission to a group of students from same department to provide guidance in courses registration/career growth/placements/opportunities for higher studies/GATE/other competitive exams etc.
xviii. Preferably 25% of course work for the theory courses in every semester shall be conducted in the blended mode of learning.

## 10. Evaluation Process

The performance of a student in each semester shall be evaluated course 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 internally for 30 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 internal evaluation and semester 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 and practical courses, the distribution shall be 30 marks for continuous Internal Evaluation and 70 marks for the Semester End-Examination.
ii. 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 semester end examination question paper shall be set with two parts each for 35 marks.
iii. If any course is having both theory and practical components, they will be evaluated separately as theory course and practical course. However, they will be given same course code with an extension of 'T' for theory subject and 'P' for practical subject.

**a) Continuous Internal Evaluation**

i. For theory courses, during the semester, there shall be two internal examinations. Each internal examination shall be evaluated for 30 marks of which 10 marks for objective paper (20 minutes duration), 15 marks for subjective paper (90 minutes duration) and 5 marks for assignment.
ii. Objective paper shall contain for 05 short answer questions with 2 marks each or maximum of 20 bits for 10 marks. Subjective paper shall contain 3 either or type questions (totally six questions from 1 to 6) of which student has to answer one from each either-or type of questions. Each question carries 5 marks.
iii. 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 weightage of 5 marks. Any fraction shall be rounded off to the next higher mark.
- The objective paper shall be conducted on the day of subjective paper test.
- Assignments shall be in the form of problems, mini projects, design problems, slip tests, quizzes etc., depending on the course content. It should be continuous assessment throughout the semester and the average marks shall be considered.

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

v. The first internal examination shall be conducted for I, II and half of the III unit syllabus with one either or type question from each unit. The second internal examination shall be conducted for remaining half of the syllabus from III unit, IV and V units with one either or type question from each unit

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

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

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

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

**b) End Examination Evaluation:**

End examination of theory courses shall have the following pattern:

i. Part-A shall contain 10 compulsory short answer questions for a total of 20marks such that each question carries 2 marks.
ii. There shall be 2 short answer questions from each unit.
iii. In each of the questions in Part-B, there shall be either/or type questions of 10 marks each. Student shall answer any one of them.
iv. The questions from 2 to 11 in part-B shall be set by covering one unit of the syllabus for each question either/or type.

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

i. Question paper shall be in two parts viz., Part A and Part B with equal weightage of 35 marks each.
ii. Part-A shall contain 10 compulsory short answer questions for a total of 10 marks such that each question carries 1mark.
iii. Part-B contains Six either/or type questions of 10 marks each. Students shall answer any one of them.
iv. All the questions in Part-B shall be set by covering one unit of the syllabus for each question.

**Practical Courses:**

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

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

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

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

   In a practical course 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. Internal examination shall be evaluated for 30 marks in each part and final internal marks shall be arrived by considering the average of marks obtained in two parts.

d) For the course having design and/or drawing, such as Engineering Drawing/Graphics, the distribution of marks shall be 30 for continuous evaluation and 70 for semester end examination.

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

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

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

e) There shall be no external examination for mandatory courses with zero credits. However, attendance shall be considered while calculating aggregate attendance and student shall be declared to have passed the mandatory course only when he/she secures 40% or more in the internal examinations. In case, the student fails, a re-examination shall be conducted for failed candidates for 30 marks satisfying the conditions mentioned in item 1 & 2 of the regulations.

f) The laboratory records and internal exam test papers shall be preserved for a minimum of 3 years in the respective Departments as per the College/University norms and shall be produced to the Committees of the College/University as and when the same are asked for.

**11. Skill oriented Courses**

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

ii) Out of the five skill courses two shall be skill-oriented courses from the same domain of 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 internal 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 Controller of Examinations/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 Department/ College to evaluate the grades/marks given for a course by external agencies and convert to the equivalent marks/grades.

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

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

**12. Massive Open Online Courses (MOOCs):**

A Student has to pursue and complete one course compulsorily through MOOCs approved by the Institution. A student can pursue courses other than core through MOOCs and it is mandatory to complete one course successfully through MOOCs for awarding the degree. A student is not permitted to register and pursue core courses through MOOCs.

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

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

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

## 13. Credit Transfer Policy

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

i) The College shall offer credit mobility for MOOCs and give the equivalent credit weightage to the students for the credits earned through online learning courses.
ii) Student registration for the MOOCs shall be only through the respective department of the institution, it is mandatory for the student to share necessary information with the department.
iii) Credit transfer policy will be applicable to the Professional & Open Elective courses only.
iv) The concerned department shall identify the courses permitted for credit transfer.
v) The Institution/Department shall notify at the beginning of semester the list of the online learning courses eligible for credit transfer.
vi) The institution/Department 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 semester end examinations. In case of delay in results, the university 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 concerned Departments 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 Department/Institution from time to time.

## 14. 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 of their choice
ii) provide option to gain the credits through MOOCs from approved digital platforms.
iii) facilitate award of certificate/diploma/degree in line with the accumulated credits in ABC
iv) execute Multiple Entry and Exit system with credit count, credit transfer and credit acceptance from students' account.

## 15. Mandatory Internships

**Summer Internships :** Two summer internships either onsite or virtual each with a minimum of 08 weeks duration, done at the end of second and third years, respectively are mandatory. It shall be completed in collaboration with local industries, Govt. Organizations, construction agencies, Power projects, software MNCs or any industries in the areas of concerned specialization of the Undergraduate program. One of the two summer internships at the end of second year (Community Service Project) shall be society oriented and shall be completed in collaboration with government organizations/NGOs & others. The other internship at the end of third year is Industry Internship and shall be completed in collaboration with Industries. The student shall register for the internship as per course structure after commencement of academic year. The guidelines issued by the APSCHE / Institution shall be followed for carrying out and evaluation of Community Service Project and Industry Internship.

Evaluation of the summer internships shall be through the departmental committee. A student will be required to submit a summer internship report to the concerned department and appear for an oral presentation before the departmental committee comprising of Head of the Department, supervisor of the internship and a senior faculty member of the department. A certificate of successful completion from industry shall be included in the report. The report and the oral presentation shall carry 50% weightage each. It shall be evaluated for 50 external marks. There shall be no internal marks for Summer Internship. A student shall secure minimum 40% of marks for successful completion. In case, if a student fails, he/she shall reappear as and when semester supplementary examinations are conducted by the Institution.

**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 Institution and is evaluated for 140 marks.

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

## 16. Guidelines for offering a Minor

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

i) The Minor program requires the completion of 12 credits in Minor stream chosen.
ii) Two courses for 06 credits related to a Minor are to be pursued compulsorily for the minor

degree, but maybe waived for students who have done similar/equivalent courses. If waived for a student, then the student must take an extra elective course in its place. It is recommended that students should complete the compulsory courses (or equivalents) before registering for the electives.

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

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

## 17. 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 15 credits for award of B.Tech.(Honors) degree from same branch/department/discipline registered for major degree. This is in addition to the credits essential for obtaining the Undergraduate degree in Major Discipline (i.e., 160 credits).

iii) A student is permitted to register for Honors in IV semester after the results of III Semester are declared and students may be allowed to take maximum two subjects per semester pertaining to the Honors from V Semester onwards.

iv) The concerned HOD shall arrange separate class work and timetable of the courses offered under Honors program.

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

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

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

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

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

x) If a student drops or is terminated from the Honors program, the additional credits so far earned cannot be converted into open or core electives; they will remain extra. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.

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

**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.

## 18. Attendance Requirements

i) 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. Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee.
ii) Shortage of Attendance below 65% in aggregate shall in NO CASE be condoned.
iii) A stipulated fee shall be payable towards condonation of shortage of attendance to the College.
iv) Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that class and their registration shall stand cancelled.
v) A student will not be promoted to the next semester unless he satisfies the attendance requirements of the present semester. They may seek readmission for that semester from the date of commencement of class work.
vi) If any candidate fulfils the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.
vii) If the learning is carried out in blended mode (both offline & online), then the total attendance of the student shall be calculated considering the offline and online attendance of the student.
viii) For induction programme attendance shall be maintained as per AICTE norms.

## 19. 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 institution 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.

## 20. Grading

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

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

**Structure of Grading of Academic Performance**

| **Range in which the marks in the subject fall** | **Grade** | **Grade points Assigned** |
|---|---|---|
| 90 & above | S (Superior) | 10 |
| 80 - 89 | A (Excellent) | 9 |
| 70 - 79 | B (Very Good) | 8 |
| 60 - 69 | C (Good) | 7 |
| 50 - 59 | D (Average) | 6 |
| 40 - 49 | E (Pass) | 5 |
| < 40 | F (Fail) | 0 |
| Absent | Ab (Absent) | 0 |

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

$$SGPA = \Sigma (Ci \times Gi)/\Sigma Ci$$

where, Ci is the number of credits of the ith subject and Gi is the grade point scored by the student in the ith 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.,

$$CGPA = \Sigma (Ci \times Si) / \Sigma Ci$$

where "Si" is the SGPA of the ith semester and Ci is the total numberof 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**

## 21. Withholding of Results

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

## 22. Multiple Entry / Exit Option

**a. Exit Policy:**

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

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

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

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

**b. Entry** Policy:

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

**Note:** The Institution/University 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.

## 23. Gap Year Concept

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

## 24. 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.

## 25. Minimum Instruction Days for a Semester:

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

## 26. Medium of Instruction:

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

## 27. Student Transfers:

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

## 28. General Instructions:

i) The academic regulations should be read as a whole for purpose of any interpretation.
ii) Malpractices rules-nature and punishments are appended.

iii) Where the words “he”, “him”, “his”, occur in the regulations, they also include “she”, “her”, “hers”, respectively.
iv) In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal is final.
v) The Institute may change or amend the academic regulations or syllabi at any time and the changes or amendments shall be made applicable to all the students on rolls with effect from the dates notified by the institute.
vi) In the case of any doubt or ambiguity in the interpretation of the guidelines given, the decision of the Head of the institution is final.

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# ACADEMIC REGULATIONS (DR24) FOR B.TECH.

## (LATERAL ENTRY SCHEME)

*(Effective for the students admitted into II year through Lateral Entry Scheme from the Academic Year **2025-26** 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 programme of study for not less than three academic years and not more than six academic years. However, for the students availing Gap year facility this period shall be extended by two years at the most and these two years would in addition to the maximum period permitted for graduation (Six years).
      ii. Registers for 120 credits and secures all 120 credits.

   b. **Award of B.Tech. degree with Honors** if he/she fulfils the following:
      i. Student secures additional 15 credits fulfilling all the requisites of a B.Tech. program i.e., 120 credits.
      ii. Registering for Honors is optional.
      iii. Honors is to be completed simultaneously with B.Tech. programme.

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

3. **Minimum Academic Requirements**

   The following academic requirements have to be satisfied in addition to the requirements mentioned in item no.**2**
      i. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, practical, design, drawing subject or project if he secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the internal 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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DR24

# ENGINEERING CURRICULUM

## W.e.f. 2024-25

**SEMESTER - I**

**B.Tech. (Regular-Full time)**

(Effective for the students admitted into I year from
The Academic Year **2024-25** onwards)

**D.N.R. COLLEGE OF ENGINEERING & TECHNOLOGY (Autonomous)**
**BALUSUMUDI, BHIMAVARAM, W.G. Dist., A.P., PIN-534 202**

**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

**B.Tech. I Year I Semester** (for Group –A Branches - CSE, AID, CSM)

| S.No. | Category | Subject Code | Title | L/D | T | P | Credits |
|---|---|---|---|---|---|---|---|
| 1 | BS&H | BT24BS1101 | Communicative English | 2 | 0 | 0 | 2 |
| 2 | BS&H | BT24BS1102 | Chemistry | 3 | 0 | 0 | 3 |
| 3 | BS&H | BT24BS1103 | Linear Algebra & Calculus | 3 | 0 | 0 | 3 |
| 4 | Engineerig Science | BT24CE1101 | Basic Civil & Mechanical Engineering | 3 | 0 | 0 | 3 |
| 5 | Engineerig Science | BT24CS1101 | Introduction to Programming | 3 | 0 | 0 | 3 |
| 6 | BS&H | BT24BS1105 | Communicative English Lab | 0 | 0 | 2 | 1 |
| 7 | BS&H | BT24BS1106 | Chemistry Lab | 0 | 0 | 2 | 1 |
| 8 | Engineerig Science | BT24ME1103 | Engineering Workshop | 0 | 0 | 3 | 1.5 |
| 9 | Engineerig Science | BT24CS1103 | Computer Programming Lab | 0 | 0 | 3 | 1.5 |
| 10 | BS&H | BT24BS1108 | Health and wellness, Yoga and Sports | - | - | 1 | 0.5 |
| **Total** | | | | **14** | **0** | **11** | **19.5** |

**B.Tech. I Year I Semester** (for Group -B Branches - CE, EEE, ME, ECE & IT)

| S.No. | Category | Subject Code | Title | L/D | T | P | Credits |
|---|---|---|---|---|---|---|---|
| 1 | BS&H | BT24BS1104 | Engineering Physics | 3 | 0 | 0 | 3 |
| 2 | BS&H | BT24BS1103 | Linear Algebra & Calculus | 3 | 0 | 0 | 3 |
| 3 | Engineering Science | BT24EE1101 | Basic Electrical & Electronics Engineering | 3 | 0 | 0 | 3 |
| 4 | Engineering Science | BT24ME1101/ BT24ME1102 | Engineering Graphics / Engineering Drawing | 1 | 0 | 4 | 3 |
| 5 | Engineering Science | BT24CS1101 | Introduction to Programming | 3 | 0 | 0 | 3 |
| 6 | Engineering Science | BT24CS1102 | IT Workshop | 0 | 0 | 2 | 1 |
| 7 | BS& H | BT24BS1107 | Engineering Physics Lab | 0 | 0 | 2 | 1 |
| 8 | Engineering Science | BT24EE1102 | Electrical & Electronics Engineering Workshop | 0 | 0 | 3 | 1.5 |
| 9 | Engineering Science | BT24CS1103 | Computer Programming Lab | 0 | 0 | 3 | 1.5 |
| 10 | BS&H | BT24BS1109 | NSS & Community Service | - | - | 1 | 0.5 |
| **Total** | | | | **14** | **0** | **11** | **19.5** |

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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- I Semester | Course Code: BT24BS1101 | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 0 | 2 |
| **COMMUNICATIVE ENGLISH** *(Common to All Branches of Engineering)* | | | | | |

**Course Objectives**:

The main objective of introducing this course, *Communicative 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:**

**CO1: Understand** the context, theme, and pieces of specific information from social or Transactional dialogues.

**CO2: Apply** the principles of writing skills and cohesive devices in paragraphs and formal/informal communication.

**CO3: Build** confidence and creative thinking by challenging the hardships in life.

**CO4: Discover** the peace and amicable relations in human development.

**CO5: Perceive** the personal traits and communicative competence in the form of interpersonal communication.

**CO6: Form** error free sentences in communication by using proper grammatical structures and correct word forms.

**Mapping of Course Outcomes with Program Outcomes:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | - | - | - | - | - | - | - | - | - | 3 | - | - |
| **CO2** | - | - | - | - | - | - | - | - | - | 3 | - | 2 |
| **CO3** | - | - | - | - | - | - | - | - | - | 3 | - | - |
| **CO4** | - | - | - | - | - | - | - | - | - | 3 | - | - |
| **CO5** | - | - | - | - | - | - | - | - | - | 3 | - | - |
| **CO6** | - | - | - | - | - | - | - | - | - | 3 | - | 3 |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | - | - |
| **CO2** | - | - |
| **CO3** | - | - |
| **CO4** | - | - |
| **CO5** | - | - |
| **CO6** | - | - |

**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.

**Speaking:** Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.

**Reading:** Skimming to get the main idea of a text; scanning to look for specific pieces of information.

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

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

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

**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.

**Speaking:** Discussion in pairs / small groups on specific topics followed by short structure talks

**Reading:** Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

**Writing:** Structure of a paragraph - Paragraph writing (specific topics)

**Grammar:** Cohesive devices - linkers, use of articles and zero article; prepositions.

**Vocabulary:** Homonyms, Homophones, Homographs.

**UNIT III Lesson: BIOGRAPHY: Elon Musk**

**Listening:**Listening for global comprehension and summarizing what is listened to.

**Speaking:**Discussing specific topics in pairs or small groups and reporting what is discussed

**Reading :**Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.

**Writing :**Summarizing, Note-making, paraphrasing

**Grammar:**Verbs - tenses; subject-verb agreement; Compound words, Collocations

**Vocabulary:** Compound words, 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

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

**Vocabulary:** Words often confused, Jargons

**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

**Reading:**Reading comprehension.

**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 Jargons

**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:**


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

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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- I Semester | Course Code: BT24BS1102 | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| **CHEMISTRY** *(Common to CSE, AIML, AIDS)* | | | | | |

**Course Objectives:**

- To familiarize engineering chemistry and its applications
- To train the students on the principles and applications of electrochemistry and polymers

**Course Outcomes:**

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

**CO1: Understand** the fundamentals of Quantum mechanics and Molecular Orbital Theory)
**CO2: Apply** the basic principles of semiconductors, super conductors, and nanomaterials in real world applications. .
**CO3: Compare** the materials for construction of batteries and electrochemical sensors.
**CO4: Explain** the preparation, properties, and applications of thermoplastics, thermosetting, elastomers and conducting polymers
**CO5: Summarize** the concepts of Instrumental methods.
**CO6:** Define the principles of spectrometry, slc in separation of solid and liquid mixtures.

**Mapping of Course Outcomes with Program Outcomes:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 1 |
| **CO2** | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 2 |
| **CO3** | 2 | 2 | 2 | - | - | - | - | - | - | - | - | 2 |
| **CO4** | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 2 |
| **CO5** | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 2 |
| **CO6** | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 1 |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | - | - |
| **CO2** | - | - |
| **CO3** | - | - |
| **CO4** | - | - |
| **CO5** | - | - |
| **CO6** | - | - |

**UNIT -I: Structure and Bonding Models** **(10Hours)**

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.

**UNIT -II: Modern Engineering materials** **(10Hours)**

**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 nanoparticles.

**UNIT -III: Electrochemistry and Applications** **(10Hours)**

Electrochemical cell, Nernst equation, cell potential calculations and numerical problems, potentiometer- potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations).

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). Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples

Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples.

**UNIT -IV: Polymer Chemistry** **(10Hours)**

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

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

Elastomers–Buna-S, Buna-N–preparation, properties and applications. Conducting polymers – polyacetylene, polyaniline, – mechanism of conduction and applications. Bio- Degradable polymers - Poly Glycolic Acid (PGA), Poly Lactic Acid (PLA).

**UNIT -V: Instrumental Methods and Applications** **(10Hours)**

Electromagnetic spectrum, Absorption of radiation: Beer-Lambert's law. UV-Visible Spectroscopy, electronic transition, Instrumentation, IR spectroscopes', fundamental modes and selection rules, Instrumentation. 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. Text book of Polymer Science, Fred W. Billmayer Jr., 3rd Edition
4. A text book of Engineering Chemistry by Sashi Chawala, Dhanpat Rai & Co. 2017

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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- I Semester | Course Code: BT24BS1103 | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| **LINEAR ALGEBRA&CALCULUS** *(Common to All Branches of Engineering)* | | | | | |

**Course Objectives:**
To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real-world problems and their applications.

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

**CO1:** Describe the basic properties on elementary row and column operations
**CO2:** Solve a given system of linear algebraic equations.
**CO3:** Find the Characteristic equation, Eigen values & Eigen vectors.
**CO4:** Utilize mean value theorems to real life problems.
**CO5:** Apply the concept of the partial differentiation in various engineering fields.
**CO6:** Evaluate double, triple integrals and their applications.

**Mapping of Course Outcomes with Program Outcomes:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 3 | - | - | - | - | - | - | - | - | - | - |
| CO2 | 1 | 3 | - | - | - | - | - | - | - | - | - | - |
| CO3 | 1 | 3 | - | - | - | - | - | - | - | - | - | - |
| CO4 | 1 | 3 | - | - | - | - | - | - | - | - | - | - |
| CO5 | 2 | 3 | - | - | - | - | - | - | - | - | - | - |
| CO6 | 2 | 3 | - | - | - | - | - | - | - | - | - | - |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| CO1 | - | - |
| CO2 | - | - |
| CO3 | - | - |
| CO4 | - | - |
| CO5 | - | - |
| CO6 | - | - |

**UNIT-I Matrices** **10 hr**

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

**UNIT-II Eigen values, Eigen vectors and Orthogonal Transformation** **10 hr**

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

**UNIT-III Calculus 8 hr**

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

**UNIT-IV Partial differentiation and Applications (Multivariable calculus) 10 hr**

Functions of several variables: Continuity and Differentiability, Partial derivatives, total derivatives, chain rule, Directional derivative, Taylor's and Maclaurin's series expansion of functions of two variables. Jacobians, Functional dependence, maxima and minima of functions of two variables, method of Lagrange multipliers.

**UNIT-V Multiple Integrals (Multi variable Calculus) 10 hr**

Double integrals, triple integrals, change of order of integration, change of variables to polar, cylindrical and spherical coordinates. Finding areas (by double integrals) and volumes (by double integrals and triple integrals).

**Textbooks:**


1. Higher Engineering Mathematics, B.S.Grewal, Khanna Publishers,2017, 44thEdition
2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10thEdition.


**Reference Books:**


1. Thomas Calculus, George B.Thomas, Maurice D.Weirand Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. Advanced Engineering Mathematics, R.K.Jain and S.R.K.Iyengar, Alpha Science International Ltd., 20215th Edition(9th reprint).
3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5thEdition.
4. Advanced Engineering Mathematics, Micheael Greenberg,Pearson publishers, 9thedition
5. Higher Engineering Mathematics, H.KDas, Er.RajnishVerma, S.Chand Publications,2014, Third Edition (Reprint 2021)

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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- I Semester | Course Code: BT24CE1101 | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| **BASIC CIVIL AND MECHANICAL ENGINEERING** *(Common to All branches of 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:
**CO1:** Understand the various sub divisions of Civil Engineering and their role in ensuring better society.
**CO2:** Know the objectives of surveying and understand the measurement of distances, angles and levels through surveying
**CO3:** Understand the role of Transportation Engineering in Nation's economy and importance of Water Resource Engineering and Environmental Engineering.

**Mapping of Course Outcomes with Program Outcomes:**

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

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | 2 | 2 |
| **CO2** | 2 | 2 |
| **CO3** | 2 | 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.

**UNIT II**

**Surveying:** Objectives of Surveying- Horizontal Measurements- Angular Measurements- Introduction to Bearings Levelling instruments used for levelling -Simple problems on levelling and bearings- Contour mapping.

**UNIT III**

Transportation Engineering Importance of Transportation in Nation's economic development- Types of Highway Pavements- Flexible Pavements and Rigid Pavements - 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–Rainwater Harvesting-Water Storage and Conveyance Structures (Simple introduction to Dams and Reservoirs).

**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, Satheesh Gopi, 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.


## 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:

**CO4: Understand** the different manufacturing processes.

**CO5:Explain** the basics of thermal engineering and its applications and the working of different mechanical power transmission systems and power plants.

**CO6:Describe** the basics of robotics and its applications

**Mapping of Course Outcomes with Program Outcomes:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO4** | 2 | - | - | - | - | 2 | 2 | - | - | - | - | - |
| **CO5** | 2 | 1 | - | - | 1 | 1 | - | - | - | - | - | - |
| **CO6** | 1 | - | - | - | - | 1 | 1 | - | - | - | - | - |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| **CO4** | 1 | - |
| **CO5** | - | - |
| **CO6** | - | - |

**UNIT I**

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

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

**UNIT II**

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

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

**UNIT III**

Power plants – Working principle of Steam, Diesel, Hydro, Nuclear power plants. Mechanical Power Transmission - Belt Drives, Chain, Rope drives, Gear Drives and their applications.

