# DADI INSTITUTE OF ENGINEERING &TECHNOLOGY (AUTONOMOUS)

Approved by A.I.C.T.E & permanently affiliated to JNTU GV

**Accredited by NAAC with 'A' Grade and Inclusion u/s 2(f) & 12(B) of UGC Act**

An ISO 9001:2015, ISO 14001:2015 & ISO 45001:2018 Certified Institute.

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## DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

# B. Tech (Regular-Full time) - DR23

## Electrical and Electronics Engineering

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

## DADI INSTITUTE OF ENGINEERING & TECHNOLOGY-ANAKAPALLE
Visakhapatnam - Andhra Pradesh, India

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# Academic Regulations (DR23) for B.Tech (Regular-Fulltime)

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

1. **Award of the Degree**

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

   (i) Pursues a course of study for not less than 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 fulfils the following:

   (i) Student secures additional 15 credits fulfilling all the requisites of a B.Tech program i.e., 160 credits.

   (ii) Registering for Honors is optional.

   (iii) Honors is to be completed simultaneously with B.Tech programme.

2. Students, who fail to fulfil all the academic requirements for the award of the degree within eight academic years from the year of their admission, shall forfeit their seat in B.Tech course and their admission stands cancelled. This clause shall be read along with clause 1 a) i).

3. **Admissions**

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

## 4. Program related terms

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

Credit definition:

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

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.

## 5. Semester/Credits:

i) A semester comprises 90 working days and an academic year is divided into two semesters.
ii) The summer term is for eight weeks during summer vacation. Internship/ apprenticeship / work-based vocational education and training can be carried out during the summer term, especially by students who wish to exit after two semesters or four semesters of study.
iii) Regular courses may also be offered during the summer on a fast-track mode to enable students to do additional courses or complete backlogs in coursework.
iv) The Universities/HEIs can decide on the courses to be offered in the summer term depending on the availability of faculty and the number of students.

## 6. Structure of the Undergraduate Programme

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

| S.No. | Category | Break up of Credits (Total160) | 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 | - |

## 7. Course Classification:

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

| S.No. | Broad Course Classification | Course Category | Description |
|---|---|---|---|
| 1. | Foundation 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 subjects related to the parent discipline/department/branch of Engineering |
| 3. | Elective Courses | Professional Elective Courses (PE) | Includes elective subjects related to the parent discipline/department/ branch of Engineering |
| | | Open Elective Courses (OE) | Elective subjects which include interdisciplinary Subjects or subjects in an area outside the parent discipline/ department/ branch of Engineering |
| | | Domain specific skill enhancement courses (SEC) | interdisciplinary/job-oriented/domain courses which are relevant to the industry |
| 4. | Project & Internships | Project | B.Tech Projector Major Project |
| | | Internships | Summer Internships–Community based and Industry Internships; Industry oriented Full Semester Internship |
| 5. | Audit Courses | Mandatory non-credit courses | Covering subjects of developing desired attitude Among the learners |

## 8. Programme Pattern

i. Total duration of the of B.Tech (Regular)Programme is four academic years.
ii. Each academic year of study is divided into two semesters.
iii. Minimumnumberofinstructiondaysineachsemesteris90days.
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 /NSS /Scouts & Guides / Community serviceactivitiesaremademandatoryascreditcoursesforalltheundergraduate 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. DesignThinkingforInnovation&TinkeringLabsaremademandatoryascredit 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 chosenspecialization/branch.Properchoiceofprofessionalelectivecoursescan leadtostudentsspecializinginemergingareaswithinthechosenfieldofstudy.

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. Apoolofinterdisciplinary/job-oriented/domainskillcourseswhicharerelevant to the industry are integrated into the curriculum of all disciplines. There shall be05skill-orientedcoursesofferedduringIIItoVIIsemesters.Amongthefive skill courses, four courses shall focus on the basic and advanced skills related tothedomain/interdisciplinarycoursesandtheothershallbeasoftskillscourse.

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 institute for the students having good academic record.

xvi. Each college shall take measures to implement Virtual Labs (https://www.vlab.co.in) which provide remote access to labs in various disciplinesofEngineeringandwillhelpstudentinlearningbasicandadvanced concept through remote experimentation. Student shall be made to work on virtual lab experiments during the regular labs.

xvii. Eachcollegeshallassignafacultyadvisor/mentorafteradmissiontoagroupof students from same department to provide guidance in courses registration/career growth/placements/opportunities for higher studies/GATE/other competitive exams etc.

xviii. Preferably25% of course work forthe theorycourses in everysemester shall be conducted in the blended mode of learning.

9. **Evaluation Process**

The performance of a student in each semester shall be evaluated subject wise with a maximum of 100 marks for theory and 100 marks for practical subject. Summer Internships shall be evaluated for 50 marks, Full Internship &Project work in final semester shall be evaluated for 200 marks, mandatory courses with no credits shall be evaluated for 30 mid semester marks.

A student has to secure not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the mid semester and end examination markstakentogetherforthetheory,practical,design,drawingsubjectorprojectetc.In case of a mandatory course, he/she should secure 40% of the total marks.

**THEORY COUSES**

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

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

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

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

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

**a) Continuous Internal Evaluation**

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

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

**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 10 marks. Any fraction shall be rounded off to the next higher mark.
- The objective paper shall be conducted either online or offline by the respective institution on the day of subjective paper test.
- If conducted offline, the midterm examination shall be conducted first by distribution of the Objective paper, simultaneously marking the attendance, after 20 minutes the answered objective paper shall be collected back. The student is not allowed to leave the examination hall.
  Then the descriptive question paper and the answer booklet shall be distributed. After 90 minutes the answered booklets are collected back.
- Assignments shall be in the form of problems, mini projects, design problems, slip test, quizzes etc., depending on the course content. It should be continuous assessmentthroughoutthesemesterandtheaveragemarksshallbeconsidered.

iii) If the student is absent for the mid semester examination, no re-exam shall be conductedandmidsemestermarksforthatexaminationshallbeconsideredaszero.

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.

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

If the student is absent for any one midterm examination, the final mid semester marks shall be arrived at by considering 80% weightage to the marks secured by the student in the appeared examination and zero to the other. For Example:
   Marks obtained in first mid: Absent
   Marks obtained in second mid: 25
   Final mid semester Marks: (25x0.8)+(0x0.2) =20

## b) End Examination Evaluation:
End examination of theory subjects shall have the following pattern:
i) There shall be 6 questions and all questions are compulsory.
ii) Question I shall contain 10 compulsory short answer questions for a total of 20marks such that each question carries 2 marks.
iii) There shall be 2 short answer questions from each unit.
a) In each of the questions from 2 to 6, there shall be either/or type questions of 10marks each. Student shall answer any one of them.
iv) The questions from 2 to 6 shall be set by covering one unit of the syllabus for each question.

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

## PRACTICALCOURSES

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

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

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

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

In a practical subject consisting of two parts (Eg: Basic Electrical &Electronics Engineering Lab), the end examination shall be conducted for 70 marks as a single laboratory in 3 hours. Mid semester examination shall be evaluated 35 marks in each part. Mid semester examination shall be evaluated as above for 30 marks in each part and final mid semester marks shall be arrived by considering the average of marks obtained in two parts.

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

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

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

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

f) 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.