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

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

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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- I Semester | Course Code: BT24CS1101 | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| **INTRODUCTION TO PROGRAMMING** *(Common to All branches of Engineering)* | | | | | |

**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, control structures, 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

**CO1:** Understand basics of computers, the concept of algorithm and algorithmic thinking (2
**CO2:** Analyse a problem and develop analgorithm to solve it (L4).
**CO3:** Implement various algorithms using the C programming language (L4).
**CO4:** Understand more advanced features of C language (L2).
**CO5:** Develop problem-solving skills and the ability to debug and optimize the code (L6).
**CO6:** Apply file input–output operations (L3)

**Mapping of Course Outcomes with Program Outcomes:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 2 | 2 | 3 | 1 | - | - | - | 2 | - | - | - | 2 |
| **CO2** | 2 | 3 | 3 | 2 | - | - | - | 2 | - | - | - | 2 |
| **CO3** | 2 | 3 | 3 | 2 | - | - | - | 3 | - | - | - | 2 |
| **CO4** | 2 | 3 | 2 | 2 | - | - | - | 2 | - | - | - | 2 |
| **CO5** | 3 | 3 | 3 | 2 | - | - | - | 3 | - | - | - | 2 |
| **CO6** | 2 | 3 | 3 | 3 | - | - | - | 2 | - | - | - | 2 |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | 2 | 2 |
| **CO2** | 2 | - |
| **CO3** | 2 | 2 |
| **CO4** | 2 | 2 |
| **CO5** | 3 | 3 |
| **CO6** | 2 | 2 |

**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. Introduction to Compilation and Execution, Primitive Data Types, Variables, and Constants, Basic Input and Output, Operations, Type Conversion, and Casting.
Problem solving techniques: Algorithmic approach, characteristics of algorithm, Problem solving strategies: Top-down approach, Bottom-up approach, Time and space complexities of algorithms.

**UNIT II Control Structures**
Simple sequential programs Conditional Statements (if, if-else, 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.

**UNIT IV Pointers & User Defined Data types**
Pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers, User-defined data types-Structures and Unions.

**UNIT V Functions & File Handling**
Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, modifying parameters inside functions using pointers, arrays as parameters. Scope and Lifetime of Variables, Basics of File Handling
**Note:** The syllabus is designed with C Language as the fundamental language of implementation**.**

**Textbooks:**

1. The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice-Hall, 1988
2. Schaum's Outline of Programming with C, Byron S Gottfried, McGraw-Hill Education, 1996


**Reference Books:**

1. Computing fundamentals and C Programming, Balagurusamy, E., McGraw-Hill Education, 2008.
2. Programming in C, Rema Theraja, Oxford, 2016, 2nd edition
3. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3rd edition

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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- I Semester | Course Code: BT24BS1105 | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 1 |
| **COMMUNICATIVE ENGLISH LAB**<br>*(Common to All Branches of Engineering)* | | | | | |

**Course Objectives**: 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. The students will get trained in basic communication skills and also make them ready to face job interviews.

**Course Outcomes**:

**CO1: Distinguish** the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension in day to day conversations.
**CO2: Demonstrate** communication skills through various language learning activities
**CO3: Apply** the writing skills in e-mail Writing and Resume Writing.
**CO4: Appraise** and manifest professionalism in participating group discussions and debates.
**CO5: Exhibit** the effective interpersonal skills in presentations and interviews
**CO6: Understand** the different aspects of the English language proficiency with emphasis on LSRW skills.

**Mapping of Course Outcomes with Program Outcomes:**

| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | 3 | - | - | - | 1 | 1 | - | - |
| CO2 | - | - | - | - | - | - | - | - | 3 | 3 | - | 1 |
| CO3 | - | - | - | - | 1 | - | - | - | 1 | 2 | - | 2 |
| CO4 | - | - | - | - | - | - | - | - | 3 | 3 | - | 2 |
| CO5 | - | - | - | - | - | - | - | - | 3 | 3 | - | 2 |
| CO6 | - | - | - | - | 2 | - | - | - | - | 2 | - | 2 |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| CO1 | - | - |
| CO2 | - | - |
| CO3 | - | - |
| CO4 | - | - |
| CO5 | - | - |
| CO6 | - | - |

**List of Topics:**

1. Vowels & Consonants
2. Neutralization/Accent Rules
3. Communication Skills & JAM

4. Role Play or Conversational Practice
5. E-mail Writing
6. Resume Writing, Cover letter, SOP
7. Group Discussions-methods & practice
8. Debates - Methods & Practice
9. PPT Presentations/ Poster Presentation
10. Interviews Skills

**Suggested Software:**

- Walden Infotech
- Young India Films

**Reference Books:**


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


**Web Resources:**

**Spoken English:**

www.esl-lab.com

www.englishmedialab.com

www.englishinteractive.net

https://www.britishcouncil.in/english/online

http://www.letstalkpodcast.com/

https://www.youtube.com/c/mmmEnglish_Emma/featured

https://www.youtube.com/c/ArnelsEverydayEnglish/featured

https://www.youtube.com/c/engvidAdam/featured

https://www.youtube.com/c/EnglishClass101/featured

https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists

https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw

**Voice & Accent:**

https://www.youtube.com/user/letstalkaccent/videos

https://www.youtube.com/c/EngLanguageClub/featured

https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc

https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA

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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- I Semester | Course Code: BT24BS1106 | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 1 |

**CHEMISTRY LAB**
*(Common to CSE, AIML, AIDS)*

**Course Objectives:**

- Verify the fundamental concepts with experiments.

**Course Outcomes:** At the end of the course, the students will be able to
**CO1: Determine** the cell constant and conductance of solutions
**CO2: Prepare** advanced polymer materials.
**CO3: Measure** the strength of an acid present in secondary batteries
**CO4: Analyze** the IR spectra of some organic compounds.
**CO5: Calculate** strength of acid in Pb-Acid battery.
**CO6: Understand** the synthesis of Bakelite

**Mapping of Course Outcomes with Program Outcomes:**

| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 2 |
| CO2 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | 2 |
| CO3 | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 2 |
| CO4 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | 2 |
| CO5 | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 2 |
| CO6 | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 2 |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| CO1 | - | - |
| CO2 | - | - |
| CO3 | - | - |
| CO4 | - | - |
| CO5 | - | - |
| CO6 | - | - |

**List of Experiments:**

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

10. Identification of simple organic compounds by IR
11. Preparation of nanomaterials by precipitation method
12. Estimation of Ferrous Iron by Dichrometry

**Reference:**

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

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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- I Semester | Course Code: BT24ME1103 | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 3 | 1.5 |
| **ENGINEERING WORKSHOP** *(Common to All branches of Engineering)* | | | | | |

**Course Objectives:**
To familiarize students with wood working, sheet metal operations, fitting, electrical house wiring skills, and basic repairs of two-wheeler vehicle.

**Course Outcomes:**
**CO1**: Build carpentry fitting and forging operations in various applications.
**CO2**: Executing operations of foundry and sheet metal works using varies tools.
**CO3**: Inspect basic electrical engineering knowledge for house wiring practice
**CO4**: Develop a lap and butt joint using arc welding.
**CO5**: Develop pipe joint for different diameter of pipes
**CO6**: Inspect basic repair of two-wheeler vehicle **.**

**Mapping of Course Outcomes with Program Outcomes:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | - | 3 | - | 2 | - | - | 3 | - | - | - | 1 |
| **CO2** | 3 | - | 3 | - | 2 | - | - | 3 | - | - | - | 1 |
| **CO3** | 3 | - | 3 | - | 2 | - | - | 3 | - | - | - | 1 |
| **CO4** | 3 | - | 3 | - | 2 | - | - | 3 | - | - | - | 1 |
| **CO5** | 3 | - | 3 | - | 2 | - | - | 3 | - | - | - | 1 |
| **CO6** | 3 | - | 3 | - | 2 | - | - | 3 | - | - | - | 1 |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | - | - |
| **CO2** | - | - |
| **CO3** | - | - |
| **CO4** | - | - |
| **CO5** | - | - |
| **CO6** | - | - |

**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.
9. Basic repairs of Two-wheeler vehicle – Demonstration of working of two-wheeler vehicle and its repairs.

**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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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- I Semester | Course Code: BT24CS1103 | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 3 | 1.5 |
| **COMPUTER PROGRAMMING LAB**<br>*(Common to All branches of Engineering)* | | | | | |

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

**Course Outcomes:**
**CO1:** Read understand and trace they execution of programs written in C language
**CO2:** Select the right control structure for solving the problem.
**CO3:** Develop C programs which utilize memory efficiently using programming constructs like pointers.
**CO4:** Develop, D-Bug and execute programs to demonstrate applications of arrays, functions, basic concepts of pointers in C.
**CO5:** Develop a programs to demonstrate the applications of string operations in C.
**CO6:** Develop a programs to demonstrate the applications of file operations in C.

**Mapping of Course Outcomes with Program Outcomes:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 2 | 3 | - | 2 | - | - | - | - | - | - | - | - |
| **CO2** | 2 | 3 | 3 | 3 | - | - | - | - | - | - | - | - |
| **CO3** | 2 | 3 | 3 | 2 | 3 | - | - | - | - | - | - | - |
| **CO4** | 2 | 3 | 3 | 3 | 2 | - | - | - | - | - | - | - |
| **CO5** | 2 | 3 | 3 | 2 | 2 | - | - | - | - | - | - | - |
| **CO6** | - | 2 | 3 | 2 | 2 | - | - | - | - | - | - | - |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | - | 2 |
| **CO2** | - | - |
| **CO3** | - | - |
| **CO4** | 2 | - |
| **CO5** | 2 | - |
| **CO6** | - | - |

**UNIT I**
**WEEK 1**
**Objective:** Getting familiar with the programming environment on the computer and writing the 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 1:** 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

Evaluate the following expressions.

i. A+B*C+(D*E) + F*G
ii. A/B*C-B+A*D/3
iii. A+++B---A
iv. J= (i++) + (++i)

Find the maximum of three numbers using conditional operator

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 or loop in addition to structured jump constructs like break and continue including when each 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 pointers to manage a dynamic array of integers, including memory allocation & value initialization, resizing changing and reordering the contents of an array and memory de-allocation using malloc (), calloc (), realloc () and free () functions. Gain experience processing command-line arguments received by C

**Suggested Experiments/Activities:**
**Tutorial 9:** Pointers, structures and dynamic memory allocation
**Lab 9:** Pointers and structures, memory dereference.
i. Write a C program to find the sum of a 1D array using malloc()
ii. Write a C program to find the total, average of n students using structures
iii. Enter n students data using calloc() and display failed students list
iv. Read student name and marks from the command line and display the student details along with the total.
v. Write a C program to implement realloc()

**WEEK 10:**
**Objective:** Experiment with C Structures, Unions, bit fields and self-referential structures (Singly linked lists) and nested structures

**Suggested Experiments/Activities:**
**Tutorial 10:** Bitfields, Self-Referential Structures, Linked lists
**Lab10 :** Bitfields, linked lists
Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the same without 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.

**UNIT V**
**WEEK 11:**
**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 11:** Functions, call by value, scope and extent,
**Lab 11:** Simple functions using call by value, solving differential equations using Eulers theorem.
i. Write a C function to calculate NCR value.
ii. Write a C function to find the length of a string.
iii. Write a C function to transpose of a matrix.
iv. Write a C function to demonstrate numerical integration of differential equations using Euler's method

**WEEK 12:**
**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 12:** Recursion, the structure of recursive calls
**Lab 12:** 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 13:**
**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 13:** Call by reference, dangling pointers
**Lab 13:** 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.

**WEEK14:**
**Objective:** To understand data files and file handling with various file I/O functions. Explore the differences 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.

**Textbooks:**

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

**Reference Books:**

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

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**BALUSUMUDI, BHIMAVARAM, W.G. Dist., A.P., PIN-534 202**

**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- I Semester | Course Code: BT24BS1108 | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 1 | 0.5 |
| **HEALTH AND WELLNESS, YOGA AND SPORTS** *(Common to All branches of Engineering)* | | | | | |

**Course Objectives:** The main objective of introducing this course is to make the students maintain their mental and physical wellness by balancing emotions in their life. It mainly enhances the essential traits required for the development of the personality.

**Course Outcomes:** After completion of the course the student will be able to
**CO1: Understand** the importance of yoga and sports for Physical fitness and sound health.
**CO2: Demonstrate** an understanding of health-related fitness components.
**CO3: Compare and contrast** various activities that help enhance their health.
**CO4: Assess** current personal fitness levels.
**CO5: Develop** Positive Personality.
**CO6: Describe** the history of sports, Ancient and Modern Olympics

**Mapping of Course Outcomes with Program Outcomes:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | - | - | - | - | - | - | 2 |
| CO2 | - | - | - | - | - | - | - | - | - | - | - | 2 |
| CO3 | - | - | - | - | - | - | - | - | - | - | - | 2 |
| CO4 | - | - | - | - | - | - | - | - | - | - | - | 2 |
| CO5 | - | - | - | - | - | - | - | - | - | - | - | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | 2 |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| CO1 | - | - |
| CO2 | - | - |
| CO3 | - | - |
| CO4 | - | - |
| CO5 | - | - |
| CO6 | - | - |

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

**Activities:**
i) Organizing health awareness programmes in community
ii) Preparation of health profile
iii) Preparation of chart for balance diet for all age groups

**UNIT II** Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asanas- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.
**Activities:** Yoga practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar

**UNIT III** Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Commonwealth games.
**Activities:**
i) Participation in one major game and one individual sport viz., Athletics, Volleyball, Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc. Practicing general and specific warm up, aerobics
ii) Practicing cardiorespiratory fitness, treadmill, run test, 9 min walk, skipping and running.
**Reference Books:**


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


**General Guidelines:**

1. Institutes must assign slots in the Timetable for the activities of Health/Sports/Yoga.
2. Institutes must provide field/facility and offer the minimum of five choices of as many as Games/Sports.
3. Institutes are required to provide sports instructor / yoga teacher to mentor the students. Evaluation

**Guidelines:**

1. Evaluated for a total of 100 marks.
2. A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
3. A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject

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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- I Semester | Course Code: BT24BS1104 | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| **ENGINEERING PHYSICS** *(Common for all branches of Engineering)* | | | | | |

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

**Course Outcomes:**

**CO1: Analyze** the intensity variation of light due to polarization, interference and diffraction.
**CO2: Examine** the crystal structures with the basics of crystals..
**CO3: Summarize** various types of polarization of dielectrics and classify the magnetic materials.
**CO4: Using fundamentals** of quantum mechanics solve the one dimensional motion of particles.
**CO5: Apply** the basic concepts of quantum free electron theory to Fermi energy and classification of crystalline solids.
**CO6: Identify** the type of semiconductor using Hall effect.

**Mapping of Course Outcomes with Program Outcomes:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 2 | 1 | - | - | - | - | - | - | - | 1 |
| **CO2** | 3 | 2 | 2 | 1 | - | - | - | - | - | - | - | 1 |
| **CO3** | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 1 |
| **CO4** | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 1 |
| **CO5** | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 1 |
| **CO6** | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 1 |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | - | - |
| **CO2** | - | - |
| **CO3** | - | - |
| **CO4** | - | - |
| **CO5** | - | - |
| **CO6** | - | - |

**UNIT I Wave Optics 12hr**

**Interference:** Introduction - Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colours in thin films- Newton's Rings, Determination of wavelength and refractive index.

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

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

**UNIT II Crystallography and X-ray diffraction 10hr**

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

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

**UNIT III Dielectric and Magnetic Materials 8hr**

**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.

**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.

**UNIT IV Quantum Mechanics and Free electron Theory 10hr**

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

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

**UNIT V Semiconductors 8hr**

**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.

**Textbooks:**

1. Engineering Physics, Dr.D. Tirupathi Naidu and M. Veeranjaneyulu, VGS Publications, 2023.
2. A Text book of Engineering Physics, M. N. Avadhanulu, P.G.Kshirsagar & TVS Arun Murthy, S.Chand Publications, 11th Edition 2019.
3. Engineering Physics - D.K.Bhattacharya and Poonam Tandon, Oxford press (2015)

**Reference Books:**

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

**Web Resources:**

https://dnrcet.org/web/departments/hs/courses/b-tech/syllabus/

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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- I Semester | Course Code: BT24EE1101 | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**BASIC ELECTRICAL & ELECTRONICS ENGINEERING**
*(Common to All branches of Engineering)*

**Course Objectives:** Students will learn

- About the basic principles of Direct Current (DC) & Alternating Current (AC) Circuit analysis
- About the fundamentals of magnetic circuits analysis.
- About Electrical Wiring and Electrical Safety.

**Course Outcomes:** At the end of the course, the student will be able to
**CO1: Apply** the circuit laws for the analysis of simple DC and AC circuits.
**CO2: Apply** the basic principles for solving fundamental magnetic circuits**.**
**CO3: Apply** the basic principles of electrical wiring and electric safety measures**.**

**Mapping of Course Outcomes with Program Outcomes:**

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

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | 1 | 2 |
| **CO2** | 1 | 1 |
| **CO3** | 1 | 2 |

## PART A: BASIC ELECTRICAL ENGINEERING

### UNIT I INTRODUCTION TO ELECTRICAL CIRCUITS

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

### UNIT II MAGNETIC CIRCUITS

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

### UNIT III ELECTRICAL WIRING, ELECTRICITY BILL & SAFETY MEASURES

**Electrical Wiring:** SimpleLamp circuits, stair case wiring scheme, godown wiring scheme, types of service mains, types of electrical wiring, cost estimation of indoor wiring, wiring layout of workshop/ electrical laboratory.

**Electricity bill:** Power rating of household appliances including air conditioners, PCs, Laptops, Printers,etc., Types of 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, SafetyPrecautions to avoid shock

**PART B: BASIC ELECTRONICS ENGINEERING**
**Course Outcomes:** At the end of the course, the student will be able to
**CO4: Analyze** various characteristics of semiconductor devices.
**CO5: Apply** the basic principles for understanding and working of rectifiers and power Supplies.
**CO6: Explain** the working of various logic gates**.**

**Mapping of Course Outcomes with Program Outcomes:**

| | PO1 | PO2 | PO3 | PO4 | PO 5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO4** | 2 | 1 | 2 | 1 | - | 1 | - | - | - | - | 1 | 3 |
| **CO5** | 3 | 1 | 2 | 1 | - | 1 | - | - | - | - | 1 | 3 |
| **CO6** | 2 | 2 | 2 | 1 | - | 1 | - | - | - | - | 1 | 3 |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| **CO4** | 2 | - |
| **CO5** | 2 | - |
| **CO6** | 2 | - |

**UNIT I SEMI CONDUCTOR DEVICES**
Introduction - Evolution of electronics – Vacuum tubes to nano electronics - Characteristics of PN Junction Diode — Zener Effect — Zener Diode and its Characteristics. Bipolar Junction Transistor — CB, CE, CC Configurations and Characteristics — Elementary Treatment of Small Signal CE Amplifier
**UNIT II BASIC ELECTRONIC CIRCUITS AND INSTRUMENTTAION**
Rectifiers and power supplies: Block diagram description of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple Zener voltage regulator. Amplifiers: Block diagram of Public Address system, Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response. Electronic Instrumentation: Block diagram of an electronic instrumentation system.
**UNIT III DIGITAL ELECTRONICS**
Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3 code, Gray code, Hamming code. Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Truth Tables and Functionality of Logic Gates – NOT, OR, AND, NOR, NAND, XOR and XNOR. Simple combinational circuits–Half and Full Adders. Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only)

**Textbooks:**
1.Principles of Electrical and Electronics Engineering, V.K. Mehtha, S. Chand Technical Publishers
2.Basic Electrical Engineering, Ritu SahDev, Khanna Publishers, 2018, First Edition.
3.FundamentalsofElectricalCircuits,CharlesK.AlexanderandMathewN.O.Sadiku,McGrawHill Education (India),2013,Fifth Edition
4.Electrical Wiring Estimating and Costing –Dr. S. L. Uppal-Khanna Publishers-198

5.Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition
6.Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition.

**Reference Books:**

1.Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Mc Graw Hill, 2019,Fourth Edition
2.Principles of Power Systems, V.K. Mehtha, S.Chand Technical Publishers, 2020
3.Circuit Theory, Abhijit Chakrabarti, Dhanpat Rai & Co. Publications, 8th edition, 2023.
4.BasicElectricalEngineering,D.C.Kulshreshtha,TataMcGrawHill, First Edition, 2019
5.Basic Electrical and Electronics Engineering, S. K. Bhatacharya, Person Publications, 2018, Second Edition.

**E-Resources:**

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

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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- I Semester | Course Code: BT24ME1101 | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 4 | 3 |
| **ENGINEERING GRAPHICS** *(Common to CE and Mechanical Engineering Branches)* | | | | | |

**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:**

**CO1**: Construct polygons, curves and scales.
**CO2:** Identify the position of points and lines.
**CO3**: Analyze the location and position of plane figures
**CO4**: Analyze the location and position of solids
**CO5**: Explain principles behind development of surfaces
**CO6:** Develop an Isometric view and orthographic views.

**Mapping of Course Outcomes with Program Outcomes:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 1 | 1 | - | - | - | - | - | 1 | - | 2 |
| **CO2** | 3 | 2 | 2 | 1 | - | - | - | - | - | 1 | - | 2 |
| **CO3** | 3 | 2 | 3 | 1 | - | - | - | - | - | 1 | - | 2 |
| **CO4** | 3 | 2 | 3 | 1 | - | - | - | - | 1 | 1 | - | 2 |
| **CO5** | 3 | 2 | 3 | 1 | - | - | - | - | 1 | 1 | - | 2 |
| **CO6** | 3 | 2 | 3 | 2 | 1 | - | - | - | 3 | 1 | - | 2 |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | - | - |
| **CO2** | - | - |
| **CO3** | - | - |
| **CO4** | - | - |
| **CO5** | - | - |
| **CO6** | - | - |

**UNIT I**

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

**Curves:** construction of ellipse, parabola and hyperbola by general, 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

**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.

**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.

**UNIT V**

**Conversion of Views:** Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

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

**Textbook:**

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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**BALUSUMUDI, BHIMAVARAM, W.G. Dist., A.P., PIN-534 202**

**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- I Semester | Course Code: BT24ME1102 | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 4 | 3 |

**ENGINEERING DRAWING**
*(Common to EEE, ECE, CSE, CSE aligned branches and IT)*

**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
- To improve the visualization skills for better understanding of projection of plane surfaces
- To improve the visualization skills for better understanding of projection of solids
- To make the students understand the viewing perception of a solid object in Isometric and Perspective projections.

**Course Outcomes:**

**CO1:** Construct polygons, curves and scales.
**CO2**: Identify the position of points and lines.
**CO3**: Identify the position of lines when inclined to both the planes.
**CO4**: Analyze the location and position of plane figures.
**CO5**: Analyze the location and position of solid bodies.
**CO6**: Develop an Isometric view and orthographic views.

**Mapping of Course Outcomes with Program Outcomes:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 1 | - | - | - | - | - | 1 | - | 2 |
| **CO2** | 3 | 2 | 3 | 1 | - | - | - | - | - | 1 | - | 2 |
| **CO3** | 3 | 2 | 3 | 1 | - | - | - | - | - | 1 | - | 2 |
| **CO4** | 3 | 2 | 3 | 1 | 1 | - | - | - | 1 | 1 | - | 2 |
| **CO5** | 3 | 2 | 3 | 1 | 1 | - | - | - | 1 | 1 | - | 2 |
| **CO6** | 3 | 2 | 3 | 2 | 1 | - | - | - | 3 | 1 | 1 | 2 |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | - | - |
| **CO2** | - | - |
| **CO3** | - | - |
| **CO4** | - | - |
| **CO5** | - | - |
| **CO6** | - | - |

**UNIT I**

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

**Curves:** construction of ellipse, parabola and hyperbola by general, 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

**UNIT III**

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

**UNIT IV**

**Projections of Solids:** Types of solids: Polyhedra and Solids of revolution.

**Projections of solids in simple positions:** Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane and Axis parallel to both the reference planes, Projection of Solids with axis inclined to one reference plane and parallel to another plane.

**UNIT V**

**Conversion of Views:** Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

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

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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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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- I Semester | Course Code: BT24CS1102 | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 1 |
| **IT WORKSHOP** *(Common to all branches of Engineering)* | | | | | |

**Course Objectives:**

- To introduce the internal parts of a computer, peripherals, I/O ports, connecting cables
- To demonstrate configuring the system as Dual boot both Windows and other Operating Systems Viz. Linux, BOSS
- 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:**

**CO1:** Apply knowledge for computer assembling and software installation and solve trouble shooting problems
**CO2:** Understand hardware components and inter dependencies
**CO3:** Evaluate the cyber hygiene that is protecting the personal computer from getting infected with the viruses, worms and other cyber-attacks
**CO4:** Use various Microsoft tools like professional word documents and presentations
**CO5:** Calculate various excel spreadsheets
**CO6:** Build various AI Tools – Chartgpt

**Mapping of Course Outcomes with Program Outcomes:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 3 | 2 | 2 | 2 | - | - | - | - | - | - | - |
| CO2 | 2 | 3 | 3 | 3 | - | - | - | - | - | - | - | - |
| CO3 | 2 | 3 | 3 | 2 | 3 | - | - | - | - | - | - | - |
| CO4 | 2 | 3 | 3 | 3 | 2 | - | - | - | - | - | - | - |
| CO5 | 2 | 3 | 3 | 2 | 2 | - | - | - | - | - | - | - |
| CO6 | 3 | 2 | 3 | 2 | 2 | - | - | - | - | - | - | - |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | - | 2 |
| **CO2** | - | - |
| **CO3** | - | - |
| **CO4** | 2 | - |
| **CO5** | 2 | - |
| **CO6** | - | - |

**PC Hardware** & Software Installation

**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 (VMWare) with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

**Task 5:** Every student should install BOSS on the computer. The system should be configured as dual boot (VMWare) with both Windows and BOSS. 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 La TeX and Word.

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

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

**EXCEL**

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

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

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

**LOOKUP/VLOOKUP**

**Task 3**: Split cells, freeze panes, group and outline, Sorting, Boolean 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 AI. Please answer the following question: What is the capital of France?"

**Task 2:** Creative Writing: Use the model as a writing assistant. Provide the beginning of a story or a description of a scene, and let the model generate the rest of the content. This can be a fun way to brainstorm creative ideas

• Ex: Prompt: "In a world where gravity suddenly stopped working, people started floating upwards. Write a story about how society adapted to this new reality."

**Task 3:** 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?'"

**Reference Books:**

1. Comdex Information Technology course tool kit, Vikas Gupta, WILEY Dream tech, 2003
2. The Complete Computer upgrade and repair book, Cheryl A Schmidt, WILEY Dream tech, 2013, 3rd edition
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education, 2012, 2nd edition
4. PC Hardware - A Handbook, Kate J. Chase, PHI (Microsoft)
5. LaTeX Companion, Leslie Lamport, PHI/Pearson.
6. IT Essentials PC Hardware and Software Companion Guide, David Anfins on and Ken Quamme. – CISCO Press, Pearson Education, 3rd edition
7. IT Essentials PC Hardware and Software Labs and Study Guide, Patrick Regan– CISCO Press, Pearson Education, 3rd edition

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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- I Semester | Course Code: BT24BS1107 | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 1 |
| **ENGINEERING PHYSICS LAB**<br>*(Common to All Branches of Engineering)* | | | | | |

**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
**CO1: Operate** optical instruments like travelling microscope and spectrometer.
**CO2: Estimate** the wavelengths of different colours using diffraction grating.
**CO3: Plot** the intensity of the magnetic field of circular coil carrying current with distance.
**CO4: Evaluate** dielectric constant and magnetic susceptibility for dielectric and magnetic materials respectively.
**CO5: Calculate** the band gap of a given semiconductor.
**CO6: Identify** the type of semiconductor using Hall effect.

**Mapping of Course Outcomes with Program Outcomes:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO 1** | 3 | 2 | - | - | - | - | - | - | 1 | - | - | 1 |
| **CO 2** | 3 | 2 | - | - | - | - | - | - | 1 | - | - | 1 |
| **CO 3** | 3 | 2 | - | - | - | - | - | - | 1 | - | - | 1 |
| **CO 4** | 3 | 2 | - | - | - | - | - | - | 1 | - | - | 1 |
| **CO 5** | 3 | 2 | - | - | - | - | - | - | 1 | - | - | 1 |
| **CO 6** | 3 | 2 | - | - | - | - | - | - | 1 | - | - | 1 |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | - | - |
| **CO2** | - | - |
| **CO3** | - | - |
| **CO4** | - | - |
| **CO5** | - | - |
| **CO6** | - | - |

**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 susceptibility 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.

**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.

**Web Resources:**

1. www.vlab.co.in

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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- I Semester | Course Code: BT24EE1102 | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 3 | 1.5 |

**ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP**
*(Common to All branches of Engineering)*

**Course Objectives:** Students will learn

- To verify Kirchhoff's laws.
- To measure various electrical quantities using different types of meters.
- About safety measures used in electrical systems.

**Course Outcomes:** At the end of the course, the student will be able to
**CO1: Study** and identification of various electrical circuit components and also measure voltage, current and power electrical circuits.
**CO2: Choose** and assemble various wiring schemes.
**CO3: Solve** electrical energy and measure earth resistance for domestic premises.

**Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:**

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

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| CO1 | 2 | - |
| CO2 | 2 | - |
| CO3 | 2 | 2 |

**Part-A BASIC ELECTRICAL ENGINEERING LAB**

**List of Experiments:**

1. Identification of various types of resistors and capacitors and understand the usage of digital multi-meter
2. Study various types of electrical cables/wires, switches, fuses, fuse carriers, MCB, ELCB, RCCB, and MCCB with their specifications and usage.
3. Measurement of Voltage, Current and Power in a DC Circuit
4. Verification of KCL and KVL
5. Measurement of Earth Resistance using Megger
6. Calculation of Electrical Energy for Domestic Premises
7. Staircase wiring scheme
8. Godown wiring scheme

**Note:** A minimum of six experiments are to be performed.

**Reference Books:**
1. Engineering Circuits Analysis, Jack Kemmerly,WilliamHayt and Steven Durbin, Tata McGraw Hill Education,2020, 9thedition.

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

**PART B: ELECTRONICS ENGINEERING LAB**

**Course Objectives**: To impart knowledge on the principles of digital electronics and fundamentals of electron devices & its applications.

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

**CO4: Identify** the various electronic components andunderstand the working of components.
**CO5: Plot** and discuss the characteristics of various electron devices.
**CO6: Explain** the operation of a digital circuit.

**Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO4** | 3 | 2 | 2 | - | - | - | - | - | - | 1 | - | 3 |
| **CO5** | 3 | 2 | 2 | - | - | - | - | - | - | 1 | - | 3 |
| **CO6** | 3 | 2 | 2 | - | - | - | - | - | - | 1 | - | 3 |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| **CO4** | 2 | - |
| **CO5** | 2 | - |
| **CO6** | 2 | - |

**List of Experiments**

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

Tools / Equipment Required: DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices.

**Reference 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. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education,2009.

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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- I Semester | Course Code: BT24BS1109 | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 1 | 0.5 |
| **NSS and COMMUNITY SERVICE** *(Common to All branches of Engineering)* | | | | | |

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

**Course Outcomes**: After completion of the course the students will be able to
**CO1:** Understand the importance of discipline, character and service motto
**CO2:** Solve some societal issues by applying acquired knowledge, facts, and techniques.
**CO3:** Explore human relationships by analyzing social problems
**CO4:** Determine to extend their help for the fellow beings and downtrodden people.
**CO5:** Develop leadership skills and civic responsibilities.
**CO6:** Participate in activities related to health, hygiene, environment, literacy, disaster management, and gender equity with empathy and commitment.

**Mapping of Course Outcomes with Program Outcomes:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | - | - | 3 | - | 2 | - | 3 |
| CO2 | - | - | - | - | - | 3 | - | 1 | - | 2 | - | 2 |
| CO3 | - | - | - | - | - | - | - | 3 | - | 2 | - | 2 |
| CO4 | - | - | - | - | - | - | - | 2 | - | 2 | - | 2 |
| CO5 | - | - | - | - | - | 1 | 3 | 2 | - | 2 | - | 2 |
| CO6 | - | - | - | - | - | 2 | 1 | 2 | | 2 | | 2 |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| CO1 | - | - |
| CO2 | - | - |
| CO3 | - | - |
| CO4 | - | - |
| CO5 | - | - |
| CO6 | - | - |

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

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

**UNIT II**
**Nature & Care**
**Activities:**

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

**UNIT III**
**Community Service**
**Activities:**

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

**Reference Books:**

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

**General Guidelines**:

1. Institutes must assign slots in the Timetable for the activities.
2. Institutes are required to provide instructor to mentor the students.

**Evaluation Guidelines:**

1. Evaluated for a total of 100 marks.
2. A student can select 6 activities of his/her choice with a minimum of 01 activity per unit.
3. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
4. A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.

# DR24

# ENGINEERING CURRICULUM

## W.e.f. 2024-25

**SEMESTER - II**

**B.Tech. (Regular-Full time)**

(Effective for the students admitted into I year from
The Academic Year **2024-25** onwards)

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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

**B.Tech. I Year II Semester** (for Group –A Branches - CSE, AID, CSM)

| S.No. | Category | Subject Code | Title | L/D | T | P | Credits |
|---|---|---|---|---|---|---|---|
| 1 | BS&H | BT24BS1205 | Engineering Physics | 3 | 0 | 0 | 3 |
| 2 | BS&H | BT24BS1204 | Differential Equations & Vector Calculus | 3 | 0 | 0 | 3 |
| 3 | BS&H | BT24EE1201 | Basic Electrical and Electronics Engineering | 3 | 0 | 0 | 3 |
| 4 | Engineering Science | BT24ME1201 | Engineering Drawing | 1 | 0 | 4 | 3 |
| 5 | Engineering Science | BT24CS1202 | IT Workshop | 0 | 0 | 2 | 1 |
| 6 | BS&H | BT24CS1201 | Data Structures (Branch specific) | 3 | 0 | 0 | 3 |
| 7 | BS&H | BT24BS1209 | Engineering Physics Lab | 0 | 0 | 2 | 1 |
| 8 | Engineering Science | BT24EE1204 | Electrical and Electronics Engineering Workshop | 0 | 0 | 3 | 1.5 |
| 9 | Engineering Science | BT24CS1203 | Data Structures Lab | 0 | 0 | 3 | 1.5 |
| 10 | BS&H | BT24BS1211 | NSS & Community Service | - | - | 1 | 0.5 |
| **Total** | | | | **13** | **00** | **15** | **20.5** |

**B.Tech. I Year II Semester** (for Group -B Branches - CE, EEE, ME, ECE & IT)

| S.No. | Category | Subject Code | Title | L/D | T | P | Credits |
|---|---|---|---|---|---|---|---|
| 1 | BS&H | BT24BS1201 | Communicative English | 2 | 0 | 0 | 2 |
| 2 | BS& H | BT24BS1203/ BT24BS1202 | Engineering Chemistry / Chemistry | 3 | 0 | 0 | 3 |
| 3 | BS& H | BT24BS1204 | Differential Equations & Vector Calculus | 3 | 0 | 0 | 3 |
| 4 | Engineering Science | BT24CE1201 | Basic Civil & Mechanical Engineering | 3 | 0 | 0 | 3 |
| 5 | Professional Core | BT24ME1202/ BT24EE1203/ BT24CS1201/ BT24EE1202 | Engineering Mechanics / Network Analysis / Data structures / Electrical Circuit Analysis – I (Branch specific) | 3 | 0 | 0 | 3 |
| 6 | BS&H | BT24BS1206 | Communicative English Lab | 0 | 0 | 2 | 1 |
| 7 | BS&H | BT24BS1208/ BT24BS1207 | Engineering Chemistry Lab/ Chemistry Lab | 0 | 0 | 2 | 1 |
| 8 | Engineering Science | BT24ME1203 | Engineering Workshop | 0 | 0 | 3 | 1.5 |
| 9 | Professional Core | BT24CE1202/ BT24ME1204/ BT24EE1206/ BT24CS1202/ BT24EE1205 | Engineering Mechanics & Building Practices Lab/ Engineering Mechanics Lab / Network Analysis and Simulation Lab / Data structures Lab/ Electrical Circuits Lab | 0 | 0 | 3 | 1.5 |
| 10 | BS& H | BT24BS1210 | Health and wellness, Yoga and Sports | - | - | 1 | 0.5 |
| **Total** | | | | **14** | **00** | **11** | **19.5** |

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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- II Semester | Course Code: BT24BS1205 | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| **ENGINEERING PHYSICS** *(Common for all branches of Engineering)* | | | | | |

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

**Course Outcomes:**

**CO1: Analyze** the intensity variation of light due to polarization, interference and diffraction.
**CO2: Examine** the crystal structures with the basics of crystals.
**CO3: Summarize** various types of polarization of dielectrics and classify the magnetic materials.
**CO4: Using fundamentals** of quantum mechanics solve the one dimensional motion of particles.
**CO5: Apply** the basic concepts of quantum free electron theory to Fermi energy and classification of crystalline solids.
**CO6: Identify** the type of semiconductor using Hall effect.

**Mapping of Course Outcomes with Program Outcomes:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 2 | 1 | - | - | - | - | - | - | - | 1 |
| **CO2** | 3 | 2 | 2 | 1 | - | - | - | - | - | - | - | 1 |
| **CO3** | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 1 |
| **CO4** | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 1 |
| **CO5** | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 1 |
| **CO6** | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 1 |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | - | - |
| **CO2** | - | - |
| **CO3** | - | - |
| **CO4** | - | - |
| **CO5** | - | - |
| **CO6** | - | - |

**UNIT I Wave Optics** **12hr**

**Interference:** Introduction - Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colours in thin films- Newton's Rings, Determination of wavelength and refractive index.

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

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

**UNIT II Crystallography and X-ray diffraction 10hr**

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

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

**UNIT III Dielectric and Magnetic Materials 8hr**

**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.

**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.

**UNIT IV Quantum Mechanics and Free electron Theory 10hr**

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

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

**UNIT V Semiconductors 8hr**

**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.

**Textbooks:**

1. Engineering Physics, Dr.D. Tirupathi Naidu and M. Veeranjaneyulu, VGS Publications, 2023.
2. A Text book of Engineering Physics, M. N. Avadhanulu, P.G.Kshirsagar & TVS Arun Murthy, S.Chand Publications, 11th Edition 2019.
3. Engineering Physics - D.K.Bhattacharya and Poonam Tandon, Oxford press (2015)

**Reference Books:**

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

**Web Resources:**

https://dnrcet.org/web/departments/hs/courses/b-tech/syllabus/

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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- II Semester | Course Code: BT24BS1204 | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS**
*(Common to All Branches of Engineering)*

**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

**CO1:** Solve first-order linear differential equations
**CO2:** Understand homogeneous and non-homogeneous linear differential equations
**CO3:** Understand the basic concepts of partial differential equations (PDEs)
**CO4:** Solve first-order linear partial differential equations using **Lagrange's method.**
**CO5:** Apply the **Del operator** to scalar point functions to compute **gradients** and **directional derivatives**
**CO6:** Evaluate **volume integrals** and apply the **Divergence Theorem** (with proof) to relate surface and volume integrals in vector fields

**Mapping of Course Outcomes with Program Outcomes:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | - | - | - | - | - | - | - | - | - | - |
| CO2 | 3 | 3 | - | - | - | - | - | - | - | - | - | - |
| CO3 | 3 | 3 | - | - | - | - | - | - | - | - | - | - |
| CO4 | 3 | 3 | - | - | - | - | - | - | - | - | - | - |
| CO5 | 3 | 2 | - | - | - | - | - | - | - | - | - | - |
| CO6 | 3 | 3 | - | - | - | - | - | - | - | - | - | - |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| CO1 | - | - |
| CO2 | - | - |
| CO3 | - | - |
| CO4 | - | - |
| CO5 | - | - |
| CO6 | - | - |

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

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

**UNIT-II Linear differential equations of higher order(Constant Coefficients) 10 hr**

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

**UNIT-III Partial Differential Equations 10 hr**

Introduction and 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.

**UNIT-IV Vector differentiation 8 hr**

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

**UNIT-V Vector integration 10 hr**

LWithoutegral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and related problems.

**Textbooks:**

1.Higher Engineering Mathematics,B.S.Grewal,KhannaPublishers,2017,44th Edition
2.Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition.

**Reference Books:**

1.Thomas Calculus, George B.Thomas, MauriceD.Weir and JoelHass, Pearson Publishers, 2018, 14th Edition.
2.Advanced Engineering Mathematics, Dennis G. Zill and Warren S. Wright, Jones and Bartlett, 2018.
3.Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5th Edition.
4.Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
5.Higher Engineering Mathematics, B.V.Ramana, Mc Graw Hill Education,2017

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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- II Semester | Course Code: BT24EE1201 | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**BASIC ELECTRICAL & ELECTRONICS ENGINEERING**
*(Common to All branches of Engineering)*

**Course Objectives:** Students will learn

- About the basic principles of Direct Current (DC) & Alternating Current (AC) Circuit analysis
- About the fundamentals of magnetic circuits analysis.
- About Electrical Wiring and Electrical Safety.

**Course Outcomes:** At the end of the course, the student will be able to
**CO1: Apply** the circuit laws for the analysis of simple DC and AC circuits.
**CO2: Apply** the basic principles for solving fundamental magnetic circuits**.**
**CO3: Apply** the basic principles of electrical wiring and electric safety measures**.**

**Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:**

| | PO1 | PO2 | PO3 | PO4 | PO 5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | 2 | - | 1 | - | - | 3 | 3 | 3 | 1 |
| CO2 | 3 | 3 | 2 | 2 | - | 2 | - | - | 2 | 3 | 3 | 1 |
| CO3 | 3 | 2 | 2 | 1 | - | 3 | - | - | 2 | 3 | 3 | 1 |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| CO1 | 1 | 2 |
| CO2 | 1 | 1 |
| CO3 | 1 | 2 |

**PART A: BASIC ELECTRICAL ENGINEERING**

**UNIT I INTRODUCTION TO ELECTRICAL CIRCUITS**

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

**UNIT II MAGNETIC CIRCUITS**

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

**UNIT III ELECTRICAL WIRING, ELECTRICITY BILL & SAFETY MEASURES**

**Electrical Wiring:** SimpleLamp circuits, stair case wiring scheme, godown wiring scheme, types of service mains, types of electrical wiring, cost estimation of indoor wiring, wiring layout of workshop/ electrical laboratory.

**Electricity bill:** Power rating of household appliances including air conditioners, PCs, Laptops, Printersetc., Types of 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, SafetyPrecautions to avoid shock

**PART B: BASIC ELECTRONICS ENGINEERING**

**Course Objectives:** Students will learn

- To teach the fundamentals of semiconductor devices and its applications, principles of digital electronics.

**Course Outcomes:** At the end of the course, the student will be able to
**CO4: Analyze** various characteristics of semiconductor devices.
**CO5: Apply** the basic principles for understanding and working of rectifiers and power Supplies.
**CO6: Explain** the working of various logic gates**.**

**Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO4** | 2 | 1 | 2 | 1 | - | 1 | - | - | - | - | 1 | 3 |
| **CO5** | 3 | 1 | 2 | 1 | - | 1 | - | - | - | - | 1 | 3 |
| **CO6** | 2 | 2 | 2 | 1 | - | 1 | - | - | - | - | 1 | 3 |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| **CO4** | 2 | - |
| **CO5** | 2 | - |
| **CO6** | 2 | - |

**UNIT I**: **SEMICONDUCTOR DEVICES**

Introduction - Evolution of electronics – Vacuum tubes to nano electronics - Characteristics of PN Junction Diode — Zener Effect — Zener Diode and its Characteristics. Bipolar Junction Transistor — CB, CE, CC Configurations and Characteristics — Elementary Treatment of Small Signal CE Amplifier

**UNIT II**: **BASIC ELECTRONIC CIRCUITS AND INSTRUMENTTAION**

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

**UNIT III :DIGITAL ELECTRONICS**

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

**Textbooks:**


1. Principles of Electrical and Electronics Engineering, V.K. Mehtha, S. Chand Technical Publishers
2. Basic Electrical Engineering, Ritu SahDev, Khanna Publishers, 2018, First Edition.
3. FundamentalsofElectricalCircuits,CharlesK.AlexanderandMathewN.O.Sadiku,McGrawHill Education (India),2013,Fifth Edition
4. Electrical Wiring Estimating and Costing –Dr. S. L. Uppal-Khanna Publishers-198

5. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition
6. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition.

**Reference Books:**

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Mc Graw Hill, 2019,Fourth Edition
2. Principles of Power Systems, V.K. Mehtha, S.Chand Technical Publishers, 2020
3. Circuit Theory, Abhijit Chakrabarti, Dhanpat Rai & Co. Publications, 8th edition, 2023.
4. BasicElectricalEngineering,D.C.Kulshreshtha,TataMcGrawHill, First Edition, 2019
5. Basic Electrical and Electronics Engineering, S. K. Bhatacharya, Person Publications, 2018, Second Edition.

**E-Resources:**

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

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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- II Semester | Course Code: BT24ME1201 | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 4 | 3 |
| **ENGINEERING DRAWING**<br>*(Common to EEE, ECE, CSE, CSE aligned branches and IT)* | | | | | |

**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
- To improve the visualization skills for better understanding of projection of plane surfaces
- To improve the visualization skills for better understanding of projection of solids
- To make the students understand the viewing perception of a solid object in Isometric and Perspective projections.

**Course Outcomes:**

**CO1:** Construct polygons, curves and scales.
**CO2:** Identify the position of points and lines.
**CO3:** Identify the position of lines when inclined to both the planes.
**CO4:** Analyze the location and position of plane figures**.**
**CO5:** Analyze the location and position of solid bodies.
**CO6 :** Develop an Isometric view and orthographic views

**Mapping of Course Outcomes with Program Outcomes:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 1 | - | - | - | - | - | 1 | - | 2 |
| **CO2** | 3 | 2 | 3 | 1 | - | - | - | - | - | 1 | - | 2 |
| **CO3** | 3 | 2 | 3 | 1 | - | - | - | - | - | 1 | - | 2 |
| **CO4** | 3 | 2 | 3 | 1 | 1 | - | - | - | 1 | 1 | - | 2 |
| **CO5** | 3 | 2 | 3 | 1 | 1 | - | - | - | 1 | 1 | - | 2 |
| **CO6** | 3 | 2 | 3 | 2 | 1 | - | - | - | 3 | 1 | 1 | 2 |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | - | - |
| **CO2** | - | - |
| **CO3** | - | - |
| **CO4** | - | - |
| **CO5** | - | - |
| **CO6** | - | - |

**UNIT I**

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

**Curves:** construction of ellipse, parabola and hyperbola by general, 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

**UNIT III**

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

**UNIT IV**

**Projections of Solids:** Types of solids: Polyhedra and Solids of revolution.

**Projections of solids in simple positions:** Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane and Axis parallel to both the reference planes, Projection of Solids with axis inclined to one reference plane and parallel to another plane.

**UNIT V**

**Conversion of Views:** Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

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

**Textbook:**

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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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- II Semester | Course Code: BT24CS1202 | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 1 |
| **IT WORKSHOP** *(Common to all branches of Engineering)* | | | | | |

**Course Objectives:**

- To introduce the internal parts of a computer, peripherals, I/O ports, connecting cables
- To demonstrate configuring the system as Dual boot both Windows and other Operating Systems Viz. Linux, BOSS
- 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:**

**CO1:** Apply knowledge for computer assembling and software installation and solve trouble shooting problems (L3)
**CO2:** Understand hardware components and inter dependencies (L2).
**CO3:** Evaluate the cyber hygiene that is protecting the personal computer from getting infected with the viruses, worms and other cyber-attacks (L5).
**CO4:** Use various Microsoft tools like professional word documents and presentations (L2).
**CO5:** Calculate various excel spreadsheets (L4).
**CO6:** Build various AI Tools – Chartgpt (L6).