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

### 10. Skill oriented Courses

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

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

h) The course shall carry 100 marks and shall be evaluated through continuous assessmentsduringthesemesterfor30sessional marks and end examination shall be for 70 marks. Day-to-day work in the class / laboratory shall be evaluated for 30 marks by the concerned teacher based on the regularity/assignments/viva/mid semester test. The end examination similar to practical examination pattern shall be conducted by the concerned teacher and an expert in the subject nominated by the principal.

iii) 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.

iv) 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 awardedtothestudentuponproducingtheCourseCompletionCertificatefromthe agency. A committee shall be formed at the level of the college to evaluate the grades/marks given for a course by external agencies and convert to the equivalent marks/grades.

v) The recommended courses offered by external agencies, conversions and appropriate grades/marks are to be approved by the University at the beginning of the semester. The principal of the respective college shall forward such proposals to the University for approval.

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

### 11. Massive Open On line Courses(MOOCs):

A Student has to pursue and complete one course compulsorily through MOOCs approved by the University. 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 12weeks) offered through MOOCs with the approval of Head of the Department. The Head of the Department shall appoint one mentor to monitor the student's progression. The student needs to earn a certificate by passing the exam. The student shall be awarded the credits assigned in the curriculum only by submission of the certificate. Examination fee, if any, will be borne by the student.

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

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

## 12. Credit Transfer Policy

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

i) The University/Institution 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 University/institution shall notify at the beginning of semester the list of the online learning courses eligible for credit transfer.

vi) The institution shall designate a faculty member as a Mentor for each course to guide the students from registration till completion of the credit course.

vii) The Institute shall ensure no overlap of MOOC exams with that of the examination schedule. In case of delay in results, the Institute will re-issue the marks sheet for such students.

viii) Student pursuing courses under MOOCs shall acquire the required credits only after successful completion of the course and submitting a certificate issued by the competent authority along with the percentage of marks and grades.

ix) The institution shall submit the following to the examination section of the university:
   a) List of students who have passed MOOC courses in the current semester along with the certificate of completion.
   b) Under taking form filled by the students forced it transfer.

x) The Institution shall resolve any issues that may arise in the implementation of this policy from time to time and shall review its credit transfer policy in the light of periodic changes brought by UGC, SWAYAM, NPTEL and state government.

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

### 13. Academic Bank of Credits (ABC)

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

    i. Provide option of mobility for learners across the universities of their choice

    ii. Provide option to gain the credits through MOOCs from approved digital platforms.

    iii. facilitate award of certificate/diploma/degree in line with the accumulated credits in ABC

    iv. execute Multiple Entry and Exit system with credit count, credit transfer and credit acceptance from students" account.

### 14. Mandatory Internships
**Summer Internships**

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

**Full Semester Internship and Project work:**

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

The project report shall be evaluated with an external examiner. The total marks for project work 200 marks and distribution shall be 60 marks for internal and 140 marks for external evaluation. The supervisor assesses the student for 30 marks (Report: 15 marks, Seminar: 15 marks).At the end of the semester, all projects shall be 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 Institute and is evaluated for 140 marks.

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

## 15. Guidelines for offering a Minor

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 12credits in Minor stream chosen.
ii)   Two courses for 06 credits related to a Minor are to be pursued compulsorily for the minor degree, but may be waived for students who have done similar/equivalent courses. If waived for a student, then the student must take an extra elective course in its place. It is recommended that students should complete the compulsory courses (or equivalents) before registering for the electives.
iii)  Electives (minimum of 2 courses) to complete a total of 12 credits.

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

## 16. Guide lines 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 Principal of the college shall arrange separate class work and timetable of the courses offered under Honors program.
v)    Courses that are used to fulfill the student's primary major may not be double counted towards the Honors. Courses with content substantially equivalent to courses in the student's primary Major may not be counted towards the Honors.
vi)   Students can complete the courses offered under Honors either in the college or in online platforms like SWAYAM with a minimum duration of 12weeks

for a 3-creditcourse 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 are to be completed simultaneously with a Major degree program.

**Registration for Honors**:

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

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

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

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

### 17. 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. b) Condonation of shortage of

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

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

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

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

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

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

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

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

### 18. Promotion Rules:

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

i) A student shall be promoted from first year to second year if he/she fulfils the minimum attendance requirement as per the norms.

ii) A student will be promoted from II to III year if he/she fulfils the academic requirementofsecuring40%ofthecredits(any *decimal* fraction should be *rounded off* to *lower* digit) up to in the subjects that have been studied up to III semester.

iii) A student shall be promoted from III year to IV year if he/she fulfils the academic requirements of securing 40% of the credits (any *decimal* fraction should be *rounded off* to *lower* digit) in the subjects that have been studied up to V semester. And in case a student is detained for want of credits for a particular academic year by ii) & iii) above, the student may make up the credits through supplementary examinations and only after securing the required credits he/she shall be permitted to join in the V semester or VII semester respectively as the case may be.

iv) When a student is detained due to lack of credits/shortage of attendance he/she may be re-admitted when the semester is offered after fulfilment of academic regulations. In such case, he/she shall be in the academic regulations into which he/she is readmitted.

## 19. Grading:

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

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

### Structure of Grading of Academic Performance

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

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

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

Computation of Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

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

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

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

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

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

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

Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.
While computing the SGPA the subjects in 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 (Without any supplementary appearance) |
| First Class | ≥ 6.5 <7.5 |
| Second Class | ≥ 5.5 <6.5 |
| Pass Class | ≥ 5.0 <5.5 |

**Note:** * Students who have written supplementary examinations to fulfil the credit requirementwillnotbeawardedFirstClasswithDistinction.Forsuchstudentsthe highest degree that is awarded will be First Class Only.

**CGPA to Percentage conversion Formula–(CGPA–0.5) x10**

## 20. With–holding of Results

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

## 21. Multiple Entry/ Exit Option
### (a) Exit Policy:

The students can choose to exit the four-year programme at the end of first/second/third year.
i) **UG Certificate in (Field of study/discipline)** - Programme duration: First year (first two semesters) of the undergraduate programme, 40 credits followed by an additional exit 10-credit bridge course(s) lasting two months, including at least 6-credit job-specific internship/apprentice ship 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-creditjob-specificinternship/apprenticeshipthatwouldhelpthecandidatesacquire 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 shall resolve any issues that may arise in the implementation of Multiple Entry and Exit policies from time to time and shall review the policies in the light of periodic changes brought by UGC, AICTE and State government.

## 22. Gap Year Concept:

Gap year concept for Student Entrepreneur in Residence is introduced and outstanding students who wish to pursue entrepreneurship / become entrepreneur are allowed to take a break of one year at any time after II year to pursue full-time entrepreneurship

Programme /to establish 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 University. An evaluation committee constituted by the University shall evaluate the proposal submitted by the student and the committee shall decide whether to permit the student(s) to avail the Gap Year or not

## 23. Transitory Regulations

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

## 24. Minimum Instruction Days for a Semester:

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

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

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

## 27. General Instructions:

a. The academic regulations should be read as a whole for purpose of any interpretation.
b. Malpractices rules-nature and punishments are appended.
c. Where the words "he", "him", "his", occur in the regulations, they also include "she", "her", "hers", respectively.
d. In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Head of the institution is final.
e. The Institution 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 Organization.
f. 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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# DADI INSTITUTE OF ENGINEERING &TECHNOLOGY
## (An Autonomous Institute)