. **Mapping of Course Outcomes with Program Outcomes:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 2 | 3 | 2 | 2 | 2 | - | - | - | - | - | - | - |
| **CO2** | 2 | 3 | 3 | 3 | - | - | - | - | - | - | - | - |
| **CO3** | 2 | 3 | 3 | 2 | 3 | - | - | - | - | - | - | - |
| **CO4** | 2 | 3 | 3 | 3 | 2 | - | - | - | - | - | - | - |
| **CO5** | 2 | 3 | 3 | 2 | 2 | - | - | - | - | - | - | - |
| **CO6** | 3 | 2 | 3 | 2 | 2 | - | - | - | - | - | - | - |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | - | 2 |
| **CO2** | - | - |
| **CO3** | - | - |
| **CO4** | 2 | - |
| **CO5** | 2 | - |
| **CO6** | - | - |

**PC Hardware** & Software Installation

**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 (VMWare) with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

**Task 5:** Every student should install BOSS on the computer. The system should be configured as dual boot (VMWare) with both Windows and BOSS. 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 La TeX and Word.

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

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

**EXCEL**

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

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

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

**LOOKUP/VLOOKUP**

**Task 3**: Split cells, freeze panes, group and outline, Sorting, Boolean 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 AI. Please answer the following question: What is the capital of France?"

**Task 2:** Creative Writing: Use the model as a writing assistant. Provide the beginning of a story or a description of a scene, and let the model generate the rest of the content. This can be a fun way to brainstorm creative ideas

• Ex: Prompt: "In a world where gravity suddenly stopped working, people started floating upwards. Write a story about how society adapted to this new reality."

**Task 3:** 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?'"

**Reference Books:**


1. Comdex Information Technology course tool kit, Vikas Gupta, WILEY Dream tech, 2003
2. The Complete Computer upgrade and repair book, Cheryl A Schmidt, WILEY Dream tech, 2013, 3rd edition
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education, 2012, 2nd edition
4. PC Hardware - A Handbook, Kate J. Chase, PHI (Microsoft)
5. LaTeX Companion, Leslie Lamport, PHI/Pearson.
6. IT Essentials PC Hardware and Software Companion Guide, David Anfins on and Ken Quamme. – CISCO Press, Pearson Education, 3rd edition
7. IT Essentials PC Hardware and Software Labs and Study Guide, Patrick Regan– CISCO Press, Pearson Education, 3rd edition

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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- II Semester | Course Code: BT24CS1201 | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| **DATA STRUCTURES** *(Common to CSE and IT)* | | | | | |

**Course Objectives:**

- To provide the knowledge of basic data structures and their implementations.
- To understand importance of data structures in context of writing efficient programs.
- To develop skills to apply appropriate data structures in problem solving.

**Course Outcomes:** At the end of the course, Student will be able to

**CO1: Explain** the role of linear data structures in organizing and accessing data efficiently in algorithms.

**CO2: Design,** implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation.

**CO3: Develop** programs using stacks to handle recursive algorithms, manage program states, and solve related problems.

**CO4: 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.

**CO5: Devise** novel solutions to small scale programming challenges involving data structures such as stacks, queues, Trees.

**CO6: Recognize** scenarios where hashing is advantageous, and design hash-based solutions for specific problems.

**Mapping of Course Outcomes with Program Outcomes:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 2 | 2 | 2 | 2 | - | - | - | - | - | - | - | 2 |
| **CO2** | 2 | 2 | 3 | 2 | - | - | - | - | - | - | - | 2 |
| **CO3** | 2 | 3 | 3 | 2 | - | - | - | - | - | - | - | 3 |
| **CO4** | 2 | 3 | 3 | 2 | - | - | - | - | - | - | - | 2 |
| **CO5** | 2 | 3 | 3 | 3 | - | - | - | - | - | - | - | 2 |
| **CO6** | 2 | 2 | 3 | 3 | - | - | - | - | - | - | - | 2 |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | 2 | 2 |
| **CO2** | 2 | 2 |
| **CO3** | 2 | 3 |
| **CO4** | 3 | 2 |
| **CO5** | 2 | 2 |
| **CO6** | 2 | 2 |

**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. Searching Techniques: Linear & Binary Search, Sorting Techniques: Bubble sort, Selection sort, Insertion Sort

**UNIT II**

**Linked Lists:** Singly linked lists: representation and operations, doubly linked lists and circular linked lists, Comparing arrays and linked lists, Applications of linked lists.

**UNIT III**

**Stacks:** Introduction to stacks: properties and operations, implementing stacks using arrays and linked lists, Applications of stacks in expression evaluation, backtracking, reversing list etc.

**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.

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

**UNIT V**

Trees: Introduction to Trees, Binary Search Tree – Insertion, Deletion & Traversal

**Hashing: Brief** introduction to hashing and hash functions, Collision resolution techniques: chaining and open addressing, Hash tables: basic implementation and operations, Applications of hashing in unique identifier generation, caching, etc.

**Textbooks:**


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


**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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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- II Semester | Course Code: BT24BS1209 | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 1 |
| **ENGINEERING PHYSICS LAB** *(Common to All Branches of Engineering)* | | | | | |

**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
**CO1: Operate** optical instruments like travelling microscope and spectrometer.
**CO2: Estimate** the wavelengths of different colours using diffraction grating.
**CO3: Plot** the intensity of the magnetic field of circular coil carrying current with distance.
**CO4:Evaluate** dielectric constant and magnetic susceptibility for dielectric and magnetic materials respectively.
**CO5: Calculate** the band gap of a given semiconductor.
**CO6: Identify** the type of semiconductor using Hall effect.

**Mapping of Course Outcomes with Program Outcomes:**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO 1** | 3 | 2 | - | - | - | - | - | - | 1 | - | - | 1 |
| **CO 2** | 3 | 2 | - | - | - | - | - | - | 1 | - | - | 1 |
| **CO 3** | 3 | 2 | - | - | - | - | - | - | 1 | - | - | 1 |
| **CO 4** | 3 | 2 | - | - | - | - | - | - | 1 | - | - | 1 |
| **CO 5** | 3 | 2 | - | - | - | - | - | - | 1 | - | - | 1 |
| **CO 6** | 3 | 2 | - | - | - | - | - | - | 1 | - | - | 1 |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | - | - |
| **CO2** | - | - |
| **CO3** | - | - |
| **CO4** | - | - |
| **CO5** | - | - |
| **CO6** | - | - |

**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 susceptibility 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 nonuniformbending (or double cantilever) method.
18. Determination of Frequency of electrically maintained tuning fork by Melde's experiment.

**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.

**Web Resources:**

1. www.vlab.co.in

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**DEPARTMENT OF ELECTRICAL & ELCTRONICS ENGINEERING**

| I Year- II Semester | Course Code: BT24EE1204 | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 3 | 1.5 |

**ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP**
*(Common to All branches of Engineering)*

**Course Objectives:** Students will learn

- To verify Kirchhoff's laws.
- To measure various electrical quantities using different types of meters.
- About safety measures used in electrical systems.

**Course Outcomes:** At the end of the course, the student will be able to
**CO1: Study** and identification of various electrical circuit components and also measure voltage, current and power electrical circuits.
**CO2: Choose** and assemble various wiring schemes.
**CO3: Solve** electrical energy and measure earth resistance for domestic premises.

**Mapping of Course Outcomes with Program Outcomes:**

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

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | 2 | - |
| **CO2** | 2 | - |
| **CO3** | 2 | 2 |

**Part-A BASIC ELECTRICAL ENGINEERING LAB**

**List of Experiments:**

1. Identification of various types of resistors and capacitors and understand the usage of digital multi-meter
2. Study various types of electrical cables/wires, switches, fuses, fuse carriers, MCB, ELCB, RCCB, and MCCB with their specifications and usage.
3. Measurement of Voltage, Current and Power in a DC Circuit
4. Verification of KCL and KVL
5. Measurement of Earth Resistance using Megger
6. Calculation of Electrical Energy for Domestic Premises
7. Staircase wiring scheme
8. Godown wiring scheme

**Note:** A minimum of six experiments are to be performed.

**Reference Books:**

1. Engineering Circuits Analysis, Jack Kemmerly,WilliamHayt and Steven Durbin, Tata McGraw Hill Education,2020, 9thedition.
2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013
3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition
4. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition.

**PART B: ELECTRONICS ENGINEERING LAB**

**Course Objectives**: To impart knowledge on the principles of digital electronics and fundamentals of electron devices & its applications.

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

**CO4: Identify** the various electronic components andunderstand the working of components.

**CO5: Plot** and discuss the characteristics of various electron devices.

**CO6: Explain** the operation of a digital circuit.

**Mapping of Course Outcomes with Program Outcomes:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO4** | 3 | 2 | 2 | - | - | - | - | - | - | 1 | - | 3 |
| **CO5** | 3 | 2 | 2 | - | - | - | - | - | - | 1 | - | 3 |
| **CO6** | 3 | 2 | 2 | - | - | - | - | - | - | 1 | - | 3 |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| **CO4** | 2 | - |
| **CO5** | 2 | - |
| **CO6** | 2 | - |

**List of Experiments**

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

Tools / Equipment Required: DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices.

**Reference 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. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education,2009.

**Note:** A minimum of six experiments are to be performed. All the experiments shall be implemented using both Hardware and Software

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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- II Semester | Course Code: BT24CS1203 | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 3 | 1.5 |
| **DATA STRUCTURES LAB** *(Common to CSE and IT)* | | | | | |

**Course Objectives:**
The course aims to strengthen the ability of the students to identify and apply the suitable data structure for the given real-world problem. It enables them to gain knowledge in practical applications of data structures.

**Course Outcomes:** At the end of the course, Student will be able to

**CO1:** Explain the role of linear data structures in organizing and accessing data efficiently in algorithms

**CO2:** Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation

**CO3:** Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems

**CO4:** Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between deques and priority queues

**CO5:** Apply the map propriately to solve data management challenges

**CO6:** Recognize scenarios where hashing is advantageous, and design hash-based solutions for specific problems

**Mapping of Course Outcomes with Program Outcomes:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 3 | 3 | - | - | - | - | - | - | - | 3 |
| **CO2** | 3 | 3 | 3 | 3 | - | - | - | - | - | - | - | 2 |
| **CO3** | 3 | 2 | 3 | 2 | - | - | - | - | - | - | - | 2 |
| **CO4** | 3 | 3 | 2 | 2 | - | - | - | - | - | - | - | 2 |
| **CO5** | 2 | 3 | 3 | 2 | - | - | - | - | - | - | - | 2 |
| **CO6** | 2 | 3 | 3 | 3 | - | - | - | - | - | - | - | 2 |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | 2 | 2 |
| **CO2** | 2 | 3 |
| **CO3** | 3 | 2 |
| **CO4** | 2 | 2 |
| **CO5** | 3 | 3 |
| **CO6** | 2 | 2 |

**List of Experiments:**

**Exercise 1: Array Manipulation**

i. Write a program to reverse an array.
ii. C Programs to implement the Searching Techniques – Linear & Binary Search
iii. C Programs to implement Sorting Techniques – Bubble, Selection and Insertion Sort

**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: Binary Search Tree**

i. Implementing a BST using Linked List.
ii. Traversing of BST.

**Exercise 9: Hashing**

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

**Textbooks:**

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

**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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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- II Semester | Course Code: BT24BS1211 | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 1 | 0.5 |
| **NSS and COMMUNITY SERVICE** *(Common to All branches of Engineering)* | | | | | |

**Course Objectives**:
The objective of introducing this course is to impart discipline, character, fraternity, teamwork, social consciousness among the students and engaging them in selfless service.
**Course Outcomes**: After completion of the course the students will be able to
**CO1:** Understand the importance of discipline, character and service motto
**CO2:** Solve some societal issues by applying acquired knowledge, facts, and techniques.
**CO3:** Explore human relationships by analyzing social problems
**CO4:** Determine to extend their help for the fellow beings and downtrodden people.
**CO5:** Develop leadership skills and civic responsibilities.
**CO6:** Participate in activities related to health, hygiene, environment, literacy, disaster management, and gender equity with empathy and commitment.

**Mapping of Course Outcomes with Program Outcomes:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | - | - | 3 | - | 2 | - | 3 |
| CO2 | - | - | - | - | - | 3 | - | 1 | - | 2 | - | 2 |
| CO3 | - | - | - | - | - | - | - | 3 | - | 2 | - | 2 |
| CO4 | - | - | - | - | - | - | - | 2 | - | 2 | - | 2 |
| CO5 | - | - | - | - | - | 1 | 3 | 2 | - | 2 | - | 2 |
| CO6 | - | - | - | - | - | 2 | 1 | 2 | | 2 | | 2 |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| CO1 | - | - |
| CO2 | - | - |
| CO3 | - | - |
| CO4 | - | - |
| CO5 | - | - |
| CO6 | - | - |

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

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

**UNIT II**
**Nature & Care**
**Activities:**

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

**UNIT III**
**Community Service**
**Activities:**

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

**Reference Books:**

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

**General Guidelines**:

1. Institutes must assign slots in the Timetable for the activities.
2. Institutes are required to provide instructor to mentor the students.

**Evaluation Guidelines:**

1. Evaluated for a total of 100 marks.
2. A student can select 6 activities of his/her choice with a minimum of 01 activity per unit.
3. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
4. A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.

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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- II Semester | Course Code: BT24BS1201 | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 0 | 2 |
| **COMMUNICATIVE ENGLISH (Common to All Branches of Engineering)** | | | | | |

**Course Objectives**:

The main objective of introducing this course, *Communicative 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:**

**CO1: Understand** the context, theme, and pieces of specific information from social or Transactional dialogues.

**CO2: Apply** the principles of writing skills and cohesive devices in paragraphs and formal/informal communication.

**CO3: Build** confidence and creative thinking by challenging the hardships in life.

**CO4: Discover** the peace and amicable relations in human development.

**CO5: Perceive** the personal traits and communicative competence in the form of interpersonal communication.

**CO6: Form** error free sentences in communication by using proper grammatical structures and correct word forms.

**Mapping of Course Outcomes with Program Outcomes:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO2 | - | - | - | - | - | - | - | - | - | 3 | - | 2 |
| CO3 | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO4 | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO5 | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | 3 | - | 3 |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| CO1 | - | - |
| CO2 | - | - |
| CO3 | - | - |
| CO4 | - | - |
| CO5 | - | - |
| CO6 | - | - |

**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.

**Speaking:** Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.

**Reading:** Skimming to get the main idea of a text; scanning to look for specific pieces of information.

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

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

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

**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.

**Speaking:** Discussion in pairs / small groups on specific topics followed by short structure talks

**Reading:** Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

**Writing:** Structure of a paragraph - Paragraph writing (specific topics)

**Grammar:** Cohesive devices - linkers, use of articles and zero article; prepositions.

**Vocabulary:** Homonyms, Homophones, Homographs.

**UNIT III Lesson: BIOGRAPHY: Elon Musk**

**Listening:**Listening for global comprehension and summarizing what is listened to.

**Speaking:**Discussing specific topics in pairs or small groups and reporting what is discussed

**Reading :**Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.

**Writing :**Summarizing, Note-making, paraphrasing

**Grammar:**Verbs - tenses; subject-verb agreement; Compound words, Collocations

**Vocabulary:** Compound words, 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

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

**Vocabulary:** Words often confused, Jargons

**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

**Reading:**Reading comprehension.

**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 Jargons

**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.

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**BALUSUMUDI, BHIMAVARAM, W.G. Dist., A.P., PIN-534 202**

**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- II Semester | Course Code: BT24BS1203 | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| **ENGINEERING CHEMISTRY** *(Common to Civil and Mechanical Engineering)* | | | | | |

**Course Objectives:**

- To familiarize engineering chemistry and its applications
- To train the students on the principles and applications of electrochemistry and polymers

**Course Outcomes:**

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

**CO1:** Understand the boiler troubles and different water treatment methods
**CO2:** Distinguish between batteries ,and fuel cells
**CO3:** Explain the properties and applications of plastics, elastomers and fuels.
**CO4:** Apply Composites, refractories, lubricants and cement materials in the field of engineering
**CO5:** Summarize the concepts of colloids ,micelle ,and Nano-materials
**CO6:** Describe the corrosion revention methods

**Mapping of Course Outcomes with Program Outcomes:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 2 | - | - | - | - | - | - | 1 | | 1 |
| **CO2** | 3 | 2 | 2 | - | - | - | - | - | - | 1 | | 2 |
| **CO3** | 2 | 2 | 2 | - | - | - | - | - | - | 1 | | 2 |
| **CO4** | 3 | 2 | 2 | - | - | - | - | - | - | 1 | | 2 |
| **CO5** | 3 | 2 | 2 | - | - | - | - | - | - | 1 | | 2 |
| **CO6** | 3 | 2 | 2 | - | - | - | - | - | - | 1 | | 2 |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | - | - |
| **CO2** | - | - |
| **CO3** | - | - |
| **CO4** | - | - |
| **CO5** | - | - |
| **CO6** | - | - |

**UNIT – I Water Technology**

Soft and hardwater, 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**

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 Bed worth ratios and uses, Factors affecting the corrosion, cathode 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. PVC Nylon 6,6 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. 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, colloids, nanometals and nanometal oxides, micelle formation, synthesis of colloids (Braggs Method), chemical and biological methods of preparation of nanometals and metal oxides, stabilization of colloids and nanomaterials by stabilizing agents, adsorption isotherm (Freundlich and Longmuir), BET equation (no derivation) applications of colloids and nanomaterials – catalysis, medicine, sensors, etc.

**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. H.F.W. Taylor, Cement Chemistry, 2/e, Thomas Telford Publications, 1997.
2. Textbook of Polymer Science, Fred W. Billmayer Jr, 3rd Edition
3. J. Shaw, Introduction to Colloids and Surface Chemistry, Butterworth-Heineman, 1992
4. A text book of Engineering Chemistry by Sashi Chawala, Dhanpat Rai & Co. 2017.

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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- II Semester | Course Code: BT24BS1202 | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| **CHEMISTRY** *(Common to ECE, EEE and IT)* | | | | | |

**Course Objectives:**

- To familiarize engineering chemistry and its applications
- To train the students on the principles and applications of electrochemistry and polymers

**Course Outcomes:**

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

**CO1: Understand** the fundamentals of Quantum mechanics and Molecular Orbital Theory.
**CO2: Apply** the basic principles of semiconductors, super conductors, and nanomaterials in real world applications.
**CO3: Compare** the materials for construction of batteries and electrochemical sensors.
**CO4: Explain** the preparation, properties, and applications of thermoplastics thermosetting, elastomers and conducting polymers.
**CO5: Summarize** the concepts of Instrumental methods.
**CO6: Define** the principles of spectrometry, slc in separation of solid and liquid mixtures.

**Mapping of Course Outcomes with Program Outcomes:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 1 |
| **CO2** | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 2 |
| **CO3** | 2 | 2 | 2 | - | - | - | - | - | - | - | - | 2 |
| **CO4** | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 2 |
| **CO5** | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 2 |
| **CO6** | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 1 |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | - | - |
| **CO2** | - | - |
| **CO3** | - | - |
| **CO4** | - | - |
| **CO5** | - | - |
| **CO6** | - | - |

**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.

**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 nanoparticles.

**UNIT III Electrochemistry and Applications**

Electrochemical cell, Nernst equation, cell potential calculations and numerical problems, potentiometer- potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations).

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). Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples

Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples.

**UNIT IV Polymer Chemistry**

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

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

Elastomers–Buna-S, Buna-N–preparation, properties and applications. Conducting polymers – polyacetylene, polyaniline, – mechanism of conduction and applications. Bio- Degradable polymers - Poly Glycolic Acid (PGA), Poly Lactic Acid (PLA).

**UNIT V Instrumental Methods and Applications**

Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. UV-Visible Spectroscopy, electronic transition, Instrumentation, IR spectroscopes', fundamental modes and selection rules, Instrumentation. 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. Text book of Polymer Science, Fred W. Billmayer Jr., 3rd Edition
4. A text book of Engineering Chemistry by Sashi Chawala, Dhanpat Rai & Co. 201

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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- II Semester | Course Code: BT24CE1201 | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| **BASIC CIVIL AND MECHANICAL ENGINEERING** (Common to All branches of 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:
**CO1:** Understand the various sub divisions of Civil Engineering and their role in ensuring better society.
**CO2:** Know the objectives of surveying and understand the measurement of distances, angles and levels through surveying
**CO3:** Understand the role of Transportation Engineering in Nation's economy and importance of Water Resource Engineering and Environmental Engineering.

**Mapping of Course Outcomes with Program Outcomes:**

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

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | 2 | 2 |
| **CO2** | 2 | 2 |
| **CO3** | 2 | 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.

**UNIT II**

**Surveying:** Objectives of Surveying- Horizontal Measurements- Angular Measurements- Introduction to Bearings Levelling instruments used for levelling -Simple problems on levelling and bearings- Contour mapping.

**UNIT III**

Transportation Engineering Importance of Transportation in Nation's economic development- Types of Highway Pavements- Flexible Pavements and Rigid Pavements - 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–Rainwater Harvesting-Water Storage and Conveyance Structures (Simple introduction to Dams and Reservoirs).

**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, Satheesh Gopi, 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.


## 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:

**CO4: Understand** the different manufacturing processes.

**CO5: Explain** the basics of thermal engineering and its applications and the working of different mechanical power transmission systems and power plants.

**CO6: Describe** the basics of robotics and its applications

**Mapping of Course Outcomes with Program Outcomes:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO4** | 2 | - | - | - | - | 2 | 2 | - | - | - | - | - |
| **CO5** | 2 | 1 | - | - | 1 | 1 | - | - | - | - | - | - |
| **CO6** | 1 | - | - | - | - | 1 | 1 | - | - | - | - | - |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| **CO4** | 1 | - |
| **CO5** | - | - |
| **CO6** | - | - |

**UNIT I**

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

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

**UNIT II**

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

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

**UNIT III**

Power plants – Working principle of Steam, Diesel, Hydro, Nuclear power plants. Mechanical Power Transmission - Belt Drives, Chain, Rope drives, Gear Drives and their applications.

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

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

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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- II Semester | Course Code: BT24ME1202 | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| **ENGINEERING MECHANICS** (Common to CE and ME) | | | | | |

**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
**CO1: Understand** the fundamental concepts in mechanics and determine thefrictional forces for bodies in contact.
**CO2: Analyze** different force systems such as concurrent, coplanar and spatial systemsand calculate their resultant forces and moments.
**CO3: Calculate** the centroids, center of gravity and moment of inertia of differentgeometrical shapes.
**CO4: Apply** the principles of work-energy and impulse-momentum to solve the problems of rectilinear and curvilinear motion of a particle.
**CO5: Solve** the problems involving the translational and rotational motion of rigid bodies.
**CO6: Calculate** the equilibrium of systems using work-Energy method

**Mapping of Course Outcomes with Program Outcomes:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | - | - | - | - | - | - | - | 1 | - | 2 |
| CO2 | 3 | 2 | 1 | - | - | 1 | - | - | - | 1 | - | 2 |
| CO3 | 3 | 3 | 2 | 1 | - | - | - | - | - | 1 | - | 2 |
| CO4 | 3 | 3 | 2 | 1 | - | - | - | - | - | 1 | - | 2 |
| CO5 | 3 | 1 | 1 | 1 | - | - | - | - | - | 1 | - | 2 |
| CO6 | 2 | 3 | 2 | 1 | - | - | - | - | - | 1 | - | 2 |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| CO1 | - | - |
| CO2 | - | - |
| CO3 | - | - |
| CO4 | - | - |
| CO5 | - | - |
| CO6 | - | - |

**UNIT I**

Introduction to Engineering Mechanics – Basic Concepts. 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 and impending motion, Coulomb'slaws of dryfriction, 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, 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, Pappus 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.

**UNIT IV**

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

**UNIT V**

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

**Textbooks:**


1. Engineering Mechanics, S. Timoshenko, D. H. Young, J.V. Rao, S. Pati., , McGraw Hill Education 2017. 5th Edition.
2. Engineering Mechanics, P.C.Dumir- S.Sengupta and Srinivas V veeravalli , University press. 2020. First Edition.
3. A Textbook of Engineering Mechanics, S.S Bhavikatti. New age international publications 2018. 4th Edition.


**Reference Books:**


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

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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- II Semester | Course Code: BT24EE1203 | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| **NETWORK ANALYSIS** (ECE & allied branches) | | | | | |

**Course Objectives: Students will learn**

- 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 the transient behavior of circuits in time and frequency domains and teach concepts of resonance
- To teach concepts of resonance and introduce open circuit, short circuit, transmission, hybrid parameters, and their interrelationship.

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

**CO1: Identify** basic electrical circuits with nodal and mesh analysis and Apply network theorems for the analysis of AC and DC networks

**CO2: Analyze** transient response and Steady state response of network.

**CO3: Apply** nodal and mesh networks, series and parallel circuits, steady state response, different circuit topologies (with R, L and C components).

**CO4: Apply** steady state response, different circuit topologies (with R, L and C components).

**CO5: Analyze** the resonant circuits and draw the locus diagrams.

**CO6: Develop** the parameters of a two-port network.

**Mapping of Course Outcomes with Program Outcomes:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 | 1 | - | - | - | - | - | - | 2 |
| **CO2** | 3 | 3 | 2 | 2 | 1 | - | - | - | - | - | - | 2 |
| **CO3** | 3 | 3 | 2 | 2 | 1 | - | - | - | - | - | - | 2 |
| **CO4** | 3 | 2 | 2 | 1 | 1 | - | - | - | - | - | - | 2 |
| **CO5** | 3 | 2 | 2 | 2 | 1 | - | - | - | - | - | - | 2 |
| **CO6** | 3 | 3 | 2 | 2 | 2 | - | - | - | - | - | - | 2 |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | - | 2 |
| **CO2** | - | 2 |
| **CO3** | - | 2 |
| **CO4** | - | 2 |
| **CO5** | - | 2 |
| **CO6** | - | 2 |

**UNIT I ELECTRICAL CIRCUITS & NETWORK THEOREMS**

Types of circuit components, Types of Sources and Source Transformations, 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, Millman's, Reciprocity, Compensation, Substitution, Superposition, Max Power Transfer, and Tellegens-problem solving using dependent sources also

**UNIT II TRANSIENTS & LAPLACE TRANSFORM APPLICATIONS**

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.

**UNIT III SINGLE PHASE AC SYSTEMS**

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, and problem solving using Laplace transforms also.

**UNIT IV MAGNETIC CIRCUITS & RESONANCE**

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. 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**

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

**Textbooks:**


1. Engineering Circuit Analysis by William H. Hayt, Jack Kemmerly, Jamie Phillips, Steven M. Durbin, and 9th Edition 2020.
2. Network lines and Fields by John. D. Ryder 2nd Edition, PHI
3. Network Analysis – ME Van Valkenberg, Prentice Hall of India, revised 3rd Edition, 2019.
4. Circuit Theory, Abhijit Chakrabarti, Dhanpat Rai & Co. Publications, 8th edition, 2023


**Reference Books:**


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


**E-Resources:**

1. https://nptel.ac.in/courses/108105159
2. https://nptel.ac.in/courses/117106108

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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- II Semester | Course Code: BT24EE1202 | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| **ELECTRICAL CIRCUIT ANALYSIS-I** (EEE & allied branches) | | | | | |

**Course Objectives: Students will learn**

- About various techniques of circuit analysis using resistive circuits and the fundamentals of AC circuit analysis
- About magnetically coupled and 3 – phase circuits and the resonance phenomenon in Electrical circuits.
- About various theorems in Electrical Circuits.

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

**CO1: Apply** nodal and mesh networks, series and parallel circuits, steady-state response, and different circuit topologies (with R, L and C components)
**CO2: Analyze** the resonant circuits and draw the locus diagrams.
**CO3: Apply** network theorems for the analysis of DC networks.
**CO4: Apply** network theorems for the analysis of AC networks.
**CO5: Analyze** three-phase balanced circuits
**CO6: Analyze** three-phase unbalanced circuits

**Mapping of Course Outcomes with Program Outcomes:**

| | PO1 | PO2 | PO3 | PO4 | PO 5 | PO6 | PO 7 | PO 8 | PO 9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 | - | 1 | - | - | - | - | - | 1 |
| **CO2** | 3 | 3 | 2 | 2 | - | 2 | - | - | - | - | - | 1 |
| **CO3** | 3 | 2 | 2 | 1 | - | 2 | - | - | - | - | - | 1 |
| **CO4** | 2 | 2 | 2 | 2 | - | 2 | - | - | - | - | - | 1 |
| **CO5** | 3 | 2 | 2 | 1 | - | 1 | - | - | - | - | - | 1 |
| **CO6** | 2 | 2 | 2 | 2 | - | 1 | - | - | - | - | - | 1 |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | 1 | 1 |
| **CO2** | 1 | 1 |
| **CO3** | 1 | 1 |
| **CO4** | 1 | 1 |
| **CO5** | 1 | 1 |
| **CO6** | 1 | 1 |

**UNIT I SINGLE PHASE A.C SYSTEMS**

Periodic waveforms - average value, rms value, peak factor and form factor, concept of phasor, phase angle and phase difference, phasor diagrams for lagging, leading networks, complex and polar forms of representations. node and mesh analysis.-Steady state analysis of R, L and C circuits, power factor and its significance, real, reactive and apparent power, waveform of instantaneous power and complex power **.**

**UNIT II RESONANCE AND LOCUS DIAGRAMS**

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

**UNIT III NETWORK THEOREMS (DC & AC EXCITATION)**

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

**UNIT IV BALANCED THREE-PHASE CIRCUITS**

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

**UNIT V UNBALANCED THREE-PHASE CIRCUITS**

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

**Textbooks:**


1. Network Analysis, M.E.Van Valkenberg, Pearson Education, 2019, Revised Third Edition.
2. Engineering Circuits Analysis, Jack Kemmerly,William Hayt and Steven Durbin


**Reference Books:**


1. Fundamentals of Electrical Circuits, Charles K Alexander and Mathew N.O Sadiku,Mc Graw Hill Education (India), 2022, 7th Edition.
2. Electric Circuits, David A. Bell, Oxford University Press, 2009, Seventh Edition.
3. Introductory Circuit Analysis, Robert L Boylestad, Pearson Publications, 2023, Fourteenth Edition.
4. Circuit Theory, Abhijit Chakrabarti, Dhanpat Rai & Co. Publications, 8th edition, 2023
5. Schaum's Outline of Electric Circuits, by Mahmood Nahvi, Joseph Edminister, McGraw Hill; 7th edition (31 December 2017).


**E-Resources:**

1. https://nptel.ac.in/courses/108105159
2. https://nptel.ac.in/courses/117106108

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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- II Semester | Course Code: BT24BS1206 | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 1 |
| **COMMUNICATIVE ENGLISH LAB**<br>(Common to All Branches of Engineering) | | | | | |

**Course Objectives**: 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. The students will get trained in basic communication skills and also make them ready to face job interviews.

**Course Outcomes:**

**CO1: Distinguish** the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension in day to day conversations.
**CO2: Demonstrate** communication skills through various language learning activities
**CO3: Apply** the writing skills in e-mail Writing and Resume Writing.
**CO4: Appraise** and manifest professionalism in participating group discussions and debates.
**CO5: Exhibit** the effective interpersonal skills in presentations and interviews
**CO6: Understand** the different aspects of the English language proficiency with emphasis on LSRW skills.

**Mapping of Course Outcomes with Program Outcomes:**

| Cos | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | 3 | - | - | - | 1 | 1 | - | - |
| CO2 | - | - | - | - | - | - | - | - | 3 | 3 | - | 1 |
| CO3 | - | - | - | - | 1 | - | - | - | 1 | 2 | - | 2 |
| CO4 | - | - | - | - | - | - | - | - | 3 | 3 | - | 2 |
| CO5 | - | - | - | - | - | - | - | - | 3 | 3 | - | 2 |
| CO6 | - | - | - | - | 2 | - | - | - | - | 2 | - | 2 |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| CO1 | - | - |
| CO2 | - | - |
| CO3 | - | - |
| CO4 | - | - |
| CO5 | - | - |
| CO6 | - | - |

**List of Topics:**

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

**Suggested Software:**

- Walden Infotech
- Young India Films

**Reference Books:**


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


**Web Resources:**

**Spoken English:**

www.esl-lab.com

www.englishmedialab.com

www.englishinteractive.net

https://www.britishcouncil.in/english/online

http://www.letstalkpodcast.com/

https://www.youtube.com/c/mmmEnglish_Emma/featured

https://www.youtube.com/c/ArnelsEverydayEnglish/featured

https://www.youtube.com/c/engvidAdam/featured

https://www.youtube.com/c/EnglishClass101/featured

https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists

https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw

**Voice & Accent:**

https://www.youtube.com/user/letstalkaccent/videos

https://www.youtube.com/c/EngLanguageClub/featured

https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc

https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA

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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- II Semester | Course Code: BT24BS1208 | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 1 |
| **ENGINEERING CHEMISTRY LAB**<br>*(Common to Civil and Mechanical Engineering)* | | | | | |

**Course Objectives:**

- To verify the fundamental concepts with experiments

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

**CO1: Determine** the cell constant and conductance of solutions.

**CO2: Prepare** advanced polymer materials.

**CO3: Determine** the physical properties like surface tension, adsorption and viscosity.

**CO4: Estimate** the Iron and Calcium in cement.

**CO5: Calculate** the hardness of water.

**CO6: Understand** the synthesis of Bakelite

**Mapping of Course Outcomes with Program Outcomes:**

| Cos | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 2 |
| CO2 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | 2 |
| CO3 | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 2 |
| CO4 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | 2 |
| CO5 | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 2 |
| CO6 | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 2 |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| CO1 | - | - |
| CO2 | - | - |
| CO3 | - | - |
| CO4 | - | - |
| CO5 | - | - |
| CO6 | - | - |

**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. Determination of percentage of Iron in Cement sample by colorimetry

6. Estimation of Calcium in portland Cement
7. Preparation of nanomaterial by precipitation method.
8. Adsorption of acetic acid by charcoal
9. Determination of percentage Moisture content in a coal sample
10. Determination of Viscosity of lubricating oil by Redwood Viscometer 1
11. Determination of Viscosity of lubricating oil by Redwood Viscometer 2
12. Determination of Calorific value of gases by Junker's gas Calorimeter

**Reference:**


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

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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- II Semester | Course Code: BT24BS1207 | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 1 |
| **CHEMISTRY LAB** *(Common to ECE, EEE and IT)* | | | | | |

**Course Objectives:**

- Verify the fundamental concepts with experiments.

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

**CO1:** Determine the cell constant and conductance of solutions.
**CO2:** Prepare advanced polymer materials.
**CO3:** Determine the physical properties like surface tension, adsorption and viscosity.
**CO4:** Estimate the Iron and Calcium in cement
**CO5:** Calculate the hardness of water.
**CO6:** Preparation of a polymer (Bakelite)

**Mapping of Course Outcomes with Program Outcomes:**

| Cos | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 2 | 3 | 2 | 1 | 2 | 1 | 2 | 1 | 1 | 2 |
| CO2 | 3 | 2 | 3 | 3 | 3 | 1 | 2 | 1 | 2 | 2 | 2 | 3 |
| CO3 | 3 | 3 | 2 | 3 | 2 | 1 | 2 | 1 | 2 | 1 | 1 | 2 |
| CO4 | 3 | 3 | 2 | 3 | 2 | 1 | 2 | 1 | 2 | 1 | 1 | 2 |
| CO5 | 3 | 3 | 2 | 3 | 2 | 1 | 2 | 1 | 2 | 1 | 1 | 2 |
| CO6 | 3 | **3** | 2 | **3** | 2 | **1** | 2 | **1** | 2 | **1** | 1 | **2** |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| CO1 | - | - |
| CO2 | - | - |
| CO3 | - | - |
| CO4 | - | - |
| CO5 | - | - |
| CO6 | - | - |

**List of Experiments:**

1. Measurement of 10Dq by spectrophotometric method
2. Conductometric titration of strong acid vs. strong base
3. Conductometric titration of weak acid vs. strong base
4. Determination of cell constant and conductance of solutions

5. Potentiometry - determination of redox potentials and emfs
6. Determination of Strength of an acid in Pb-Acid battery
7. Preparation of a Bakelite
8. Verify Lambert-Beer's law
9. Wavelength measurement of sample through UV-Visible Spectroscopy
10. Identification of simple organic compounds by IR
11. Preparation of nanomaterials by precipitation method
12. Estimation of Ferrous Iron by Dichrometry

**Reference:**

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

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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- II Semester | Course Code: BT24ME1203 | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 3 | 1.5 |
| **ENGINEERING WORKSHOP**<br>(Common to All branches of Engineering) | | | | | |

**Course Objectives:**
To familiarize students with wood working, sheet metal operations, fitting, electrical house wiring skills, and basic repairs of two-wheeler vehicle.

**Course Outcomes:**
**CO1**: Build carpentry fitting and forging operations in various applications.
**CO2**: Executing operations of foundry and sheet metal works using varies tools.
**CO3**: Inspect basic electrical engineering knowledge for house wiring practice
**CO4**: Develop a lap and butt joint using arc welding.
**CO5**: Develop pipe joint for different diameter of pipes
**CO6**: Inspect basic repair of two-wheeler vehicle **.**

**Mapping of Course Outcomes with Program Outcomes:**

| Cos | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | 3 | - | 2 | - | - | 3 | - | - | - | 1 |
| CO2 | 3 | - | 3 | - | 2 | - | - | 3 | - | - | - | 1 |
| CO3 | 3 | - | 3 | - | 2 | - | - | 3 | - | - | - | 1 |
| CO4 | 3 | - | 3 | - | 2 | - | - | 3 | - | - | - | 1 |
| CO5 | 3 | - | 3 | - | 2 | - | - | 3 | - | - | - | 1 |
| CO6 | 3 | - | 3 | - | 2 | - | - | 3 | - | - | - | 1 |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| CO1 | - | - |
| CO2 | - | - |
| CO3 | - | - |
| CO4 | - | - |
| CO5 | - | - |
| CO6 | - | - |

**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.
9. Basic repairs of Two-wheeler vehicle – Demonstration of working of two-wheeler vehicle and its repairs.

**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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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- II Semester | Course Code: BT24CE1202 | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 3 | 1.5 |

**ENGINEERING MECHANICS & BUILDING PRACTICES LAB**
(Civil Engineering & allied branches)

**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 gravity of different plane Lamina.
- Understand the layout of a building, concepts of Non-Destructive Testing and different Alternative Materials.

**Course Outcomes:** On completion of the course, the student should be able to:
**CO1: Evaluate** the coefficient of friction between two different surfaces and between the inclined plane and the roller.
**CO2: Verify** Law of Parallelogram of forces and Law of Moment using force Polygon and bell crank lever.
**CO3: Determine** the Centre of gravity different configurations and
**CO4: Understand** the Quality Testing and Assessment Procedures and Principles of Non-Destructive Testing.
**CO5: Exposure** to safety practices in the construction industry.

**Mapping of Course Outcomes with Program Outcomes:**

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

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| CO1 | - | - |
| CO2 | 1 | - |
| CO3 | 2 | - |
| CO4 | 2 | - |
| CO5 | - | - |

**Students have to perform any 10 of the following Experiments:**

1. To study various types of tools used in construction.
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. Study of Alternative Materials like M-sand, Flyash, Sea Sandetc.
9. Field-Visit to understand the Quality Testing- report.
10. Safety Practices in Construction industry
11. Demonstration of Non-Destructive Testing- using Rebound Hammer &UPV
12. Study of Plumbing in buildings.

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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- II Semester | Course Code: BT24ME1204 | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 3 | 1.5 |
| **ENGINEERING MECHANICS LAB**<br>(Mechanical Engineering & allied branches) | | | | | |

**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:**

**CO1: Evaluate** the coefficient of friction between two different surfaces and between the inclined plane and the roller.
**CO2: Verify** Law of Polygon of forces and Law of Moment using force polygon and bell crank lever.
**CO3: Determine** the Centre of gravity and Moment of Inertia of different configurations.
**CO4: Verify** the equilibrium conditions of a rigid body under the action of different force systems.
**CO5: Determine** the coefficients of friction of Static and Rolling friction and Centre of gravity of different plane Lamina.
**CO6: Analyse** the system of Pulleys and Moment of Inertia of Compound Pendulum and Flywheel**.**

**Mapping of Course Outcomes with Program Outcomes:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | - | 2 | - | - | - | - | - | - | - | 1 |
| **CO2** | 3 | 3 | - | 2 | - | - | - | - | - | - | - | 1 |
| **CO3** | 3 | 3 | - | 2 | - | - | - | - | - | - | - | 1 |
| **CO4** | 3 | 3 | - | 2 | - | - | - | - | - | - | - | 1 |
| **CO5** | 3 | 3 | - | 2 | - | - | - | - | - | - | - | 1 |
| **CO6** | 3 | 3 | - | 2 | - | - | - | - | - | - | - | 1 |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | 3 | 3 |
| **CO2** | 3 | 3 |
| **CO3** | 3 | 3 |
| **CO4** | 3 | 3 |
| **CO5** | 3 | 3 |
| **CO6** | 3 | 3 |

**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 nonconcurrent, 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.

**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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**BALUSUMUDI, BHIMAVARAM, W.G. Dist., A.P., PIN-534 202**

**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- II Semester | Course Code: BT24EE1206 | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 3 | 1.5 |

**NETWORK ANALYSIS AND SIMULATION LABORATORY**
(ECE & allied branches)

**Course Objectives: Students will learn**

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

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

**CO1:** Solve Kirchhoff's laws for the given circuits
CO2: Analyze the given Network by applying various Network Theorems.
CO3: Measure the frequency response of RL & RC circuits.
CO4: Analyze the behavior of RL, RC and RLC circuit for different cases.
CO5: Develop the resonant circuit for given specifications.
CO6: Analyze and model the network in terms of all network parameters.

**Mapping of Course Outcomes with Program Outcomes:**

| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 | 1 | - | - | - | 1 | - | - | 1 |
| **CO2** | 3 | 3 | 2 | 2 | 1 | - | - | - | 1 | - | - | 1 |
| **CO3** | 3 | 3 | 2 | 3 | 1 | - | - | - | 1 | - | - | 1 |
| **CO4** | 2 | 3 | 3 | 3 | 2 | - | - | - | 1 | - | - | 1 |
| **CO5** | 3 | 3 | 3 | 3 | 2 | - | - | - | 1 | - | - | 1 |
| **CO6** | 2 | 2 | 3 | 3 | 1 | - | - | - | 1 | - | - | 1 |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | 1 | 2 |
| **CO2** | 1 | 2 |
| **CO3** | 1 | 2 |
| **CO4** | 2 | 3 |
| **CO5** | 2 | 3 |
| **CO6** | 2 | 2 |

**List of Experiments:**

1. Study of components of a circuit and verification of KCL and KVL.
2. Verification of mesh and nodal analysis for DC circuits
3. Verification of Superposition theorem for DC circuits
4. Verification of Thevenin's & Norton theorems for DC circuits
5. Verification of maximum power transfer theorem for DC circuits

6. Determination of open circuit (Z) and short circuit (Y) parameters
7. Determination of hybrid (H) and transmission (ABCD) parameters
8. Find the Q Factor and Bandwidth of a Series and Parallel Resonance circuit.
9. Simulation and analysis of DC transients in RL, RC and RLC circuits.
10. Study frequency response of various 1st order RL & RC networks
11. Verification of Reciprocity theorem using simulation tools.
12. Verification of Compensation theorem using simulation tools.

**Reference Books:**


1. Engineering Circuits Analysis, Jack Kemmerly,William Hayt and Steven Durbin, Tata McGraw Hill Education,2020, 9thedition.
2. Network Analysis, M.E.VanValkenburg, Pearson Education, 2019, Revised Third Edition.
3. Circuit Theory, Abhijit Chakrabarti, Dhanpat Rai & Co. Publications, 8th edition, 2023

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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- II Semester | Course Code: BT24EE1205 | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 3 | 1.5 |
| **ELECTRICAL CIRCUITS LAB** (EEE & allied branches) | | | | | |

**Course Objectives: Students will learn**

- To verify Kirchhoff's laws.
- To verify the theorems of electrical circuits.
- The concept of self, mutual inductance phenomenon and measure parameters of iron cored inductor.
- About the resonance phenomenon for series/parallel RLC circuits

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

**CO1**: Solve the given Electrical Network by using Mesh and Nodal Analysis
**CO2**: Analyze the given Network by applying various Network Theorems
**CO3**: Draw locus diagrams of RL, RC series circuits and verify network theorems theoretically and practically
**CO4**: Determine self, mutual inductances and coefficient of coupling values, parameters of choke coil
**CO5**: Calculate the power consumed by 3-ϕ balanced and unbalanced loads
**CO6**: Calculate cold, hot resistance and choke coil parameters of electric lamps

**Mapping of Course Outcomes with Program Outcomes:**

| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 2 | - | - | 2 | 2 | - | 2 | 1 | - | 1 |
| CO2 | 3 | 3 | - | 1 | 2 | 1 | - | - | 2 | 2 | - | 1 |
| CO3 | 3 | 1 | - | 1 | - | - | - | - | 2 | 2 | - | 1 |
| CO4 | 3 | 2 | 2 | 2 | 2 | 1 | - | - | 2 | 1 | - | 2 |
| CO5 | 3 | 1 | - | 1 | - | - | - | - | 2 | 2 | - | 1 |
| CO6 | 3 | 1 | - | - | 1 | 1 | - | - | 1 | 2 | - | 1 |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| CO1 | 2 | - |
| CO2 | 2 | 2 |
| CO3 | 2 | - |
| CO4 | 2 | 2 |
| CO5 | 2 | - |
| CO6 | 1 | - |

**Experiments:**

1. Verification of network reduction techniques.
2. Verification of node and mesh analysis.
3. Determination of cold and hot resistance of an electric lamp
4. Determination of Parameters of a choke coil.

5. Determination of self, mutual inductances, and coefficient of coupling
6. Series resonance
7. Locus diagrams of R-L(L Variable) and R-C (C Variable)series circuits
8. Verification of Superposition theorem
9. Verification of Thevenin's and Norton's Theorems
10. Verification of Maximum power transfer theorem
11. Verification of Compensation theorem
12. Verification of Reciprocity and Millman's Theorems
13. Measurement of 3-phase power by two-wattmeter method for balanced loads
14. Measurement of 3-phase power by two-wattmeter method for unbalanced loads

**Reference Books:**


1. Engineering Circuits Analysis, Jack Kemmerly,William Hayt and Steven Durbin, Tata McGraw Hill Education,2020, 9thedition.
2. Network Analysis, M.E.VanValkenburg, Pearson Education, 2019, Revised Third Edition.
3. Circuit Theory, Abhijit Chakrabarti, Dhanpat Rai & Co. Publications, 8th edition, 2023

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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

| I Year- II Semester | Course Code: BT24BS1210 | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 1 | 0.5 |

**HEALTH AND WELLNESS, YOGA AND SPORTS**
(Common to All branches of Engineering)

**Course Objectives:** The main objective of introducing this course is to make the students maintain their mental and physical wellness by balancing emotions in their life. It mainly enhances the essential traits required for the development of the personality.