### B.Tech. - COURSE STRUCTURE – DR23
**(Applicable from the Academic Year 2023-24 onwards)**

### INDUCTION PROGRAMME

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

# DADI INSTITUTE OF ENGINEERING &TECHNOLOGY
## (An Autonomous Institute)

## I Year I Semester

| S.No. | Course Code | Course Name | L | T | P | Credits |
|-------|-------------|-------------|---|---|---|---------|
| 1. | DR23BST01 | Linear Algebra & Calculus | 3 | 0 | 0 | 3 |
| 2. | DR23BST04 | Chemistry | 3 | 0 | 0 | 3 |
| 3. | DR23EST07 | Introduction to Programming | 3 | 0 | 0 | 3 |
| 4. | DR23EST03 | Engineering Graphics | 1 | 0 | 4 | 3 |
| 5. | DR23EST04 | Basic Electrical & Electronics Engineering | 3 | 0 | 0 | 3 |
| 6. | DR23BSL04 | Chemistry Lab | 0 | 0 | 2 | 1 |
| 7. | DR23ESL07 | Computer Programming Lab | 0 | 0 | 3 | 1.5 |
| 8. | DR23ESL05 | Electrical &Electronics Engineering Workshop | 0 | 0 | 3 | 1.5 |
| 9. | DR23MCL02 | NSS/NCC/Scouts &Guides/Community Service | 0 | 0 | 1 | 0.5 |
| | | **Total Credits** | | | | **19.5** |

## I Year II Semester

| S.No. | CourseCode | Course Name | L | T | P | Credits |
|-------|------------|-------------|---|---|---|---------|
| 1. | DR23BST02 | Differential Equations and Vector Calculus | 3 | 0 | 0 | 3 |
| 2. | DR23BST03 | Engineering Physics | 3 | 0 | 0 | 3 |
| 3. | DR23HST01 | Communicative English | 2 | 0 | 0 | 2 |
| 4. | DR23EST01 | Basic Civil & Mechanical Engineering | 3 | 0 | 0 | 3 |
| 5. | DR23EET02 | Electrical Circuit Analysis-I | 3 | 0 | 0 | 3 |
| 6. | DR23HSL01 | Communicative English Lab | 0 | 0 | 2 | 1 |
| 7. | DR23BSL03 | Engineering Physics Lab | 0 | 0 | 2 | 1 |
| 8. | DR23ESL06 | IT workshop | 0 | 0 | 2 | 1 |
| 9. | DR23ESL02 | Engineering Workshop | 0 | 0 | 3 | 1.5 |
| 10. | DR23EEL02 | Electrical Circuits Lab | 0 | 0 | 3 | 1.5 |
| 11. | DR23MCL01 | Health and Wellness, Yoga and Sports | 0 | 0 | 1 | 0.5 |
| | | **Total Credits** | | | | **20.5** |

# DADI INSTITUTE OF ENGINEERING &TECHNOLOGY
## (An Autonomous Institute)

## II Year I Semester

| S.No. | Course Code | Course Name | L | T | P | Credits |
|---|---|---|---|---|---|---|
| 1. | DR23BST0* | Complex Variables & Numerical Methods | 3 | 0 | 0 | 3 |
| 2. | DR23MBT0* | Universal Human Values- Understanding Harmony | 2 | 1 | 0 | 3 |
| 3. | DR23EST0* | Electromagnetic Field Theory | 3 | 0 | 0 | 3 |
| 4. | DR23EET03 | Electrical Circuit Analysis-II | 3 | 0 | 0 | 3 |
| 5. | DR23EET04 | DC Machines & Transformers | 3 | 0 | 0 | 3 |
| 6. | DR23EEL03 | Electrical Circuit Analysis-II and Simulation Lab | 0 | 0 | 3 | 1.5 |
| 7. | DR23EEL04 | DC Machines & Transformers Lab | 0 | 0 | 3 | 1.5 |
| 8. | DR23CSL** | Data Structures | 0 | 1 | 2 | 2 |
| 9. | DR23MCL03 | Environmental Science | 2 | 0 | 0 | - |
| | | **Total Credits** | **15** | **2** | **10** | **20** |

## II Year II Semester

| S.No. | CourseCode | Course Name | L | T | P | Credits |
|---|---|---|---|---|---|---|
| 1. | DR23MBT0* | Managerial Economics & Financial Analysis / Business Environment / Organizational Behaviour | 2 | 0 | 0 | 2 |
| 2. | DR23EST0* | Analog Circuits | 3 | 0 | 0 | 3 |
| 3. | DR23EET05 | Power Systems-I | 3 | 0 | 0 | 3 |
| 4. | DR23EET06 | Induction and Synchronous Machines | 3 | 0 | 0 | 3 |
| 5. | DR23EET07 | Control Systems | 3 | 0 | 0 | 3 |
| 6. | DR23EEL05 | Induction and Synchronous Machines Lab | 0 | 0 | 3 | 1.5 |
| 7. | DR23EEL06 | Control Systems Lab | 0 | 0 | 3 | 1.5 |
| 8. | DR23CSL0* | Python Programming | 0 | 1 | 2 | 2 |
| 9. | | Design Thinking & Innovation | 1 | 0 | 2 | 2 |
| | | **Total Credits** | **15** | **1** | **10** | **21** |

# DADI INSTITUTE OF ENGINEERING &TECHNOLOGY
## (An Autonomous Institute)

**I Year-I Semester**

| 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 of mathematics to handle various real-world problems and their applications.

## Course Outcomes:
At the end of the course, the student will be able to:
- Develop matrix algebra techniques that are needed by engineers for practical applications.
- To find the eigen values and eigen vectors and solve the problems by using linear transformation
- Learn important tools of calculus in higher dimensions.
- Familiarize with functions of several variables which is useful in optimization.
- Familiarize with double and triple integrals of functions of several variables in two andthree dimensions.

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

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

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

## UNIT- IV : Partial differentiation and Applications (Multi variable calculus)
Partial derivatives, total derivatives, chain rule, change of variables, Taylor's and Maclaurin's series

expansion of functions of two variables. Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

## UNIT – V : Multiple Integrals (Multi variable Calculus)

Duble integrals - change of variables (Cartesian and Polar coordinates), Change of order of integration, cylindrical and spherical coordinates. Finding areas (by double integrals) and volumes (by double integrals and triple integrals).

## Text books:

1. B.S.Grewal,HigherEngineeringMathematics,44/e,KhannaPublishers,2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e,John Wiley & Sons, 2018.

## Reference Books:

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

**I Year-I Semester**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

# CHEMISTRY

## Course Objectives:
- To familiarize engineering chemistry and its applications
- To train the students on the principles and applications of electrochemistry andpolymers
- To introduce instrumental methods, molecular machines and switches.

## Course Outcomes:
At the end of the course, the students will be able to:
**CO1:** Compare the materials of construction for battery and electrochemical sensors.
**CO2**: Explain the preparation, properties, and applications of thermoplastics & thermosetting & elastomers conducting polymers.
**CO3**: Explain the principles of spectrometry, slc in separation of solid and liquid mixtures. **CO4:** Apply the principle of Band diagrams in the application of conductors and semiconductors.
**CO5:** Summarize the concepts of Instrumental methods.

## UNIT- I : Structure and Bonding Models
Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of $\Psi$ and $\Psi^2$, particle in one dimensional box, molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules – energy level diagrams of O2 and CO, etc. $\pi$-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.
**Supercapacitors**: Introduction, Basic Concept-Classification – Applications.
**Nano materials:** Introduction, classification, properties and applications of Fullerenes, carbon nano tubes and Graphines nanoparticles.

## UNIT- III: Electrochemistry and Applications
Electrochemical cell, Nernst equation, cell potential calculations and numerical problems, potentiometry- potentiometric titrations (redox titrations), concept of conductivity, conductivitycell, conductometric titrations (acid-base titrations).
Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples.Primary cells – Zinc-air battery, Secondary cells –lithium-ion batteries- working of the batteries including cell reactions; Fuel cells, hydrogen-oxygenfuel cell– working of the cells. Polymer Electrolyte Membrane Fuel cells (PEMFC).