**Course Outcomes:** After completion of the course the student will be able to
**CO1: Understand** the importance of yoga and sports for Physical fitness and sound health.
**CO2: Demonstrate** an understanding of health-related fitness components.
**CO3: Compare and contrast** various activities that help enhance their health.
**CO4: Assess** current personal fitness levels.
**CO5: Develop** Positive Personality.
**CO6: Describe** the history of sports, Ancient and Modern Olympics

**Mapping of Course Outcomes with Program Outcomes:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | - | - | - | - | - | - | 2 |
| CO2 | - | - | - | - | - | - | - | - | - | - | - | 2 |
| CO3 | - | - | - | - | - | - | - | - | - | - | - | 2 |
| CO4 | - | - | - | - | - | - | - | - | - | - | - | 2 |
| CO5 | - | - | - | - | - | - | - | - | - | - | - | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | 2 |

**Mapping of Course Outcomes with Program Specific Outcomes:**

| | PSO1 | PSO2 |
|---|---|---|
| CO1 | - | - |
| CO2 | - | - |
| CO3 | - | - |
| CO4 | - | - |
| CO5 | - | - |
| CO6 | - | - |

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

**Activities:**
i) Organizing health awareness programmes in community
ii) Preparation of health profile
iii) Preparation of chart for balance diet for all age groups

**UNIT II** Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asanas- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.
**Activities:** Yoga practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar

**UNIT III** Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Commonwealth games.
**Activities:**
i) Participation in one major game and one individual sport viz., Athletics, Volleyball, Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc. Practicing general and specific warm up, aerobics
ii) Practicing cardiorespiratory fitness, treadmill, run test, 9 min walk, skipping and running.
**Reference Books:**


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


**General Guidelines:**

1. Institutes must assign slots in the Timetable for the activities of Health/Sports/Yoga.
2. Institutes must provide field/facility and offer the minimum of five choices of as many as Games/Sports.
3. Institutes are required to provide sports instructor / yoga teacher to mentor the students. Evaluation

**Guidelines:**

1. Evaluated for a total of 100 marks.
2. A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
3. A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject

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## B.Tech.II Year-I Semester

| S. No | Category | Course code | Title | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 1 | BS | BT24BS2102 | Complex Variables & Numerical Methods | 3 | 0 | 0 | 3 |
| 2 | HSMC | BT24HS2101 | Universal human values–Understanding harmony and Ethical human conduct | 2 | 1 | 0 | 3 |
| 3 | Engineering Science | BT24EE2101 | Electro magnetic Field Theory | 3 | 0 | 0 | 3 |
| 4 | Professional Core | BT24EE2102 | Electrical Circuit Analysis-II | 3 | 0 | 0 | 3 |
| 5 | Professional Core | BT24EE2103 | DC Machines &Transformers | 3 | 0 | 0 | 3 |
| 6 | Professional Core | BT24EE2104 | Electrical Circuit Analysis-II And Simulation Lab | 0 | 0 | 3 | 1.5 |
| 7 | Professional Core | BT24EE2105 | DC Machines &Transformers Lab | 0 | 0 | 3 | 1.5 |
| 8 | Skill Enhancement Course | BT24CS2106 | Data Structures Lab | 0 | 1 | 2 | 2 |
| 9 | Audit Course | BT24BS2106 | Environmental Science | 2 | 0 | 0 | - |
| | | **Total** | | **15** | **2** | **10** | **20** |

## B.Tech.II Year-II Semester

| S. No | Category | Course code | Title | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 1 | Management Course-I | BT24HS2201 | Managerial Economics& Financial Analysis | 2 | 0 | 0 | 2 |
| 2 | Engineering Science/Basic Science | BT24EC2207 | Analog Circuits | 3 | 0 | 0 | 3 |
| 3 | Professional Core | BT24EE2201 | Power Systems-I | 3 | 0 | 0 | 3 |
| 4 | Professional Core | BT24EE2202 | Induction and Synchronous Machines | 3 | 0 | 0 | 3 |
| 5 | Professional Core | BT24EE2203 | Control Systems | 3 | 0 | 0 | 3 |
| 6 | Professional Core | BT24EE2204 | Induction and Synchronous Machines Lab | 0 | 0 | 3 | 1.5 |
| 7 | Professional Core | BT24EE2205 | Control Systems Lab | 0 | 0 | 3 | 1.5 |
| 8 | Skill Enhancement course | BT24CS2207 | Python Programming Lab | 0 | 1 | 2 | 2 |
| 9 | Engineering Science | BT24ME2207 | Design Thinking &Innovation | 1 | 0 | 2 | 2 |
| | | **Total** | | **15** | **1** | **10** | **21** |

| II Year- I Semester | Course Code: BT24BS2102 | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**COMPLEXVARIABLES & NUMERICAL METHODS**

**Course objectives:**

- To elucidate the different numerical methods to solve nonlinear algebraic equations
- To disseminate the use of different numerical techniques for carrying out numerical integration.
- To familiarize the complex variables.
- To equip the students to solve application problems in their disciplines.

**Course Outcomes:**

1. Apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals
2. Apply numerical integral techniques to different Engineering problems. Apply different algorithms for approximating the solutions of ordinary differential equations with initial conditions to its analytical computations
3. Apply Cauchy-Riemann equations to complex functions in order to determine whether a given continuous functions analytic
4. Use the concept of conjugate harmonic functions to solve problems related to complex variables.
5. Evaluate the Taylor and Laurent expansions of simple functions, determining the nature of the singularities and calculating residues. Make use of the Cauchy residue theorem to evaluate certain integrals
6. Explain properties of various types of conformal mappings

**Mapping of course outcomes with program outcomes**

| | P O1 | P O2 | P O3 | P O4 | P O5 | P O6 | P O7 | P O8 | P O9 | P O10 | P O11 | P O12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | | | | | | | | | | |
| CO2 | 3 | 3 | | | | | | | | | | |
| CO3 | 3 | 3 | | | | | | | | | | |
| CO4 | 3 | 3 | | | | | | | | | | |
| CO5 | 3 | 3 | | | | | | | | | | |
| CO6 | 2 | 2 | | | | | | | | | | |

**Mapping of course outcomes with program specific outcomes**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | - | - |
| **CO2** | - | - |
| **CO3** | - | - |
| **CO4** | - | - |
| **CO5** | - | - |
| **CO6** | - | - |

**UNIT–I: Iterative Methods:**

Introduction–Solutions of algebraic and transcendental equations: Bisection method– Secant method – Method of false position – General Iteration method – Newton- Raphson method (Simultaneous Equations)

***Interpolation:*** Newton's forward and backward formulae for interpolation–Interpolation with unequal intervals – Lagrange's interpolation formula

**UNIT–II: Numerical integration, Solution of ordinary differential equations with initial conditions:**

Trapezoidal rule– Simpson's 1/3rdand 3/8thrule– Solution of initial value problems by Taylor's series–Picard's method of successive approximations–Euler's method–Runge- Kutta method (second and fourth order)– Milne's Predictor and Corrector Method.

**UNIT–III: Functions of a complex variable and Complex integration:**

Introduction – Continuity – Differentiability – Analyticity –Cauchy-Riemann equations in Cartesian and polar coordinates – Harmonic and conjugate harmonic functions – Milne – Thompson method.

Complex integration: Line integral–Cauchy's integral theorem–Cauchy's integral formula – Generalized integral formula (all without proofs) and problems on above theorems.

**UNIT–IV: Series expansions and Residue Theorem:**

Radius of convergence–Expansion of function in Taylor's series, Maclaurin's series and Laurent series. Types of Singularities: Isolated–Essential singularities–Pole of order m–Residues–Residue theorem (without proof) – Evaluation of real integral of the types $\int_{-\infty}^{\infty} f(x)dx$ and $\int_{c}^{c+2\pi} f(\cos\theta, \sin\theta)d\theta$.

**UNIT–V: Conformal mapping:**

Transformation by $e^z$, $\ln z$, $z^2$, $z^n$ (n positive integer), Sin z, cos z, z + a/z. Translation, rotation, inversion and bilinear transformation–fixed point–cross ratio–properties–invariance of circles and cross ratio–determination of bilinear transformation mapping 3 given points.

**Text Books:**

1. B. S. Grewal, Higher Engineering Mathematics, 44th Edition, Khanna Publishers. Edition
2. Micheael Greenberg, Advanced Engineering Mathematics, 2ndedition, Pearson

**Reference Books:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, Wiley-India.
2. B. V. Ramana, Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.

3. Steven C. Chapra, Applied Numerical Methods with MATLAB for Engineering and Science, Tata Mc. Graw Hill Education.
4. M. K. Jain, S. R. K. Iyengarand R. K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International Publications.
5. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 9thedition, Mc-Graw Hill, 2013

| II Year I Semester | Course Code : BT24HS2101 | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 1 | 0 | 3 |
| UNIVERSAL HUMAN VALUES – UNDERSTANDING HARMONY AND ETHICAL HUMAN CONDUCT | | | | | |

**Course Objectives:**

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

**Course Outcomes:**

- Define the terms like Natural Acceptance, Happiness and Prosperity (L1,L2)
- Identify one's self, and one's surroundings (family, society nature) (L1,L2)
- Apply what they have learnt to their own self in different day-to-day settings in real life (L3)
- Relate human values with human relationship and human society.(L4)
- Justify the need for universal human values and harmonious existence(L5)
- Develop as socially and ecologically responsible engineers(L3,L6)

**Course Topics**

The course has 28 lectures and 14 tutorials in 5 modules. The lectures and tutorials are of 1- hour duration. Tutorial sessions are to be used to explore and practice what has been proposed during the lecture sessions. The Teacher's Manual provides the outline for lectures as well as practice sessions. The Teacher is expected to present the issues to be discussed as propositions and encourage the students to have a dialogue.

**Mapping of course outcomes with program outcomes**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | - | - | - | - | - | - | 3 | 3 | - | 2 | - | 3 |
| **CO2** | - | - | - | - | - | - | - | 3 | 2 | 2 | - | 3 |
| **CO3** | - | - | - | - | - | - | - | 3 | 2 | - | - | 2 |
| **CO4** | - | - | - | - | - | - | 3 | 3 | 2 | 2 | - | 3 |
| **CO5** | - | - | - | - | - | - | 3 | 3 | - | - | - | 3 |
| **CO6** | - | - | - | - | - | 3 | 3 | 2 | 2 | - | - | 2 |

**Mapping of course outcomes with program specific outcomes.**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | 1 | - |
| **CO2** | 1 | - |
| **CO3** | 1 | - |
| **CO4** | 1 | - |
| **CO5** | 1 | - |
| **CO6** | 1 | - |

**UNIT I** Introduction to Value Education (6 lectures and 3 tutorials for practice session)

Lecture1: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)
Lecture2: Understanding Value Education
Tutorial 1: Practice Session PS1 Sharing about One self
Lecture 3: self-exploration as the Process for Value Education
Lecture4: Continuous Happiness and Prosperity–the Basic Human Aspirations
Tutorial 2: Practice Session PS2 Exploring Human Consciousness
Lecture 5: Happiness and Prosperity – Current Scenario
Lecture 6: Method to Fulfill the Basic Human Aspirations
Tutorial 3: Practice Session PS3 Exploring Natural Acceptance

**UNIT II** Harmony in the Human Being (6 lectures and 3 tutorials for practice session)

Lecture 7: Understanding Human being as the Co-existence of the self and the body.
Lecture 8: Distinguishing between the Needs of the self and the body
Tutorial 4: Practice Session PS4 Exploring the difference of Needs of self and body.
Lecture 9: The body as an Instrument of the self
Lecture 10: Understanding Harmony in the self
Tutorial 5: Practice Session PS5 Exploring Sources of Imagination in the self
Lecture 11: Harmony of the self with the body
Lecture12: Programme to ensure self-regulation and Health
Tutorial 6: Practice Session PS6 Exploring Harmony of self with the body

**UNIT III** Harmony in the Family and Society (6 lectures and 3tutorials for practice session)

Lecture 13: Harmony in the Family – the Basic Unit of Human Interaction
Lecture 14: 'Trust' – the Foundational Value in Relationship
Tutorial 7: Practice Session PS7 Exploring the Feeling of Trust
Lecture 15: 'Respect' – as the Right Evaluation
Tutorial 8: Practice Session PS8 Exploring the Feeling of Respect
Lecture 16: Other Feelings, Justice in Human-to-Human Relationship
Lecture 17: Understanding Harmony in the Society
Lecture18: Vision for the Universal Human Order
Tutorial9: Practice Session PS9 Exploring Systems to fulfil Human Goal

**UNIT IV** Harmony in the Nature/Existence (4 lectures and 2 tutorials for practice session)

Lecture19: Understanding Harmony in the Nature
Lecture 20: Inter connectedness, self-regulation and Mutual Ful filment among the Four Orders of Nature
Tutorial 10: Practice Session PS10 Exploring the Four Orders of Nature
Lecture 21: Realizing Existence as Co-existence at All Levels
Lecture22: The Holistic Perception of Harmony in Existence
Tutorial11: Practice Session PS11 Exploring Co-existence in Existence.

**UNIT V** Implications of the Holistic Understanding –a Look at Professional Ethics (6 lectures and 3 tutorials for practice session)

Lecture 23: Natural Acceptance of Human Values
Lecture 24: Definitiveness of (Ethical) Human Conduct
Tutorial 12: Practice Session PS12 Exploring Ethical Human Conduct
Lecture25: A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order
Lecture26: Competence in Professional Ethics

Tutorial13: Practice Session PS13 Exploring Humanistic Models in Education
Lecture27: Holistic Technologies, Production Systems and Management Models-Typical Case Studies
Lecture28: Strategies for Transition towards Value-based Life and Profession

Practice Sessions for UNIT I – Introduction to Value Education
PS1 Sharing about Oneself
PS2 Exploring Human Consciousness
PS3 Exploring Natural Acceptance

Practice Sessions for UNIT II – Harmony in the Human Being
PS4 Exploring the difference of Needs of self and body
PS5 Exploring Sources of Imagination in the self
PS6 Exploring Harmony of self with the body

Practice Sessions for UNIT III – Harmony in the Family and Society
PS7 Exploring the Feeling of Trust
PS8 Exploring the Feeling of Respect
PS9 Exploring Systems to fulfil Human Goal

Practice Sessions for UNIT IV – Harmony in the Nature (Existence)
PS10 Exploring the Four Orders of Nature
PS11Exploring Co-existence in Existence

Practice Sessions for UNITV–Implications of the Holistic Understanding–a Look at Professional Ethics
PS12Exploring Ethical Human Conduct
PS13Exploring Humanistic Models in Education
PS14Exploring Steps of Transition towards Universal Human Order

**READINGS:**

**Text book and Teachers Manual**

a. The Textbook

R R Gaur, R Asthana, G P Bagaria, *A Foundation Course in Human Values and Professional Ethics*, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1

b. The Teacher's Manual

RRGaur, RAsthana, GPBagaria, Teachers' Manual for A Foundation Course in Human *Values and Professional Ethics*, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

**Reference Books**

1. Jeevan Vidya:Ek Parichaya,ANagaraj,JeevanVidyaPrakashan,Amarkantak,1999.
2. Human Values, A.N.Tripathi, New, New Age Intl.Publishers,New, New Delhi,2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth-by Mohandas Karam chand Gandhi
5. Small is Beautiful-E .F Schumacher.
6. Slow is Beautiful-Cecile Andrews
7. Economy of Permanence-JCK umarappa
8. Bharat Me in Angreji Raj–Pandit Sunderlal
9. Red is covering India-by Dharma pal
10. Hind Swaraj or Indian Home Rule-by Mohan das K.Gandhi
11. India Wins Freedom-Maulana Abdul Kalam Azad
12. Vivekananda-Roma in Roll and (English)
13. Gandhi-Roma in Roll and (English)

**Mode of Conduct:**

Lecture hours are to be used for interactive discussion, placing the proposals about the topics at hand and motivating students to reflect, explore and verify them.

Tutorial hours are to be used for practice sessions.

While analyzing and discussing the topic, the faculty mentor's role is in pointing to essential elements to help in sorting them out from the surface elements. In other words, help the students explore the important or critical elements.

In the discussions, particularly during practice sessions (tutorials), the mentor encourages the Student to connect with one's own self and do self-observation, self-reflection and self-exploration.

Scenarios may be used to initiate discussion. The student is encouraged to take up "ordinary" situations rather than" extra-ordinary" situations. Such observations and their analyses are shared and discussed with other students and faculty mentor, in a group sitting.

Tutorials (experiments or practical) are important for the course. The difference is that the laboratory is everyday life, and practical are how you behave and work in real life. Depending on the nature of topics, worksheets, home assignment and/or activity are included. The practice sessions (tutorials) would also provide support to a student in performing actions commensurate to his/her beliefs. It is intended that this would lead to development of commitment, namely behaving and working based on basic human values.

It is recommended that this content be placed before the student as it is, in the form of a basic Foundation course, without including anything else or excluding any part of this content.

Additional content may be offered in separate, higher courses. This course is to be taught by faculty from every teaching department, not exclusively by any one department.

Teacher preparation with a minimum exposure to at least one 8-day Faculty Development Program on Universal Human Values is deemed essential.

**Online Resources:**

1. https://fdp-si.aicte-india.org/UHV II%20Class%20Notes%20&%20Handouts/UHV%20Handout%201-Introduction%20to%20Value%20Education.pdf
2. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%202-Harmony%20in%20the%20Human%20Being.pdf
3. https://fdp-si.aicte-india.org/UHV- II%20Class%20Notes%20&%20Handouts/UHV%20Handout%203-Harmony%20in%20the%20Family.pdf
4. https://fdp-si.aicte-india.org/UHV%201%20Teaching%20Material/D3- S2%20Respect%20July%2023.pdf
5. https://fdp-si.aicte-india.org/UHV- II%20Class%20Notes%20&%20Handouts/UHV%20Handout%205-Harmony%20in%20the%20Nature%20and%20Existence.pdf
6. https://fdp-si.aicte-india.org/download/FDPTeachingMaterial/3-days%20FDP- SI%20UHV%20Teaching%20Material/Day%203%20Handouts/UHV%203D%20D3-S2A%20Und%20Nature-Existence.pdf
7. https://fdp-si.aicte- india.org/UHV%20II%20Teaching%20Material/UHV%20II%20Lecture%2023-25%20Ethics%20v1.pdf
8. https://www.studocu.com/in/document/kiet-group-of-institutions/universal-human-values/chapter-5-holistic-understanding-of-harmony-on-professional-ethics/62490385
9. https://onlinecourses.swayam2.ac.in/aic22_ge23/preview

| II Year I Semester | Course Code : BT24EE2101 | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| ELECTRO MAGNETIC FIELD THEORY | | | | | |

**Pre-requisite:** Concepts of Differential Equations, Vector Calculus and Electrical Circuit Analysis.

**Course Objectives:**

- To study the production of electric field and potentials due to different configurations of static charges.
- To study the properties of conductors and dielectrics, calculate the capacitance of Different configurations. Understand the concept of conduction and convection current densities.
- To study the magnetic fields produced by currents in different configurations, Application of Ampere's law and the Maxwell's second and third equations.
- To study the magnetic force and torque through Lorentz force equation in magnetic field environment like conductors and other current loops.
- To develop the concept of self and mutual inductances and the energy stored.
- To study time varying and Maxwell's equations in different forms and Maxwell's fourth equation for the induced EMF.

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

CO1: Compute electric fields and potentials using Gauss law.
CO2. Solve Poisson's Laplace's or equations for various electric charge distributions
CO3: Analyse the behavior of conductors in electric fields, electric dipole and the Capacitance and Energy stored in dielectrics.
CO4: Calculate the magnetic field intensity due to current carrying conductor and understanding the application of Ampere's law, Maxwell's second and third law.
CO5: Estimate self and mutual inductances and the energy stored in the magnetic field.
CO6: Understand the concepts of Faraday's laws, Displacement current, Poynting theorem and Poynting vector.

**Mapping of course outcomes with program outcomes**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 1 | 1 | 1 | - | - | - | - | - | - | - | - |
| **CO2** | 3 | 1 | 1 | 1 | - | - | - | - | - | - | - | - |
| **CO3** | 3 | 1 | 1 | 1 | - | - | - | - | - | - | - | - |
| **CO4** | 3 | 2 | 2 | 2 | - | - | - | - | - | - | - | - |
| **CO5** | 3 | 2 | 2 | 2 | - | - | - | - | - | - | - | - |
| **CO6** | 3 | 2 | 2 | 2 | - | - | - | - | - | - | - | - |

**Mapping of course outcomes with program specific outcomes.**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | 1 | - |
| **CO2** | 1 | - |
| **CO3** | 1 | - |
| **CO4** | 1 | - |
| **CO5** | 1 | - |
| **CO6** | 1 | - |

**UNIT-I Vector Analysis:**

**Vector --Algebra:** Scalars and Vectors, Unit vector, Vector addition and subtraction, Position and distance vectors, Vector multiplication, Components of a vector.

**Coordinate Systems:** Rectangular, Cylindrical and Spherical coordinate systems.

**Vector Calculus: Differential** length, Area and Volume. Del operator, Gradient of a scalar, Divergence of a vector and Divergence theorem (definition only).Curl of a vector and Stoke's theorem (definition only), Laplacian of a scalar

**Electrostatics:**

Coulomb's law and Electric field intensity (EFI) –EFI due to Continuous charge distributions (line and surface charge), Electric flux density, Gauss's law (Maxwell's first equation, $\nabla . \bar{D} \rightarrow = \rho_v$), Applications of Gauss's law, Electric Potential, Work done in moving a point charge in an electro static field (second Maxwell's equation for static electric fields, $\nabla \times \bar{E} \rightarrow = 0$ ), Potential gradient, Laplace's and Poison's equations

**UNIT-II**

**Conductors–Dielectrics and Capacitance:**

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

**UNIT-III**

**Magneto statics, Ampere's Law and Force in magnetic fields:**

Biot-Savart's law and its applications viz. Straight current carrying filament, circular, square, rectangle and solenoid current carrying wire – Magnetic flux density and Maxwell's second Equation ($\nabla . \bar{B} \rightarrow = 0$), Ampere's circuital law and its applications viz. MFI due to an infinite sheet, long filament, solenoid, toroidal current carrying conductor, point form of Ampere's circuital law, Maxwell's third equation ($\nabla \times \bar{H} \rightarrow = \rightarrow J$). Magnetic force, moving charges in a magnetic field–Lorentz force equation, force on a current element in a magnetic field, force on a straight and a long current carrying conductor in a magnetic field, force between two straight long and parallel current carrying conductors, Magnetic dipole, Magnetic torque, and moment.

**UNIT-IV Self and mutual inductance:**

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

**UNIT-V Time Varying Fields:**

Faraday's laws of electromagnetic induction, Maxwell's fourth equation ($\nabla \times \bar{E} \rightarrow = -\frac{\partial B}{\partial T}$), integral and point forms of Maxwell's equations, statically and dynamically induced EMF, Displacement Current,

Modification of Maxwell's equations for time varying fields, Poynting theorem and Poynting vector

**Textbooks:**

1. "Elements of Electromagnetic "by Matthew NO Sadiku, Oxford 7th Publications, 7TH edition, 2018.
2. "Engineering Electromagnetic" by William H. Hayt & John. A. Buck Mc. Graw-Hill, 7th Editon.2006.

**Reference Books:**

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

**Online Learning Resources:**

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

| II Year I Semester | Course Code : BT24EE2102 | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| ELECTRICALCIRCUITANALYSIS-II | | | | | |

**Pre-requisite:** Analysis of DC and Single phase AC Circuits, Concepts of differentiation and integration.

**Course Objectives:**

- To understand three phase circuits
- To analyse transients in electrical systems
- To evaluate network parameters of given electrical network
- To apply Fourier analysis to electrical systems
- To understand graph theory for circuit analysis and to understand the behavior of filters

**Course Outcomes**:

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

CO1: Analyse the balanced and unbalanced 3 phase circuits for power calculations.

CO2: Apply the shifting theorem to evaluate Laplace transforms for functions that involve time shifts, both for time shifting and frequency shifting

CO3: Analyse the transient behavior of electrical networks in different domains.

CO4: Estimate various Network parameters.

CO5: Apply the concept of Fourier series to electrical systems.

CO6: Analyse the filter circuit for electrical circuits.

**Mapping of course outcomes with program outcomes**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 2 | 1 | - | - | - | - | - | - | - | 1 |
| **CO2** | 3 | 2 | 2 | 1 | - | - | - | - | - | - | - | 1 |
| **CO3** | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 1 |
| **CO4** | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 1 |
| **CO5** | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 1 |
| **CO6** | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 1 |

**Mapping of course outcomes with program specific outcomes.**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | 1 | - |
| **CO2** | 1 | - |
| **CO3** | 1 | - |
| **CO4** | 1 | - |
| **CO5** | 1 | - |
| **CO6** | 1 | - |

**UNIT-I**

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

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

**UNIT–II**

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

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

**UNIT-III**

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

**UNIT-IV**

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

**UNIT-V**

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

**Textbooks:**

- Engineering Circuit Analysis, William Hayt andJackE.Kemmerly,8thEdition McGraw-Hill, 2013
- Fundamentals of Electric Circuits,CharlesK.Alexander,MathewN.O.Sadiku,3rd Edition, Tata McGraw-Hill, 2019

**Reference Books:**

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

**Online Learning Resources:**

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

| II Year I Semester | Course Code : BT24EE2103 | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| DC MACHINES & TRANSFORMERS | | | | | |

**Pre-requisite:** Principles of Electro mechanical Energy Conversion, Electromagnetic fields and Electrical Circuit Analysis.

**Course Objectives:**

Students will get exposure to

- Understand the characteristics and applications of DC Machines.
- Develop problem solving skills about the starting, speed control and testing of DC Machines.
- Understand the concepts of efficiency and regulation of a transformer by obtaining equivalent circuit.
- Analyze the performance of single-phase transformers and to understand the connection diagrams of three-phase transformers.

**Course Outcomes:**

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

CO1. Analyze different excitation techniques used in DC machines and their effects on Performance.

CO2.Analyze and compare the characteristics of separately-excited, shunt, series, and compound DC motors, including their speed-torque curves and applications.

CO3. Operate the DC Motor with different speed control and testing methods.

CO4.Analyze transformer performance under various loads, including lagging, leading, and unity Power factor loads.

CO5. Know about the transformer testing methods for testing of transformer.

CO6.Analyze the different poly phase connections used in transformers.

**Mapping of course outcomes with program outcomes**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 2 | - | - | - | - | - | - | - | 2 | - |
| **CO2** | 3 | 2 | 2 | - | - | - | - | - | - | - | - | - |
| **CO3** | 3 | 2 | 1 | - | - | - | - | - | - | - | - | - |
| **CO4** | 3 | 2 | 1 | - | - | - | - | - | - | - | 2 | - |
| **CO5** | 3 | 2 | 1 | - | - | - | - | - | - | - | 1 | - |
| **CO6** | 3 | 2 | 2 | - | - | - | - | - | - | - | 1 | - |

**Mapping of course outcomes with program specific outcomes.**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | 1 | - |
| **CO2** | 1 | - |
| **CO3** | 1 | - |
| **CO4** | 1 | - |
| **CO5** | 1 | - |
| **CO6** | 1 | - |

**UNIT-I: DC Generators**:

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

**UNIT–II: Starting, Speed Control and Testing of DC Machines**

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

**UNIT–III: Single-phase Transformers**

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

**UNIT–IV: Testing of Transformers**

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

**UNIT–V**

**Three-Phase Transformers:**

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

**Textbooks:**


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


**Reference Books:**


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


**Online Learning Resources:**

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

| II Year I Semester | Course Code : BT24EE2104 | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 3 | 1.5 |
| ELECTRICAL CIRCUIT ANALYSIS-II AND SIMULATION LAB | | | | | |

**Course Objectives:**

- To measure three phase Active and Reactive power
- To analyse transient behaviour of circuits
- To determine 2-port network parameters
- To analyse electrical circuits using simulation tools

**Course Outcomes:**

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

CO1: Understand the power calculations in three phase circuits.
CO2: Evaluate the time response of given network.
CO3: Evaluate two port network parameters.
CO4: Apply KCL and KVL to solve real-world electrical circuit problems
CO5: Understand the interrelationship between inductors and their impact on overall circuit behavior.
CO6: Simulate and analyse electrical circuits using suitable software.

**Mapping of course outcomes with program outcomes**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 2 | 2 | 2 | - | - | - | 2 | - | - | - |
| **CO2** | 3 | 2 | 2 | 2 | 2 | - | - | - | 2 | - | - | - |
| **CO3** | 3 | 2 | 2 | 2 | 2 | - | - | - | 2 | - | - | - |
| **CO4** | 3 | 2 | 2 | 2 | 2 | - | - | - | 2 | - | - | - |
| **CO5** | 3 | 2 | 2 | 2 | 2 | - | - | - | 2 | - | - | - |
| **CO6** | 3 | 2 | 2 | 2 | 2 | - | - | - | 2 | - | - | - |

**Mapping of course outcomes with program specific outcomes.**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | - | - |
| **CO2** | - | - |
| **CO3** | - | - |
| **CO4** | - | - |
| **CO5** | - | - |
| **CO6** | - | - |

**List of Experiments**

**Any 10 of the following experiments are to be conducted:**

1. Measurement of Active Power and Reactive Power for balanced loads.
2. Measurement of Active Power and Reactive Power for unbalanced loads.
3. Determination of Z and Y parameters.
4. Determination of ABCD and hybrid parameters
5. Verification of Kirchhoff's current law and voltage law using simulation tools.
6. Verification of mesh and nodal analysis using simulation tools.
7. Verification of super Position and maximum power transfer theorems using simulation tools.
8. Verification of Reciprocity and Compensation theorems using simulation tools.

9. Verification of Thevenin's and Norton's theorems using simulation tools.
10. Verification of series and parallel resonance using simulation tools.
11. Simulation and analysis of transient response of RL, RC and RLC circuits.
12. Verification of self inductance and mutual inductance by using simulation tools.

| II Year I Semester | Course Code : BT24EE2105 | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 3 | 1.5 |
| DC MACHINES & TRANSFORMERS LAB | | | | | |

**Course Objectives:**

**The objectives of this course is**

- To conduct the experiment and plot the characteristics and applications of DC machines.
- To perform the starting, speed control and testing methods of DC Machines.
- To determine/Predetermine efficiency and regulation of the transformer through equivalent circuit.

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

CO1. Analyze the load characteristics of a DC shunt, series and DC compound generator

CO2. Analyze the factors that influence the efficiency of DC machines and identify ways to improve their overall performance.

CO3. Analyze the obtained data to plot the torque-speed characteristic curve of the motor, illustrating The relationship between torque and speed at different load conditions.

CO4.Evaluate the performance and limitations of DC shunt motors under both field and armature Control methods for specific speed control requirements

CO5. Apply concepts of efficiency and regulation to determine the transformer's performance and Evaluate its energy conversion capabilities under different load conditions.

CO6. Analyze the impact of load on the transformer's performance, including voltage regulation and losses, and identify its operating characteristics under different loading conditions.

**Mapping of course outcomes with program out comes.**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | - | - | - | - | - | 2 | - | - | - |
| **CO2** | 3 | 3 | 2 | - | - | - | - | - | 2 | - | - | - |
| **CO3** | 3 | 3 | 2 | - | - | - | - | - | 2 | - | - | - |
| **CO4** | 3 | 3 | 2 | - | - | - | - | - | 2 | - | - | - |
| **CO5** | 3 | 3 | 2 | - | - | - | - | - | 2 | - | - | - |
| **CO6** | 3 | 3 | 2 | - | - | - | - | - | 2 | - | - | - |

**Mapping of course outcomes with program specific outcomes.**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | 1 | - |
| **CO2** | 1 | - |
| **CO3** | 1 | - |
| **CO4** | 1 | - |
| **CO5** | 1 | - |
| **CO6** | 1 | - |

**List of Experiments**

**Any 10 of the following experiments are to be conducted:**

1. Speed control of DC shunt motor by Field Current and Armature Voltage Control.
2. Brake test on DC shunt motor-Determination of performance curves.
3. Swinburne's test-Pre determination of efficiencies as DC Generator and Motor.

4. Hopkinson’s test on DC shunts Machines.
5. Load test on DC compound generator-Determination of characteristics.
6. Load test on DC shunt generator-Determination of characteristics.
7. Fields test on DC series machines-Determination of efficiency.
8. Brake test on DC compound motor-Determination of performance curves.
9. OC & SC tests on single phase transformer.
10. Sumpner’s test on single phase transformer.
11. Scott connection of transformers.
12. Parallel operation of Single-phase Transformers.
13. Separation of core losses of a single-phase transformer.

**Online Learning Resources:**

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

| II Year I Semester | Course Code : BT24CS2106 | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 1 | 2 | 2 |
| DATA STRUCTURES LAB | | | | | |

**Pre-requisite:**

**Course Objectives:**

- To provide the knowledge of basic data structures and their implementations.
- To understand importance of data structures in context of writing efficient programs.
- To develop skills to apply appropriate data structures in problem solving.

**Course Outcomes:** At the end of the course, Student will be able to

CO1: Identify the role of data structures in organizing and accessing data.
CO2: Design, implement, and apply linked lists for dynamic data storage.
CO3: Develop applications using stacks and queues.
CO4: Design and implement algorithms for operations on binary trees and binary search trees.
CO5: Devise novel solutions to small scale programming challenges involving data structures such as stacks, queues, Trees.
CO6: Develop algorithms that incorporate these data structures to solve the given challenges.

**Mapping of course outcomes with program outcomes**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 1 | 1 | 1 | - | - | - | 2 | - | - | - |
| CO2 | 3 | 2 | 1 | 1 | 1 | - | - | - | 2 | - | - | - |
| CO3 | 3 | 2 | 1 | 1 | 1 | - | - | - | 2 | - | - | - |
| CO4 | 3 | 2 | 2 | 2 | 2 | - | - | - | 2 | - | - | - |
| CO5 | 3 | 2 | 2 | 2 | 2 | - | - | - | 2 | - | - | - |
| CO6 | 3 | 2 | 2 | 2 | 2 | - | - | - | 2 | - | - | - |

**Mapping of course outcomes with program specific outcomes.**

| | PSO1 | PSO2 |
|---|---|---|
| CO1 | - | - |
| CO2 | - | - |
| CO3 | - | - |
| CO4 | - | - |
| CO5 | - | - |
| CO6 | - | - |

**UNIT-I**

**Introduction to Data Structures:** Definition and importance of Data structures, Abstract data types (ADTs) and its specifications, **Arrays**: Introduction, 1-D, 2-D Arrays, accessing elements of array, Row Major and Column Major storage of Arrays, **Searching Techniques**: Linear & Binary Search, **Sorting Techniques**: Bubble sort, Selection sort, Quick sort.

**Sample experiments:**

1. Program to find min & max element in an array.
2. Program to implement matrix multiplication.
3. Find an element in given list of sorted elements in an array using Binary search.
4. Implement Selection and Quick sort techniques.

**UNIT-II**

**Linked Lists:** Singly linked lists: representation and operations, doubly linked lists and circular linked lists, Comparing arrays and linked lists, Applications of linked lists.

**Sample experiments:**

1. Write a program to implement the following operations.
   a. Insert b. Deletion c. Traversal
2. Write a program to store name, roll no, and marks of students in a class using circular double linked list.
3. Write a program to perform addition of given two polynomial expressions using linked

**UNIT-III**

**Stacks:** Introduction to stacks: properties and operations, implementing stacks using arrays and linked lists, Applications of stacks in expression evaluation, back tracking, reversing list etc.

**Sample experiments:**

1. Implement stack operations using
   a. Arrays b. Linked list
2. Convert given in fix expression into post fix expression using stacks.
3. Evaluate given post fix expression using stack.
4. Write a program to reverse given linked list using stack.

**UNITIV**

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

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

**Sample experiments:**

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

**UNITV**

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

**Sample experiments:**

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

**Textbooks:**

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

**Reference Books:**

1. Algorithms and Data Structures: The Basic Tool box by Kurt Mehlhorn and Peter Sanders.
2. C Data Structures and Algorithms by Alfred V .Aho, Jeffrey D. Ullman, and John E. Hop croft.
3. Problem Solving with Algorithms and Data Structures by Brad Miller and David Ranum.
4. Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiser son, Ronald L. Rivest, and Clifford Stein.
5. Algorithms in C, Parts1-5(Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms "by Robert Sedge wick.

| II Year- I Semester | Course Code: BT24BS2106 | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 0 | 0 |
| Environmental science (COMMON FOR ALL BRANCHES) | | | | | |

**Course Objectives:**

- To make the students to get awareness on environment
- To understand the importance of protecting natural resources, ecosystems for future.
- To save earth from the inventions by the engineers.

**Course Outcomes:**

CO1.Grasp multidisciplinary nature of environmental studies and various renewable and non-renewable resources.

CO2.Understand flow and bio-geo-chemical cycles and ecological pyramids.

CO3.Understand various causes of pollution and solid waste management and related preventive measures

CO4.Solid Waste Management: Causes, effects and control measures of urban and industrial Wastes.

CO5.About the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation

CO6.Casus of population explosion, value education and welfare programmes

**Mapping of course outcomes with program outcomes**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 2 | - | - | - | 3 | - | - | - | - | 1 |
| **CO2** | 2 | 3 | 2 | - | - | - | 2 | - | - | - | - | 1 |
| **CO3** | 2 | 2 | 1 | - | - | - | 1 | - | - | - | - | 1 |
| **CO4** | 2 | 1 | 2 | - | - | - | 1 | - | - | - | - | 1 |
| **CO5** | 3 | 2 | 2 | - | - | - | 1 | - | - | - | - | 1 |
| **CO6** | 2 | 2 | 2 | - | - | - | 1 | - | - | - | - | 1 |

**Mapping of course outcomes with program specific outcomes**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | - | - |
| **CO2** | - | - |
| **CO3** | - | - |
| **CO4** | - | - |
| **CO5** | - | - |
| **CO6** | - | - |

**UNIT – 1: Multidisciplinary Nature of Environmental Studies**

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

**UNIT – II: Ecosystems:**

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

1. Forest ecosystem.
2. Grassl and ecosystem
3. Desert ecosystem
4. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity And Its Conservation: Introduction Definition: genetic, species and ecosystem diversity–Bio-geographical classification of India–Value of biodiversity: consumptive use Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts– Endangered and endemic species of India –Conservation of bio diversity: In-situ and Ex-situ conservation of biodiversity.

**UNIT – III: Environmental Pollution:**

Environmental Pollution: Definition, Cause, effects and control measures of: 1. Air Pollution. 2. Water pollution 3. Soil pollution 4.Marine pollution 5.Noise pollution 6.Thermal pollution 7.Nuclear hazards
Solid Waste Management: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earth quake, cyclone and landslides.

**UNIT – IV: Social Issues and the Environment:**

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

**UNIT – V: Human Population and the Environment**

Population growth, variation among nations. Population explosion – Family Welfare Programmes. – Environment and human health – Human Rights – Value Education– HIV/AIDS–Women and Child Welfare–Role of information Technology in Environment and human health–Case studies. Field Work: Visit to a local area to document environmental assets River/ forest grassland/ hill/ mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds–river, hills lopes, etc..

**Text Books:**

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

**Reference Books:**

1. Deeksha Dave and E .Sai Baba Reddy, "Text book of Environmental Science",Cengage Publications.
2. M.AnjiReddy,"Text book of Environmental Sciences and Technology",BSPublication.
3. J.P.Sharma,Comprehensive Environmental studies,Laxmi publicati
4. J.GlynnHenryandGaryW.Heinke,"Environmental Sciences and Engineering",Prentice Hall of India Private limited
5. G.R.Chatwal,"A Text Book of Environmental Studies"Himalaya Publishing House
6. Gilbert M.Masters and WendellP.Ela,"Introduction to Environmental Engineering and Science,Prentice Hall of India Private limited

| II Year II Semester | Course Code : BT24HS2201 | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 0 | 2 |
| MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS | | | | | |

**Course Objectives:**

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

**Course Outcomes:**

- Define the concepts related to Managerial Economics, financial accounting and management (L2)
- Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets (L2)
- Apply the Concept of Production cost and revenues for effective Business decision (L3)
- Analyze how to invest their capital and maximize returns (L4)
- Evaluate the capital budgeting techniques.(L5)
- Develop the accounting statements and evaluate the financial performance of business entity (L5)

**Mapping of course outcomes with program outcomes and program specific outcomes**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | - | - | - | - | - | - | 2 | - | - | - | 2 | 3 |
| **CO2** | - | - | - | - | - | - | 2 | - | - | - | 2 | 3 |
| **CO3** | - | - | - | - | - | - | 3 | - | - | - | 2 | 2 |
| **CO4** | - | - | - | - | - | - | 2 | - | - | - | 2 | 3 |
| **CO5** | - | - | - | 3 | 3 | - | 2 | 2 | - | - | 3 | 3 |
| **CO6** | - | - | - | 3 | 3 | - | 2 | 2 | - | - | 3 | 2 |

**Mapping of course outcomes with program specific outcomes.**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | - | - |
| **CO2** | - | - |
| **CO3** | - | - |
| **CO4** | - | - |
| **CO5** | - | - |
| **CO6** | - | - |

**UNIT-I Managerial Economics**

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

**UNIT-II Production and Cost Analysis**

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

**UNIT-III Business Organizations and Markets**

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

**UNIT-IV Capital Budgeting**

Introduction – Nature, meaning, significance. Types of Working Capital, Components, Sources of Short-term and Long capital, estimating working capital requirements. Capital budgeting features, Proposals, Methods and Evaluation. Projects –Pay back Method, Accounting Rate of Return (ARR) Net Present Value (NPV) Internal Rate Return (IRR) Method (sample problems)

**UNIT-V Financial Accounting and Analysis**

Introduction – Concepts and Conventions- Double-Entry Bookkeeping, Journal, Ledger, Trial Balance-Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). Introduction to Financial Analysis - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.

**Textbooks:**


1. Varshney &Maheswari: Managerial Economics, Sultan Chand.
2. Arya sri : Business Economics and FinancialAnalysis,4/e, MGH.


**Reference Books:**


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


**Online Learning Resources:**

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

| II Year II Semester | Course Code : BT24EC2207 | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| ANALOG CIRCUITS | | | | | |

**Pre-requisite: Knowledge** of electronic components and semiconductor devices, number systems, binary arithmetic, Boolean or switching algebra, and logic gates.

**Course Objectives:**

- To acquire the basic knowledge on clippers, clampers & biasing circuits.
- To determine the h-parameters of a transistor circuit & understand the feedback Concepts of amplifiers.
- To know the operation of oscillators and operational amplifier.
- To understand the applications of operational amplifier.
- To acquire the knowledge on IC555 timer and their applications.
- To know the operation of Analog to Digital Converters and Digital to Analog Converters.

**Course Outcomes:**

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

CO1**:** Analyze diode clipping and clamping circuits. Understand different types of biasing circuits of a transistor.

CO2**:** Use small signal modeling for transistor circuit analysis and illustrate the operation of feedback amplifiers.

CO3: Understand operation of oscillators and their applications.

CO4**:** Understand operation of operational amplifier and their applications.

CO5**:** Use 555 timers in multi-vibrators, Schmitt Trigger and PLL applications.

CO6**:** Describe the operation of different ADC's and DAC's.

**Mapping of course outcomes with program outcomes**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | 1 |
| CO2 | 3 | 3 | - | - | - | - | - | - | - | - | - | 1 |
| CO3 | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 1 |
| CO4 | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 1 |
| CO5 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | 1 |
| CO6 | 3 | 2 | 1 | - | - | - | - | - | - | - | - | 1 |

**Mapping of course outcomes with program specific outcomes**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | - | - |
| **CO2** | - | - |
| **CO3** | - | - |
| **CO4** | - | - |
| **CO5** | - | - |
| **CO6** | - | - |

**Unit–1:**

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

**DC biasing of BJTs:** Load lines, Operating Point, Bias Stability, Collector-to-Base Bias, Self-Bias, Stabilization against Variations in $V_{BE}$ and β for the Self- Bias Circuit, Bias Compensation, Thermal

Runaway, Thermal Stability.

**Unit–II:**

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

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

**Unit–III:**

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

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

**Unit–IV:**

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

**Comparators and Waveform Generators:** Introduction, Comparator, Square Wave Generator, Monostable Multi vibrator, Triangular Wave Generator, Sine Wave Generators.

**Unit–V:**

**Timers and Phase Locked Loop:** Introduction to 555 timer, functional diagram, Monostable and Astable operations and applications ,Schmitt Trigger, PLL block schematic, principles and description of individual blocks, 565 PLL, Applications of VCO (566).

**Digital to Analog and Analog to Digital Converters:** Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, A-D Converters – parallel Comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC, DAC and ADC Specifications.

**Textbooks:**


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


**Reference Books:**


1. Electronic Devices and Circuit Theory–Robert L. Boylston and Lowis Nashel sky, Pearson Edition, 2021.
2. Electronic Devices and Circuits–G.K.Mithal, Khanna Publisher, 23rd Edition, 2017.
3. Electronic Devices and Circuits–David Bell, Oxford, 5th Edition, 2008.
4. Electronic Principles–Malvino, Albert Paul, and David J. Bates, McGraw-Hill/Higher Education, 2007.
5. Operational Amplifiers and Linear Integrated Circuits– Gaya wad R.A, Prentice Hall India, 2002.
6. Operational Amplifiers and Linear Integrated Circuits –Sanjay Sharma, Kataria & Sons, 2nd Edition, 2010.


**Online Learning Resources:**

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

| II Year II Semester | Course Code : BT24EE2201 | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| POWER SYSTEMS-I | | | | | |

**Pre-requisite: Electrical** Circuit Analysis

**Course Objectives:**

- To study principle of operation of different components of a hydro and thermal power stations.
- To study principle of operation of different components of a nuclear power stations.
- To study constructional and operation of different components of an Air and Gas Insulated substations.
- To study different types of cables and distribution systems.
- To study different types of load curves and tariffs applicable to consumers.

**Course Outcomes:**

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

CO1. Identify various types of power generation systems and components of respective power stations.
CO2. Outline the principle of operation of a Nuclear power station.
CO3. Compare AIS and GIS in various aspects
CO4. Apply the knowledge of comparing various bus bar arrangements in substations
CO5. Explain the construction of different types of cables and distribution systems
CO6. Analyze different methods of power generation and tariffs

**Mapping of course outcomes with program outcomes**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 2 | 2 | - | 2 | - | - | - | - | - | - |
| **CO2** | 3 | 2 | 2 | 2 | - | 2 | - | - | - | - | - | - |
| **CO3** | 3 | 2 | 2 | 2 | - | 2 | - | - | - | - | - | - |
| **CO4** | 3 | 2 | 2 | 2 | - | 2 | - | - | - | - | - | - |
| **CO5** | 3 | 2 | 2 | 2 | - | 2 | - | - | - | - | - | - |
| **CO6** | 3 | 2 | 2 | 2 | - | 2 | - | - | - | - | - | - |

**Mapping of course outcomes with program specific outcomes.**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | 2 | 2 |
| **CO2** | 2 | 2 |
| **CO3** | 2 | 2 |
| **CO4** | 2 | 2 |
| **CO5** | 2 | 2 |
| **CO6** | 2 | 2 |

**Unit I:**

**Hydroelectric Power Stations:**

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

**Thermal Power Stations:**

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

**Unit II:**

**Nuclear Power Stations:**

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

**Unit III:**

**Substation**s:

**Air Insulated Substations** – indoor & outdoor substations, substations layouts of 33/11 kV showing the location of all the substation equipment. Bus bar arrangements in the sub-stations: simple arrangements like single bus bar, sectionalized single bus bar, double bus bar with one and two circuit breaker, main and transfer bus bar system with relevant diagrams.

**Gas Insulated Substations (GSI)** –advantages of gas insulated substations, constructional aspects of GIS, comparison of air insulated substations and gas insulated substations.

**Unit IV:**

**Underground Cables:**

Types of cables, construction, types of insulating materials, calculation of insulation resistance, stress in Insulation and power factor of cable. Capacitance of single and 3-Core belted Cables.

**Grading of cables:** Capacitance grading and inter sheath grading

**Distribution Systems:**

Classification of Distribution systems, A.C Distribution, Overhead versus Underground system, Connection schemes of distribution system, Requirements of Distribution system, requirements of a Distribution system, Design Considerations in Distribution system.