## UNIT- IV: Polymer Chemistry

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, 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), Polyl 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 spectroscopies, fundamental modes and selection rules, Instrumentation. Chromatography-Basic Principle, Classification-HPLC: Principle, Instrumentation and Applications.

### Textbooks:

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

### Reference Books:

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

**I Year-I Semester**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

## INTRODUCTION TO C PROGRAMMING
### (Common to All Branches of Engineering)

## Course Objectives:

The objectives of this course is to acquire knowledge on the
- To impart adequate knowledge on the need of programming languages and problem-solving techniques and develop programming skills.
- To enable effective usage of Control Structures and Implement different operations on arrays.
- To demonstrate the use of Strings and Functions.
- To impart the knowledge of pointers and understand the principles of dynamic memoryallocation.
- To understand structures and unions and illustrate the file concepts and its operations.
- To impart the Knowledge Searching and Sorting Techniques

## UNIT-I  Introduction to Computer Problem Solving:
Programs and Algorithms, Computer Problem Solving Requirements, Phases of Problem Solving, Problem. Solving Strategies, Top-Down Approach, Algorithm Designing, Program Verification, Improving Efficiency, Algorithm Analysis and Notations.

## UNIT-II Introduction to C Programming:
Introduction, Structure of a C Program. Comments, Keywords, Identifiers, Data Types, Variables, Constants, Input/output Statements. Operators, Type Conversion. Control Flow, Relational Expressions: Conditional Branching Statements: if, if-else, if-else—if, switch. Basic Loop Structures: while, do-while loops, for loop, nested loops, The Break and Continue Statements, goto statement**.**

## UNIT-III Arrays:
Introduction, Operations on Arrays, Arrays as Function Arguments, Two Dimensional Arrays, Multidimensional Arrays. Pointers: Concept of a Pointer, Declaring and Initializing Pointer Variables, Pointer Expressions and Address Arithmetic, Null Pointers, Generic Pointers, Pointersas Function Arguments, Pointers and Arrays, Pointer to Pointer, Dynamic Memory Allocation, Dangling Pointer, Command Line Arguments.

## UNIT-IV Functions:
Introduction Function : Declaration, Function Definition, Function Call, Categories of Functions, Passing Parameters to Functions, Scope of Variables, Variable Storage Classes. Recursion.
Strings: String Fundamentals, String Processing with and without Library Functions, Pointers and

Strings.

## UNIT-V Structures:

Structures, Unions, Bit Fields:Introduction, Nested Structures, Arrays of Structures, Structures and Functions, Self-Referential Structures, Unions, Enumerated Data Type —Enum variables, Using Typedef keyword, Bit Fields. Data Files: Introduction to Files, Using Files in C, Reading from Text Files, Writing to Text Files, Random File Access.

**Note:** The syllabus is designed with C Language as the fundamental language ofimplementation.
**Course Outcomes:**
At the end of the Course, Student should be able to:
- Illustrate the Fundamental concepts of Computers and basics of computer programming and problem-solving approach
- Understand the Control Structures, branching and looping statements
- Use of Arrays and Pointers in solving complex problems.
- Develop Modular program aspects and Strings fundamentals.
- Demonstrate the ideas of User Defined Data types, files. Solve real world problems using theconcept of Structures, Unions and File operations.

## Text Books:

1. A Structured Programming Approach Using C, Forouzan, Gilberg, Cengage.
2. How to solve it by Computer, R. G. Dromey, and Pearson Education.
3. Programming In C A-Practia1 Approach. Ajay Mittal, Pearson

## References:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.
2. Computer Programming. Reema Thareja, Oxford University Press
3. The C Programming Language, Dennis Richie And Brian Kernighan, Pearson Education.
4. Programming In C, Ashok Kamthane, Second Edition, Pearson Publication.
5. Let us C ,YaswanthKanetkar, 16th Edition,BPB Publication.
    6.  Computing fundamentals and C Programming, Balagurusamy, E., McGraw-Hill Education,2008

## Web References:

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

# DADI INSTITUTE OF ENGINEERING &TECHNOLOGY
## (An Autonomous Institute)

**I Year-I Semester**

| L | T | P | C |
|---|---|---|---|
| 1 | 0 | 4 | 3 |

# ENGINEERING GRAPHICS
### (Common to All Branches of Engineering)

## 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: Understand the principles of engineering drawing, including engineering curves, scales, orthographic and isometric projections.

CO2: Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views.

CO3: Understand and draw projection of solids in various positions in first quadrant. CO4: Explain principles behind development of surfaces.

CO5: Prepare isometric and perspective sections of simple solids.

## 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 ofobjects including PCB and Transformationsusing 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, TataMcGraw Hill, 2017.

# DADI INSTITUTE OF ENGINEERING &TECHNOLOGY
## (An Autonomous Institute)

**I Year-I Semester**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

# BASIC ELECTRICAL & ELECTRONICS ENGINEERING
### (Common to All Branches of Engineering)

## Course Objectives:

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

**Course Outcomes:** After the completion of the course students will be able to

**CO1:** Remember the fundamental laws, operating principles of motors, generators, MC and MI instruments.

**CO2:** Understand the problem solving concepts associated to AC and DC circuits, construction and operation of AC and DC machines, measuring instruments; different power generation mechanisms, Electricity billing concept and important safety measures related to electrical operations.

**CO3:** Apply mathematical tools and fundamental concepts to derive various equations related to machines, circuits and measuring instruments; electricity bill calculations and layout representation of electrical power systems.

**CO4:** Analyze different electrical circuits, performance of machines and measuring instruments.

**CO5:** Evaluate different circuit configurations, Machine performance and Power systems operation.

## PART A: BASIC ELECTRICAL ENGINEERING

### UNIT-I: DC & AC Circuits

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

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

### UNIT- II: Machines and Measuring Instruments

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

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

## UNIT- III: Energy Resources, Electricity Bill & Safety Measures

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

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

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

## Textbooks:

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

## 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. Basic Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford UniversityPress, 2017
4. Basic Electrical and Electronics Engineering, S. K. Bhatacharya, Person Publications,2018, Second Edition.

## Web Resources:

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

## PART B: BASIC ELECTRONICS ENGINEERING

### Course Objective:

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

### UNIT- I: SEMICONDUCTOR DEVICES

Introduction - Evolution of electronics – Vacuum tubes to nano electronics - Characteristics ofPN 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. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, PearsonEducation, 2021.
2. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009

### Reference Books:

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

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# CHEMISTRY LAB

## 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 Bakelite materials.
CO3: Measure the strength of an acid present in secondary batteries.CO4: Analyse the IR spectra of some organic compounds.
CO5: Calculate strength of acid in Pb-Acid battery.

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

**I Year-I Semester**

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# COMPUTER PROGRAMMING LAB
**(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 the 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, Debug and Execute programs to demonstrate the applications of arrays, functions, basic concepts of pointers in C.

## 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 & constantsand operators used in the expression and how operator precedence works.

**Suggested Experiments/Activities:**

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

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

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

**WEEK 6**
**Objective:** Explore the full scope of iterative constructs namely while loop, do-while loop and
For loop in addition to structured jump constructs like break and continue including 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. Gainexperience 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 alongwith 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 someexperiments 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 Eulerstheorem.
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, Arithmeticoperations 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 othercharacters using pointers.

**WEEK14 Objective:** To understand data files and file handling with various file I/O functions. Explore thedifferences between text and binary files.