**UNITV: Economic Aspects &Tariff**

**Economic Aspects** -load curve, load duration and integrated load duration curves, discussion on Economic aspects: connected load, maximum demand, demand factor, load factor, diversity factor, Plant capacity factor and plant use factor, base and peak load plants.

**Tariff Methods**–Costs of generation and their division into fixed, semi-fixe and running Costs, desirable characteristics of a tariff method, tariff methods: simple rate, flat rate, block-rate, two- part, three–part, and power factor tariff methods.

**Text Books:**


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


**Reference Books:**


1. I.J. Nagarath & D.P.Kothari, Power System Engineering, McGraw-Hill Education, 3rd Edition, 2019.
2. C.L. Wadhwa, Generation, Distribution and Utilization of Electrical Energy, New Age International Publishers, 6th Edition, 2018.
3. V.K.Mehta and Rohit Mehta, Principles of Power System, S .Chan 2005.4th edition ,2005
4. Turan Gonen, Electric Power Distribution System Engineering, McGraw Hill, 1985.
5. Hand book of switchgear, BHEL, McGraw-Hill Education, 2007.


**Online Learning Resources:**

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

| II Year II Semester | Course Code : BT24EE2202 | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| INDUCTION AND SYNCHRONOUS MACHINES | | | | | |

**Pre-requisite:** Principles of Electromechanical Energy Conversion, Electromagnetic fields and Electrical Circuit Analysis.

**Course Objectives:**

**Students will get exposure to understand the concepts of**

- characteristics, starting and testing methods of Induction Motor
- Torque production and performance of Induction Motor.
- In determining the performance parameters of Induction Motor.
- Working of synchronous machines

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

CO1: Explain the construction and operation of three-phase induction motor.

CO2: Analyse the performance of three-phase induction motor.

CO3: Explain the response of a three-phase induction motor

CO4: Describe the working of single-phase induction motors.

CO5: Analyse the construction and performance of Synchronous generators.

CO6: Analyse the performance of Synchronous motors.

**Mapping of course outcomes with program outcomes and program specific outcomes**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 2 | 2 | 2 | 2 | - | - | - | - | - | - |
| **CO2** | 3 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | - |
| **CO3** | 3 | 2 | 2 | 1 | - | - | - | - | - | - | - | - |
| **CO4** | 3 | 2 | 2 | 2 | - | - | - | - | - | - | - | - |
| **CO5** | 3 | 2 | 2 | 2 | - | - | - | - | - | - | - | - |
| **CO6** | 3 | 2 | 2 | 2 | - | - | - | - | - | - | - | - |

**Mapping of course outcomes with program specific outcomes.**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | 2 | 2 |
| **CO2** | 2 | 2 |
| **CO3** | 2 | 2 |
| **CO4** | 2 | 2 |
| **CO5** | 2 | 2 |
| **CO6** | 2 | 2 |

**UNIT-I:**

**3-phase induction motors:** Construction of Squirrel cage and Slip ring induction motors– production of rotating magnetic field–principle of operation– rotor emf and rotor frequency –rotor current and power factor at standstill and during running conditions–rotor power input, rotor copper loss and mechanical power developed and their inter-relationship–equivalent circuit – phasor diagram

**UNIT-II: Performance of 3-Phase induction motors:**

Torque equation–expressions for maximum torque and starting torque–torque- slip -characteristics–double cage and deep bar rotors –No load, Brake test and Blocked rotor tests circle diagram for predetermination of performance –methods of starting– starting current and torque calculations –speed

control of induction motor with V/f control method, rotor resistance control and rotor emf injection technique– crawling and cogging induction generator operation.

**UNIT–III: Single Phase Motors:**

Single phase induction motors–constructional features–double revolving field theory, Cross field theory – equivalent circuit-starting methods: capacitor start capacitor run, capacitor start induction run, split phase & Shaded pole, AC series motor.

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

**UNIT–V: Synchronous Motor**
Synchronous motor principle and theory of operation – Effect of excitation on current and power factor– synchronous condenser –expression for power developed –hunting and its suppression – methods of starting.

**Text Books:**


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


**Reference Books:**


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


**Online Learning Resources:**

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

| II Year II Semester | Course Code : BT24EE2203 | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| CONTROLSYSTEMS | | | | | |

**Pre-requisite:** Basic Engineering Mathematics

**Course Objectives:**

- To obtain the mathematical models of physical systems and derive transfer function.
- To determine the time response of systems and analyse system stability.
- To analyse system stability using frequency response methods.
- To design compensators using Bode diagrams.

**Course Outcomes**:

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

**CO1:** Derive the transfer function of physical systems and determine overall transfer function using block diagram algebra and signal flow graphs.

**CO2:** Obtain the time response of first and specifications of second order systems and determine error constants.

**CO3:** Analyze the absolute and relative stability of LTI systems using Routh's stability criterion.

**CO4:** Analyze the absolute and relative stability of LTI systems using root locus method.

**CO5:** Analyze the stability of LTI systems using frequency response methods.

**CO6:** Design Lag, Lead, Lag-Lead compensators to improve system performance using Bode Diagrams.

**Mapping of course outcomes with program outcomes**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 2 | 2 | - | - | - | - | - | - | - | - |
| **CO2** | 3 | 2 | 2 | 2 | - | - | - | - | - | - | - | - |
| **CO3** | 3 | 2 | 2 | 2 | - | - | - | - | - | - | - | - |
| **CO4** | 3 | 2 | 2 | 2 | - | - | - | - | - | - | - | - |
| **CO5** | 3 | 2 | 2 | 2 | - | - | - | - | - | - | - | - |
| **CO6** | 3 | 2 | 2 | 2 | - | - | - | - | - | - | - | - |

**Mapping of course outcomes with program specific outcomes.**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | 1 | - |
| **CO2** | 1 | - |
| **CO3** | 1 | - |
| **CO4** | 1 | - |
| **CO5** | 1 | - |
| **CO6** | 1 | - |

**UNIT-1**

**Mathematical Modeling of Control Systems**

Classification of control systems - open loop and closed loop control systems and their differences- Feedback characteristics –transfer function of linear system, differential equations of electrical networks- translational and rotational mechanical systems -transfer function of Armature voltage controlled DC servomotor-block diagram algebra–Representation by signal flow graph–reduction

using Mason's gain formula.

**UNIT-2: Time Response Analysis**

Standard test signals–time response of first and second order systems–time domain specifications - steady state errors and error constants - effects of proportional (P) -proportional integral (PI) - proportional derivative (PD) proportional integral derivative (PID) systems.

**UNIT-3: Stability and Root Locus Technique**

The concept of stability – Routh's stability criterion – limitations of Routh's stability, root locus concept – construction of root loci (simple problems) - Effect of addition of Poles and Zeros to the transfer function.

**UNIT-4: Frequency Response Analysis**

Introduction to frequency domain specifications – Bode diagrams – transfer function from the Bode diagram –Polar plots, Nyquist stability criterion- stability analysis using Bode plots (phase margin and gain margin).

**UNIT-5:** Classical Control Design Techniques

Lag, lead, lag-lead compensators - physical realisation - design of compensators using Bode plots.

**Text Books**:

1. Modern Control Engineering by Kotsuhiko Ogata, Prentice Hall of India, 2010.
2. Automatic control systems by Benjamin C.Kuo, Prentice Hall of India, 2ndEdition.

**Reference Books:**


1. Control Systems principles and design by M.Gopal, Tata Mc Graw Hill education Pvt Ltd., 4th Edition.
2. Control Systems Engineering by Norman S.Nise,Wiley Publications ,7th edition
3. Control Systems by Mani k Dhanesh N, Cengage publications.
4. Control Systems Engineering by I.J.Nagarath and M.Gopal, New age Publications, International 5th Edition.
5. Control Systems Engineering by S.Palani, Tata McGraw Hill Publications.


Online Learning Resources:

1. https://archive.nptel.ac.in/courses/107/106/107106081/
2. https://archive.nptel.ac.in/courses/108/106/108106098/
3. https://nptelvideos.com/video.php?id=1423&c=14

| II Year II Semester | Course Code : BT24EE2204 | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 3 | 1.5 |
| INDUCTION AND SYNCHRONOUS MACHINES LAB | | | | | |

**Course Objectives:**

The objectives of this course is

- To apply the concepts of speed control methods in 3-phase Induction Motor.
- To experimentally develop circle diagram and obtain equivalent circuit to analyse the performance of 3-phase induction motor
- To apply the concepts of power factor improvement on single phase Induction Motor
- To perform various testing methods on alternators for experimentally predetermine the regulation

**Course Outcomes:**

CO1: Analyze the speed control methods on 3-phase Induction Motor.
CO2: Evaluate the performance of 3-phase Induction Motor by obtaining the locus diagram and Equivalent circuit of 3-phase Induction Motor
CO3: Adapt the power factor improvement methods for single phase Induction Motor
CO4: Pre-determineteregulationof3-phasealternator
CO5: Determine the synchronous machine reactance of 3-phase alternator
CO6: Analyze the various operating conditions of synchronous motor.

**Mapping of course outcomes with program outcomes**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 2 | 2 | 2 | - | - | - | 2 | - | - | - |
| **CO2** | 3 | 2 | 2 | 2 | 2 | - | - | - | 2 | - | - | - |
| **CO3** | 3 | 2 | 2 | 2 | 2 | - | - | - | 2 | - | - | - |
| **CO4** | 3 | 2 | 2 | 2 | 2 | - | - | - | 2 | - | - | - |
| **CO5** | 3 | 2 | 2 | 2 | 2 | - | - | - | 2 | - | - | - |
| **CO6** | 3 | 2 | 2 | 2 | 2 | - | - | - | 2 | - | - | - |

**Mapping of course outcomes with program specific outcomes.**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | 1 | - |
| **CO2** | 1 | - |
| **CO3** | 1 | - |
| **CO4** | 1 | - |
| **CO5** | 1 | - |
| **CO6** | 1 | - |

**List of Experiments**

**Any 10 experiments of the following are required to be conducted**

1. Brake test on three phase Induction Motor.
2. Circle diagram of three phase induction motor.
3. Speed control of three phase induction motor by V/f method.
4. Equivalent circuit of single-phase induction motor.
5. Power factor improvement of single-phase induction motor by using capacitors.
6. Load test on single phase induction motor.
7. Regulation of a three-phase alternator by synchronous impedance method.

8. Regulation of a three-phase alternator by MMF method.
9. V and Inverted V curves of a three-phase synchronous motor.
10. Determination of $X_d$, $X_q$ & Regulation of a salient pole synchronous generator.
11. Determination of efficiency of three phase alternator by loading with three phase induction motor.
12. Determination of efficiency of a single-phase AC series Motor by conducting Brake test.

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

| II Year II Semester | Course Code : BT24EE2205 | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 3 | 1.5 |
| CONTROL SYSTEMS LAB | | | | | |

**Course Objectives:**

- To impart hands on experience to understand the performance of basic control system components such as magnetic amplifiers, D.C. servo motors, A.C. Servo motors and Synchros.
- To understand time and frequency responses of control system with and without Controllers and compensators.
- To know the different logic gates and Boolean expressions using PLC.

**Course Outcomes:**

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

CO1: Analyze the performance of Magnetic amplifier, D.C and A.C. servomotors and Synchros.
CO2: Design of PID controllers and compensators.
CO3: Evaluate temperature control of an oven using PID controller
CO4: Determine the transfer function of D.C Motor and
CO5. Examine the truth table of logic gates using PLC.
CO6: Judge the stability in time and frequency domain and Kalman's test for controllability and observability.

**Mapping of course outcomes with program outcomes and program specific outcomes**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 2 | 2 | 2 | - | - | - | 2 | - | - | - |
| **CO2** | 3 | 2 | 2 | 2 | 2 | - | - | - | 2 | - | - | - |
| **CO3** | 3 | 2 | 2 | 2 | 2 | - | - | - | 2 | - | - | - |
| **CO4** | 3 | 2 | 2 | 2 | 2 | - | - | - | 2 | - | - | - |
| **CO5** | 3 | 2 | 2 | 2 | 2 | - | - | - | 2 | - | - | - |
| **CO6** | 3 | 2 | 2 | 2 | 2 | - | - | - | 2 | - | - | - |

**Mapping of course outcomes with program specific outcomes.**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | 2 | - |
| **CO2** | 2 | - |
| **CO3** | 2 | - |
| **CO4** | 2 | - |
| **CO5** | 2 | - |
| **CO6** | 2 | - |

**List of Experiments**

**Any 10 of the following experiments are to be conducted**

1. Analysis of Second order system in time domain
2. Characteristics of Synchros
3. Effect of P, PD, PI, PID Controller on a second order systems

4. Design of Lag and lead compensation–Magnitude and phase plot
5. Transfer function of DC motor
6. Root locus, Bode Plot and Nyquist Plot for the transfer function of systems up to $5^{th}$ order using MATLAB.
7. Kalman's test of Controllability and Observability using MATLAB.
8. Temperature controller using PID
9. Characteristics of magnetic amplifiers
10. Characteristics of AC servo motor
11. Characteristics of DC servo motor
12. Time response of second order system using MATLAB.

Online Learning Resources: **https://ce-dei.vlabs.ac.in/List%20of%20experiments.html**

| | |
|---|---|
| | **D.N.R COLLEGE OF ENGINEERING & TECHNOLOGY**<br>**AUTONOMOUS**<br>**ELECTRICAL AND ELECTRONICS ENGINEERING**<br>**(DR24-II$^{nd}$ YEAR II SEM COURSE STRUCTURE & SYLLABUS)** |

| **II Year II Semester** | **Course Code : BT24CS2207** | **L** | **T** | **P** | **C** |
|---|---|---|---|---|---|
| | | **0** | **1** | **2** | **2** |
| **SKILL ENHANCEMENT COURSE: PYTHON PROGRAMMING LAB** | | | | | |

**Course Objectives:**

The main objectives of the course are to

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

**Course outcomes:**

CO1. Understand basic Python syntax, data types, operators, and control structures.
CO2.Implement functions with parameters and return values, including recursion.
CO3. Develop data structures like lists, tuples, dictionaries, and sets for efficient data Manipulation.
CO4.Evaluate file input/output operations in Python
CO5.Construct object-oriented programming concepts (classes, objects, inheritance) where Appropriate
CO6. Determine the need of JSON and XML and other file formats.

**Mapping of course outcomes with program out comes.**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 1 | 1 | 1 | - | - | - | 2 | - | - | - |
| **CO2** | 3 | 2 | 1 | 1 | 1 | - | - | - | 2 | - | - | - |
| **CO3** | 3 | 2 | 1 | 1 | 1 | - | - | - | 2 | - | - | - |
| **CO4** | 3 | 2 | 2 | 2 | 2 | - | - | - | 2 | - | - | - |
| **CO5** | 3 | 2 | 2 | 2 | 2 | - | - | - | 2 | - | - | - |
| **CO6** | 3 | 2 | 2 | 2 | 2 | - | - | - | 2 | - | - | - |

**Mapping of course outcomes with program specific outcomes.**

| | **PSO1** | **PSO2** |
|---|---|---|
| **CO1** | 3 | - |
| **CO2** | 3 | - |
| **CO3** | 3 | - |
| **CO4** | 3 | - |
| **CO5** | 3 | - |
| **CO6** | 3 | - |

**UNIT- I:**

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

Parts of Python Programming Language: Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments,

Reading Input, Print Output, Type Conversions, the type () Function and Is Operator,Dynamic and Strongly Typed Language.

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

**Sample Experiments:**

1. Write a program to find the largest element among three Numbers.
2. Write a Program to display all prime numbers with in an interval
3. Write a program to swap two numbers with out using a temporary variable.
4. Demonstrate the following Operators in Python with suitable examples.

   i) Arithmetic Operators ii) Relational Operators iii) Assignment Operators iv) Logical Operators v) Bitwise Operators vi) Ternary Operatory ii) Member ship Operators viii) Identity Operators
5. Write a program to add and multiply complex numbers
6. Write a program to print multiplication table of a given number.

**UNIT-II:**

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

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

Lists: Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, del Statement.

**Sample Experiments:**

1. Write a program to define a function with multiple return values.

2. Write a program to define a function using default arguments.
3. Write a program of in the length of the string with out using any library functions.
4. Write a program to check if the substring is present in a given string or not.
5. Write a program to perform the given operations on a list:
    i. Addition ii. Insertion iii. `slicing
6. Write a program to perform any 5 built-in functions by taking any list.

**UNIT-III:**

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

**Sample Experiments:**

7. Write a program to create tuples (name, age, address, college) for at least two members and concatenate the tuples and print the concatenated tuples.
8. Write a program to count the number of vowels in a string (No control flow allowed).
9. Write a program to check if a given key exists in a dictionary or not.
10. Write a program to add a new key-value pair to an existing dictionary.
11. Write a program to sum all the items in a given dictionary.

**UNIT-IV:**

Files: Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules. Object-Oriented Programming: Classes and Objects, Creating Classes in Python, Creating Objects in Python, Constructor Method, Classes with Multiple Objects, Class Attributes Vs Data Attributes, Encapsulation, Inheritance, Polymorphism.

**Sample Experiments:**

1. Write a program to sort words in a file and put them in another file. The output file should have only lower-case words, so any upper-case words from source must be lowered.
2. Python program to print each line of a file in reverse order.
3. Python program to compute the number of characters, words and lines in a file.

4. Write a program to create, display, append, insert and reverse the order of the items in the array.
5. Write a program to add, transpose and multiply two matrices.
6. Write a Python program to create a class that represents a shape. Include methods to calculate its area and perimeter. Implement subclasses for different shapes like circle, triangle and square.

**UNIT-V:**

Introduction to Data Science: Functional Programming, JSON and XML in Python, NumPy with Python, Pandas.

**Sample Experiments:**

1. Python program to check whether a JSON string contains complex object or not.
2. Python Program to demonstrate NumPy arrays creation using array () function.
3. Python program to demonstrate use of n dim, shape, size, d type.
4. Python program to demonstrate basic slicing, integer and Boolean indexing.
5. Python program to find min, max, sum, cumulative sum of array
6. Create a dictionary with at least five keys and each key represent value as a list where this list contains at least ten values and convert this dictionary as a pandas data frame and explore the data through the data frame as follows:
    a) Apply head() function to the pandas data frame
    b) Perform various data selection operations on Data Frame
7. Select any two columns from the above data frame, and observe the change in one attribute with respect to other attribute with scatter and plot operations in mat plot lib

**Reference Books:**


1. Gowri Shankar S, Veena A., Introduction to Python Programming, CRC Press.
2. Python Programming ,S Sridhar, J Indumathi, V M Hariharan,2nd Edition, Pearson, 2024
3. Introduction to Programming Using Python, Y .Daniel Liang, Pearson.


**Online Learning Resources/Virtual Labs:**

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

| II Year II Semester | Course Code : BT24ME2207 | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | 2 |
| DESIGN THINKING & INNOVATION | | | | | |

**Course Objectives: The** objectives of the course are to

- Bring awareness on innovative design and new product development.
- Explain the basics of design thinking.
- Familiarize the role of reverse engineering in product development.
- Train how to identify the needs of society and convert into demand.
- Introduce product planning and product development process.

**Course Outcomes:**

CO1 .Define the concepts related to design Thinking.

CO2. Explain the fundamentals of Design Thinking and innovation.

CO3. Apply the design thinking techniques for solving problems in various sectors.

CO4.Analyse to work in a multi disciplinary environment.

CO5.Evaluate the value of creativity.

CO6. Define the product planning and product development process.

**Mapping of course outcomes with program outcomes and program specific outcomes**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | 2 | 2 | - | 2 | - | 2 | 3 | 2 | - | 2 |
| CO2 | 3 | - | 2 | 2 | - | 2 | - | 2 | 3 | 2 | - | 2 |
| CO3 | 3 | - | 2 | 2 | - | 2 | - | 2 | 3 | 2 | - | 2 |
| CO4 | 3 | - | 2 | 2 | - | 2 | - | 2 | 3 | 2 | - | 2 |
| CO5 | 3 | - | 2 | 2 | - | 2 | - | 2 | 3 | 2 | - | 2 |
| CO6 | 3 | - | 2 | 2 | - | 2 | - | 2 | 3 | 2 | - | 2 |

**Mapping of course outcomes with program specific outcomes**

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | - | - |
| **CO2** | - | - |
| **CO3** | - | - |
| **CO4** | - | - |
| **CO5** | - | - |
| **CO6** | - | - |

**UNIT–I Introduction to Design Thinking**

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

**UNIT-II Design Thinking Process**

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

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

**UNIT-III Innovation**

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

creativity.

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

**UNIT-IV Product Design**

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

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

**UNIT–V Design Thinking in Business Processes**

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

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

**Text books:**


1. Tim Brown, Change by design,1/e, Harper Bollins,2009.
2. Idris Mootee, Design Thinking for Strategic Innovation, 1/e, Adams Media, 2014.


**Reference Books:**


1. David Lee, Design Thinking in the Classroom, Ulysses press, 2018.
2. Shrrutin N Shetty, Design the Future, 1/e, Norton Press, 2018.
3. William lid well, Kristina Holden,& Jill butter, Universal principles of Design,2/e Rockport Publishers, 2010.
4. Ches brough. H, Theera of open innovation, 2003.


**Online Learning Resources:**

- https://nptel.ac.in/courses/110/106/110106124/
- https://nptel.ac.in/courses/109/104/109104109/
- https://swayam.gov.in/nd1_noc19_mg60/preview
- https://onlinecourses.nptel.ac.in/noc22_de16/preview

Website: www.jntuk.edu.in
E-mail: registrar@jntuk.edu.in

Phone: Off. 0884-2300906
Fax: 0884-2300901



**PROCEEDINGS OF THE**
**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA**
Kakinada-533003, Andhra Pradesh (India)

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*Proc. No.* JNTUK/DAP/Evaluation Procedure for DT&I/Approval/2025 Date: 27.01.2025

Sub: DAP – Academic Planning – Evaluation Procedure for Design Thinking and Innovation (L-T-P-C) (1-0-2-2) - Orders - Issued.

Read: e-Office No. 2690537 approved by Honourable Vice Chancellor dated 27.01.2025

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**ORDER:**

With reference cited above, the Honorable Vice Chancellor, JNTUK is pleased to approve the recommendations for Evaluation Procedure for Design Thinking and Innovation (L-T-P-C) (1-0-2-2) as follows:

- **Evaluation Procedure for Design Thinking and Innovation (L-T-P-C) (1-0-2-2):**

The performance of a student **for Design Thinking and Innovation** shall be evaluated with a maximum of 100 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.

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

The distribution shall be 30 marks for Internal Evaluation and 70 marks for the End-Examination.

**a) Internal Evaluation Procedure**

i) **Of the internal marks of 30, Day to Day Evaluation in the lab will be given a maximum of 7.5 Marks (25%) and Mid Exam(theory), a maximum of 22.5 Marks (75%).**

ii) During the semester, there shall be two midterm examinations. Each midterm examination shall be evaluated for 30 marks of which 10 marks for objective paper (20 minutes duration), 15 marks for subjective paper (90 minutes duration) and 5 marks for assignment. **30 Marks will be scaled down to 22.5 Marks.**

a. Objective paper shall contain for 05 short answer questions with 2 marks each OR maximum of 20 bits for 10 marks.
b. Subjective paper shall contain 3 questions of internal choice (i.e., either-or type questions of which student has to answer one from each either-or type of questions, each question carries 10 marks. The marks obtained in the subjective paper are condensed to 15 marks.
c. 5 marks for assignment
d. Mid examinations of Design thinking and Innovation to be conducted by the corresponding college.

**Note:**

- The subjective paper shall contain 3 either-or type questions of equal weightage 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% weightage given to the better mid exam and 20% to the other.

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

**b) End Examination (Only Practical's) Evaluation:**

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.

REGISTRAR
REGISTRAR
J.N.T. University Kakinada
Kakinada-533003.

To
The Director of Evaluation, JNTUK Kakinada.
Copy to the Director, Academic Planning, JNTUK Kakinada.
Copy to the Secretary to Hon'ble Vice-Chancellor, JNTUK Kakinada.
Copy to the PA to the Registrar, JNTUK Kakinada.