**Suggested Experiments/Activities:**
**Tutorial 14:** File handling
**Lab 14:** File operations
i)   Write a C program to write and read text into a file.
ii)  Write a C program to write and read text into a binary file using fread() andfwrite()
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-linearguments.
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&#39; 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

**I Year-I Semester**

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

## Course Objectives:
To impart knowledge on the fundamental laws & theorems of electrical circuits, functions of electrical machines and energy calculations.

## Course Outcomes:
**CO1:** Understand the Electrical circuit design concept; measurement of resistance, power, power factor; concept of wiring and operation of Electrical Machines and Transformer.

**CO2:** Apply the theoretical concepts and operating principles to derive mathematical models for circuits, Electrical machines and measuring instruments; calculations for the measurement of resistance, power and power factor.

**CO3:** Apply the theoretical concepts to obtain calculations for the measurement of resistance,power and power factor.

**CO4:** Analyse various characteristics of electrical circuits, electrical machines and measuring instruments.

**CO5:** Design suitable circuits and methodologies for the measurement of various electrical parameters; Household and commercial wiring.

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

## PART A: ELECTRICAL ENGINEERING LAB

### List of experiments:

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

### Reference Books:

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

**Note:** Minimum Six Experiments to be performed.

## 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:

CO1: Identify & testing of various electronic components.

CO2: Understand the usage of electronic measuring instruments. CO3: Plot and discuss the characteristics of various electron devices.CO4: Explain the operation of a digital circuit.

### List of Experiments:

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

## References:

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

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

## Virtual lab Links

| S.NO | Experiment Name | LINK |
|---|---|---|
| 1 | To Study Magnetization  Characteristics of DC Shunt Generator | https://ems-iitr.vlabs.ac.in/exp/magnetization-characteristics-dcshunt/theory.html |
| 2 | 3*8 Decoder | https://he-coep.vlabs.ac.in/exp/decoders-encodersmultiplexer-demultiplexer/theory.html |
| 3 | CE Amplifier | https://be-iitkgp.vlabs.ac.in/exp/ce-amplifier/simulation/ceamp.html |
| 4 | Verify the truth table of RS, JK, T and D flip-flops | https://de-iitr.vlabs.ac.in/exp/truth-tables-flip-flops/ |

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## NSS/NCC/SCOUTS & GUIDES/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.

## 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 personaltalents and skills
ii) Conducting orientations programs for the students –future plans-activities-releasingroad map etc.
iii) Displaying success stories-motivational biopics- award winning movies on societalissues 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- authorities- experts-etc.
ii) Conducting awareness programs on Health-related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS,
iii) Conducting consumer Awareness. Explaining various legal provisions etc.
iv) Women Empowerment Programmes- Sexual Abuse, Adolescent Health and PopulationEducation.
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, DirectorateGeneral 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:
- Evaluated for a total of 100 marks.
- 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.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting vivavoce on the subject.

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**I Year-II Semester**

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# 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 in to advanced level by handling various real-world applications.

## Course Outcomes:
At the end of the course, the student will be able to:
- Solve the differential equations related to various engineering fields.
- Model engineering problems as  higher order differential equations and solve analytically.
- Identify solution methods for partial differential equations that model physical processes.
- Interpret the physical meaning of different operators such as gradient, curl and divergence.
- Estimate the work done against a field, circulation and flux using vector calculus.

## UNIT- I : Differential equations of first order and first degree

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)

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

## UNIT – III : Partial Differential Equations

Introduction 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

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

## UNIT –V : Vector Integration

Line integral- circulation- work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and applications of these theorems.

**Textbooks:**
1. Erwin  Kreyszig, Advanced Engineering Mathematics, 10/e,John Wiley & Sons, 2018.
2. B.S.Grewal,HigherEngineeringMathematics,44/e,Khanna publishers,2017.

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

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**I Year-II Semester**

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# ENGINEERING PHYSICS
### (Common to 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: Familiarize with the basics of crystals and their structures.
CO3: Explain fundamentals of quantum mechanics and apply it to one dimensional motion of particles.
CO4: Summarize various types of polarization of dielectrics and classify the magnetic materials.
CO5: Explain the basic concepts of Quantum Mechanics and the band theory of solids. CO6: Identify the type of semiconductor using Hall effect.

## UNIT  I    Wave Optics

**Interference:** Introduction - Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colours in thin films- Newton's Rings, Determination of wavelength and refractive index.
**Diffraction:** Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit & N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative). Polarization: Introduction -Types of polarization - Polarization by reflection, refraction and Double refraction - Nicol's Prism -Half wave and Quarter wave plates.

## UNIT  II Crystallography and X-ray diffraction

**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

**Dielectric Materials:** Introduction - Dielectric polarization - Dielectric polarizability,Susceptibility, Dielectric constant and Displacement Vector – Relation between the electric vectors - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation
polarizations (Qualitative) - Lorentz internal field - Clausius- Mossotti equation - complex dielectric constant – Frequency dependence of polarization – dielectric loss

**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

**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

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 effectand its applications.

### Textbooks:
1. A Text book of Engineering Physics, M. N. Avadhanulu, P.G.Kshirsagar & TVS ArunMurthy, S. Chand Publications, 11th Edition 2019.
2. 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://www.loc.gov/rr/scitech/selected-internet/physics.html

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**I Year-II Semester**

# COMMUNICATIVE ENGLISH
(Common to All Branches of Engineering)

## Course Objectives:
The main objective of introducing this course, *Communicative English,* is to facilitate using Listening, Reading, Speaking and Writing skills effectively by the students. It should result in their better comprehending abilities, oral presentations, reporting useful information and with enhanced knowledge of grammatical structures  and vocabulary. This course helps the students in using speaking and writing (productive) skills more efficiently and to make them industry- ready

## Course Outcomes
- By the end of the course the students will have Learned how to understand thecontext, topic, and specific information from social or transactional dialogues.
- Remedially learn applying grammatical structures to formulate sentence sand use appropriate words and correct word forms.
- Using discourse  markers to speak clearly  on a specific  topic  in formal as well as informal discussions.(not required)
- Improved communicative competence in formal and informal contexts and for social and academic purposes.
- Critically comprehending and appreciating ding /listening texts and to write summaries based on global comprehension of these texts.
- Writing coherent paragraphs essays, letters/e-mails and resume.

## Instructions:
1. The reading texts can be given as podcasts to the students so that their listening skills can be enhanced
2. While listening and reading to the text can be given as homework, the classwork for the students can be to discuss and critically evaluate the texts based on the context, purpose or writing the text and understanding it from the author's as well as reader's point of view.
3. Reading as habit for both academic and non-academic ( pleasure) purposes has to be inculcated in the students. So training has to be given in intensive and extensive reading strategies.
4. Writing for both academic (assignments, examinations, reports, e-mails/letters etc)
5. The writing tasks given in the class are to be self and peer evaluated by the students before they are finally graded by the faculty.
Note: Please note that the texts given here are just contexts for teaching various language skills and sub skills. The students' ability to use language cannot be confined to comprehending or using the language related to the given texts (textbooks). The given texts can be used only for  practice.

6. All the activities to develop language skills have to be integrated and interconnected, within each

unit and across the units.

7.  Use as many supplementary materials as possible in various modes ( Audio, visual and printed versions) in the classroom so that the students get multimode input and will how to use language skills in the absence of the teacher.

## UNIT -I
**Lesson: HUMAN VALUES: A Power of a Plate of Rice by Ifeoma Okoye (Short Story)**

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

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

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

**Writing:**       Mechanics of Writing-Capitalization, Spellings, Punctuation-Parts of Sentences.( That has to be part of the bridge course- 2 weeks before the actual academic programme starts)

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

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

## UNIT-II
**Lesson: NATURE:       Night of the Scorpion by Nissim Ezekiel (Indian and contemporary)**

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

**Speaking:**      Discussion in pairs/small groups on specific topics followed by short structuretalks.

**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 Steve Jobs**

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

**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 specifictextclues; 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 on texts

**Reading:**        Reading comprehension.

**Writing:**        Writings structured essays on specific topics.

**Grammar:**       Editing  short  texts  –identifying  and  correcting  common  errors  in  grammar  and usage (articles, prepositions, tenses, subject-verb agreement)

**Vocabulary:**  Technical Jargons

### .Textbooks:
1. Pathfinder: Communicative English for Undergraduate Students, 1st Edition,Orient BlackSwan, 2023 (Units 1,2 & 3)
2. Empowering English  by Cengage Publications, 2023 (Units 4 & 5)

**Suggestion:** Instead of giving the syllabus in the form of textbooks it would be better toprocurethe soft copies of individual texts ( stories or poems or biographies and non-fiction texts)by the university and make them available on the university website for registered studentsto access and download

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

**Web Resources**:

GRAMMAR:

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

VOCABULARY

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

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**I Year-II Semester**

# BASIC CIVIL & MECHANICAL ENGINEERING
### (Common to All branches of Engineering)

## PART A: BASIC CIVIL ENGINEERING

### Course Objectives:
- Get familiarized with the scope and importance of Civil Engineering sub-divisions.
- Introduce the preliminary concepts of surveying.
- Acquire preliminary knowledge on Transportation and its importance in nation'seconomy.
- 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 various sub-divisions of Civil Engineering and to appreciate their role in ensuring better society.

CO2: Know the concepts of surveying and to understand the measurement of distances, angles and levels through surveying.

CO3: Realize the importance of Transportation in nation's economy and the engineering measures related to Transportation.

CO4: Understand the importance of Water Storage and Conveyance Structures so that the social responsibilities of water conservation will be appreciated.

CO5: Understand the basic characteristics of Civil Engineering Materials and attain knowledge on prefabricated technology.

### 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. FifthEdition.
2. Hydrology and Water Resources Engineering, Santosh Kumar Garg, KhannaPublishers, 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

CO1: Understand the different manufacturing processes.

CO2: Explain the basics of thermal engineering and its applications.

CO3: Describe the working of different mechanical power transmission systems and power plants.

CO4: Describe the basics of robotics and its applications.

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

## Reference Books:

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

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# ELECTRICAL CIRCUIT ANALYSIS -I

## Course Objectives:
To develop an understanding of the fundamental laws, elements of electrical circuits and toapply circuit analysis to DC and AC circuits.

## Course Outcomes:
**CO1:** Remembering the basic electrical elements and different fundamental laws.
**CO2:** Understand the network reduction techniques, transformations, concept of self-inductance and mutual inductance, phasor diagrams, resonance and network theorems.
**CO3:** Apply the concepts to obtain various mathematical and graphical representations.
**CO4:** Analyse nodal and mesh networks, series and parallel circuits, steady state response, different circuit topologies (with R, L and C components).
**CO5:** Evaluation of Network theorems, electrical, magnetic and single-phase circuits.

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

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

## UNIT- IV RESONANCE AND LOCUS DIAGRAMS

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

## UNIT- V NETWORK THEOREMS (DC & AC EXCITATIONS)

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

### Textbooks:

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

### Reference Books:

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

### Web Resources:

1. https://onlinecourses.nptel.ac.in/noc23_ee81/preview
2. https://nptel.ac.in/courses/108104139
3. https://nptel.ac.in/courses/108106172
4. https://nptel.ac.in/courses/117106108

**I Year-II  Semester**

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# COMMUNICATIVE ENGLISH LAB
### (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: Understand the different aspects of the English language  proficiency  with emphasis on LSRW skills.

CO2: Apply communication skills through various language learning activities.

CO3: Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.

CO4: Evaluate and exhibit professionalism in participating in debates and group discussions. CO5: Create effective Course Objectives:

## List of Topics:

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

## Suggested Software:
- Walden Infotech
- Young India Films

## 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*, (2$^{nd}$ Ed),Kindle, 2013

## Web Resources:

### Spoken English:

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

### Voice & Accent:

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

# DADI INSTITUTE OF ENGINEERING &TECHNOLOGY
## (An Autonomous Institute)

**I Year-II  Semester**

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# 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 colors 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.

## 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'sMethod.
11. Determination of Hall voltage and Hall coefficient of a given semiconductor using Halleffect.
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 Torsionalpendulum.

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 TWOexperiments may be conducted in virtual mode.

## References:

- A Textbook of Practical Physics - S. Balasubramanian, M.N. Srinivasan, S. ChandPublishers, 2017.

## Web Resources

- www.vlab.co.in

https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype

**I Year-II  Semester**

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# 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 OperatingSystems 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: Perform Hardware troubleshooting.
CO2: Understand Hardware components and inter dependencies.CO3: Safeguard computer systems from viruses/worms.
CO4: Document/ Presentation preparation. CO5: Perform calculations using spreadsheets.

## 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 throughthe 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 bothWindows 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 configuredas 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 LANproxy 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 howto 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, Usinghelp 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 TeXand 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 helpand 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 sentencesto see how the model completes them.
- Ex: Prompt: "You are a knowledgeable AI. Please answer the following question: Whatis the capital of France?"

**Task 2:** Creative Writing: Use the model as a writing assistant. Provide the beginning of a storyor a description of a scene, and let the model generate the rest of the content. This can be a funway 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 tosee how accurate and fluent the translations are.
- Ex:Prompt: "Translate the following English sentence to French: 'Hello, how are you doing today?'"

### Reference Books:
2. Comdex Information Technology course tool kit, Vikas Gupta, WILEY Dream tech, 2003
3. The Complete Computer upgrade and repair book, Cheryl A Schmidt, WILEY Dream tech,2013,

3rd edition

4.      Introduction to Information Technology, ITL Education Solutions limited, Pearson Education, 2012, 2$^{nd}$ edition

5. PC Hardware - A Handbook, Kate J. Chase, PHI (Microsoft)

6. LaTeX Companion, Leslie Lamport, PHI/Pearson.

7. IT Essentials PC Hardware and Software Companion Guide, David Anfins on and Ken Quamme. – CISCO Press, Pearson Education, 3$^{rd}$ edition

8. IT Essentials PC Hardware and Software Labs and Study Guide, Patrick Regan– CISCO Press, Pearson Education, 3$^{rd}$ edition

# DADI INSTITUTE OF ENGINEERING &TECHNOLOGY
## (An Autonomous Institute)

**I Year-II Semester**

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# ENGINEERING WORKSHOP
### (Common to All branches of Engineering)

## Course objectives:

To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills

## Course Outcomes:

CO1: Identify workshop tools and their operational capabilities.
CO2: Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding.
CO3: Apply fitting operations in various applications.
CO4: Apply basic electrical engineering knowledge for House Wiring Practice

## 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 woodworking 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 makethe 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 jointswith coupling for same diameter and with reducer for different diameters.

**Textbooks:**

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

**Reference Books:**

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

**I Year-II Semester**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 3 | 1.5 |

# ELECTRICAL CIRCUITS LAB

## Course Objectives:
To impart hands on experience in verification of circuit laws and theorems, measurement of circuit parameters, study of circuit characteristics. It also gives practical exposure to the usage of different circuits with different conditions.

## Course Outcomes:
**CO1:** Understand the concepts of network theorems, node and mesh networks, series and parallel resonance and Locus diagrams.
**CO2:** Apply various theorems to compare practical results obtained with theoreticalcalculations.
**CO3:** Determine self, mutual inductances and coefficient of coupling values, parameters ofchoke coil.
**CO4:** Analyse different circuit characteristics with the help of fundamental laws and various configurations.
**CO5:** Create locus diagrams of RL, RC series circuits and examine series and parallelresonance.

## List of Experiments:

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

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

**I Year-II Semester**

| 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

## 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 cardio respiratory fitness, treadmill, run test, 9 min walk, skipping andrunning.

## 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:

- Evaluated for a total of 100 marks.
- 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.
- 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 | COMPLEX VARIABLES AND NUMERICAL METHODS | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**Course Outcomes:**
**After successful completion of this course, the students should be able to:**

| COs | Statements | Blooms level |
|---|---|---|
| CO1 | Analyze limit, continuity and differentiation of functions of complex variables and 3. Understand Cauchy-Riemann equations, analytic functions and various properties of analytic functions. | L2, L3 |
| CO2 | Understand Cauchy theorem, Cauchy integral formulas and apply these to evaluate complex contour integrals. Classify singularities and poles; find residues and evaluate complex integrals using the residue theorem. | L3, L5 |
| CO3 | Apply numerical methods to solve algebraic and transcendental equations | L3 |
| CO4 | Derive interpolating polynomials using interpolation formulae | L2, L3 |
| CO5 | Solve differential and integral equations numerically | L3, L5 |

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

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

**UNIT III: Solution of Algebraic & Transcendental Equations**
Introduction-Bisection Method-Iterative method, Regula-falsi method and Newton Raphson method System of Algebraic equations: Gauss Elimination, Jacoby and Gauss Siedal method.

**UNIT IV: Interpolation**
Finite differences-Newton's forward and backward interpolation formulae – Lagrange's formulae. Curve fitting: Fitting of straight line, second-degree and Exponential curve by method of least squares.

**UNIT V: Solution of Initial value problems to Ordinary differential equations**
Numerical solution of Ordinary Differential equations: Solution by Taylor's Series-Picard's Method of successive Approximations-Euler's and modified Euler's methods-Runge-Kutta methods (second and fourth order).

**Textbooks:**
1. B.S. Grewal, Higher Engineering Mathematics, KhannaPublishers,2017, 44th Edition
2. S S Sastry, Introductory Methods of Numerical Analysis, PHI Learning Private Limited.

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

**Online Learning Resources:**
1. https://onlinecourses.nptel.ac.in/noc17_ma14/preview
2. https://onlinecourses.nptel.ac.in/noc20_ma50/preview
3. http://nptel.ac.in/courses/111105090
4. https://ekumbh.aicte-india.org

# DADI INSTITUTE OF ENGINEERING &TECHNOLOGY
## (An Autonomous Institute)

| B.Tech.– II Year – I SEMESTER | UNIVERSAL HUMAN VALUES – UNDERSTANDING HARMONY AND ETHICAL HUMAN CONDUCT | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**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.
- TohighlightplausibleimplicationsofsuchaHolisticunderstandingintermsofethicalhuman      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.

**UNIT I:** Introduction to Value Education (6 lectures and 3 tutorials for practice session)
Lecture 1: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)
Lecture 2: Understanding Value Education
Tutorial 1: Practice Session PS1 Sharing about Oneself
Lecture 3: self-exploration as the Process for Value Education
Lecture 4: 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: PracticeSessionPS3ExploringNaturalAcceptance

**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

Lecture 11: Harmony of the self with the body
Lecture12: Programmed to ensure self-regulation and Health
Tutorial 6: Practice Session PS6Exploring Harmony of self with the body

**UNIT III:** Harmony in the Family and Society (6 lectures and 3 tutorials 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 SessionPS7 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
Lecture 18:  Vision for the Universal Human Order
Tutorial 9: Practice Session PS9 Exploring Systems to fulfill Human Goal

**UNIT IV:** Harmony in the Nature/Existence (4 lectures and 2 tutorials for practice session)
Lecture 19: Understanding Harmony in the Nature
Lecture 20: Inter connectedness, self-regulation and Mutual Fulfillment 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
Lecture 22: 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
Lecture 25: A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order
Lecture 26: Competence in Professional Ethics
Tutorial 13: Practice Session PS13 Exploring Hum Agnostic Models in Education
Lecture 27: Holistic Technologies, Production Systems and Management Models- Typical Case Studies Lecture 28: Strategies for Transition towards Value-based Life and Profession
Tutorial 14: Practice Session PS14 Exploring Steps of Transition towards Universal Human Order

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 fulfill Human Goal

Practice Sessions for UNIT IV – Harmony in the Nature(Existence)
PS10 Exploring the Four Orders of Nature
PS11 Exploring Co-existence in Existence

Practice Sessions for UNIT V – Implications of the Holistic Understanding – a Look at Professional Ethics
PS12 Exploring Ethical Human Conduct
PS13 Exploring Humanistic Model Sin Education
PS14 Exploring Steps of Transition towards Universal Human Order

**READINGS:**
**Text book and Teachers Manual**
a.      The Textbook
R R Gaur, R Asthana, G P Bag aria , 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, Asthana, GPBagaria,  Teachers'  Manual for A Foundation Course in Human Values and Professional Ethics, 2ndRevised Edition, Excel Books,NewDelhi,2019.ISBN978-93-87034-53-2

**Reference Books**
1.  Jeevan Vidya : Ek Parichaya,ANagaraj,JeevanVidyaPrakashan,Amarkantak,1999.
2.  Human Values ,A.N. Tripathi ,New Age Intl. Publishers, NewDelhi,2004.
3.  The Story of Stuff(Book).
4.  The Story of My Experiments with Truth-by Mohand as Karamchand Gandhi
5.  Small  is Beautiful-E.FSchumacher.
6.  Slow is Beautiful-Cecile Andrews
7.  Economy of Permanence-JC Kumarappa
8.  Bharat Mein Angreji Raj–Pandit Sunderlal
9.  Rediscovering India-by Dharampal
10. Hind Swarajor Indian Home Rule-by Mohandas K.Gandhi
11. India Wins Freedom –Maulana Abdul Kalam Azad
12. Vivekananda-Romain Rolland(English)
13. Gandhi-Romain Rolland(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 to 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 atleast one 8 – day Faculty Development Program on Universal Human Values is deemed essential.

**Online Resources:**

- https://fdp-si.aicte-india.org/UHV- II%20Class%20Notes%20&%20Handouts/UHV%20Handout%201-Introduction%20to%20Value%20Education.pdf

- https://fdp-si.aicte-india.org/UHV- II%20Class%20Notes%20&%20Handouts/UHV%20Handout%202-Harmony%20in%20the%20Human%20Being.pdf

- https://fdp-si.aicte-india.org/UHV- II%20Class%20Notes%20&%20Handouts/UHV%20Handout%203-Harmony%20in%20the%20Family.pdf

- https://fdp-si.aicte-india.org/UHV%201%20Teaching%20Material/D3- S2%20Respect%20July%202023.pdf

- https://fdp-si.aicte-india.org/UHV- II%20Class%20Notes%20&%20Handouts/UHV%20Handout%205-Harmony%20in%20the%20Nature%20and%20Existence.pdf

- 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

- https://fdp-si.aicte-india.org/UHV%20II%20Teaching%20Material/UHV%20II%20Lecture%2023-25%20Ethics%20v1.pdf

- https://www.studocu.com/in/document/kiet-group-of-institutions/universal-human-values/chapter-5-holistic-understanding-of-harmony-on-professional-ethics/62490385

- https://onlinecourses.swayam2.ac.in/aic22_ge23/previous

- https://ekumbh.aicte-india.org

# DADI INSTITUTE OF ENGINEERING &TECHNOLOGY
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| B.Tech.– II Year – I SEMESTER | ELECTROMAGNETIC FIELD THEORY | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**Pre-requisite: Concepts** of Differential Equations, Vector Calculus and Basic Electrical Circuits

## 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, magnetic force and torque through Lorentz force equation in magnetic field environment like conductors and other current loops.
- To develop the concept to 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/solve Laplace's or Poisson's equations for various electric charge distributions.

CO2: Analyze the behavior of conductor sin electric fields, electric diploe and the capacitance and energy stored in dielectrics.

CO3: Calculate the magnetic field intensity due to current carrying conductor and understanding the application of Ampere's law, Maxwell's second and third law magnetic force and Equations

CO4: Estimate self and mutual inductances and the energy stored in the magnetic field.

CO5: Understand the concepts of Faraday's laws, Displacement current, pointing theorem and Pointing vector

## Course Topics
### 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).

### Electrostatics:
Coulomb's law and Electric field intensity (EFI) – EFI due to Continuous charged distributions (line and surface charge), Electric flux density, Work done in moving a point charge in an electrostatic field, Electric Potential- properties of potential function, Potential gradient, Gauss's law (Maxwell's first equation,), Laplace's and Poison's equations.

### UNIT-II
### Conductors–Di electrics 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 (), 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 ( ). 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, integral and point forms of Maxwell's equations, statically and dynamically induced EMF, Displacement current, Modification of Maxwell's equations for time varying fields, Pointing theorem and Pointing vector.

### Textbooks:
1. "Elements of Electro magnetics "by Matthew NO Sadiki, Oxford Publications, 7th edition, 2018.
2. "Engineering Electro magnetics" by William H.  Hayt& John.A .BuckMc.  Graw-Hill, 9th Editon.2020.

### Reference Books:
1. "Introduction to Electro Dynamics" by Griffiths, Prentice- HallofIndiaPvt.Ltd,4thedition,2020
2. "Electromagnetic Field Theory" byYaduvir Singh, PearsonIndia,1stedition,2011.
3. "Fundamentals of Engineering Electromagnetics" by Sunil Bhooshan, Oxford University Press, 2012.
4. Schaum's Outline of  Electromagnetics by Joseph A. Edminister, Mahamood Navi,4thEdition,2014.

### Online Learning Resources:
1. https://archive.nptel.ac.in/courses/108/106/108106073
2. https://nptel.ac.in/courses/117103065
3. https://ekumbh.aicte-india.org

| B.Tech.– II Year – I SEMESTER | ELECTRICAL CIRCUIT ANALYSIS - II | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**Pre-requisite:** Analysis of DC and Single-phase AC Circuits, Concepts of differentiation and integration.

**Course Objectives:**
- To understand three phase circuits
- To analyses transients in electrical systems
- To evaluate network parameters of given electrical network
- To apply Fourier analysis to electrical systems
- Tounderstandgraphtheoryforcircuitanalysisandtounderstandthebehaviouroffilters

**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: Analyse the transient behavior of electrical networks in different domains.
CO3: Estimate various Network parameters.
CO4: Apply the concept of Fourier series to electrical systems.
CO5: Analyse the filter circuit for electrical circuits.

## Course Topics

### UNIT-I
**Analysis of three phase balanced circuits:**
Phase sequence, star and delta connection of sources and loads, relationship 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, measurement of active and reactive power.

### UNIT–II
**Laplace transforms** – Definition and Laplace transforms of standard functions (Impulse, Step, Ramp, Parabolic) – Shifting theorem – Laplace Transforms of derivatives and integrals, Inverse Laplace transforms.
**Transient Analysis:** Transient response of R-L, R-C and R-L-C circuits 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**

**Fourier Analysis:**

Trigonometric and exponential form of Fourier series, evaluation of Fourier coefficients, Symmetry in Fourier Series – Even Symmetry, Odd Symmetry, Half Wave Symmetry, Quarter Wave Symmetry, Average & RMS values of periodic waveforms, Analysis of Electric Circuits with Periodic Excitation.

**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 - Low pass and High pass.

**Textbooks:**

1. Engineering Circuit Analysis, William Hayt and Jack E. Kemmerly, 9th EditionMcGraw- Hill, 2020
2. Fundamentals of Electric Circuits, Charles K. Alexander, Mathew N. O.Sadiku, 7th Edition, Tata McGraw-Hill, 2022

**Reference Books:**

1. Network Analysis, M.E.VanValkenburg,3rd Edition,PHI,2019.
2. Network Theory, N. C. Jagan and C. Lakshminarayana, 3rd Edition, B. S. Publications, 2015.
3. Circuits and Networks Analysis and Synthesis, A. Sudhakar, Shyam Mohan S. Palli, 5th Edition, Tata McGraw-Hill, 2017.
4. Engineering Network Analysis and Filter Design (Including Synthesis of One Port Networks)- Durgesh C. Kulshreshtha Gopal G. Bhise, Prem R. Chadha, Umesh Publications 2012.
5. Circuit Theory: Analysis and Synthesis, A. Chakrabarti, Dhanpat 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
3. https://ekumbh.aicte-india.org

| B.Tech.– II Year – | DC MACHINES & TRANSFORMERS | L | T | P | C |
|---|---|---|---|---|---|
| I SEMESTER | | 3 | 0 | 0 | 3 |

**Pre-requisite:** Principles of Electromechanical 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.
- Understand the performance of single-phase transformers.
- Understand the connection diagrams of three-phase transformers.

Course Outcomes:
At the end of the course, the student will be able to,
CO1: Understand the process of voltage build-up in DC generators and characteristics.
CO2: Understand the process of torque production, starting and speed control of DC motors and illustrate their characteristics.
CO3: Obtain the equivalent circuit of single-phase transformer and determine its efficiency & regulation.
CO4: Analyze the performance of Single- Phase Transformers
CO4: Analyse various configurations of three-phase transformers.

**Course Topics**

**UNIT–I:**

**DC Machines**
Construction and principle of operation of DC machines – EMF equation for generator – Excitation techniques – characteristics of DC generators –applications of DC Generators, Back-emfandtorqueequationsofDCmotor-CharacteristicsofDCmotors-ApplicationsofDC      motors      – Armature reaction and commutation.

**UNIT –II:**
**Starting, Speed Control and Testing of DC Machines**
Necessity of a starter – starting by 3-pointand 4-point starters– speed control by armature voltage and field current control – Testing of DC machines, losses and efficiency – 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 factor loads – phasor diagrams– equivalent circuit –regulation – losses and efficiency – effect of variation of frequency and supply voltage on losses – auto transformer - 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— equivalent circuit – comparison with two winding transformers.

**UNIT–V:**

**Three-Phase Transformers:**

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

**Textbooks:**

1. Electrical Machinery by Dr. P S Bimbhra, Fully Revised edition, Khanna Publishers, New Delhi,2021.
2. Performance and analysis of AC machines by M.G.Say,CBS,2002.

**Reference Books:**

1. Electrical Machines by D.P.Kothari, I.J.Nagarth,McGrawHillPublications,5th edition, 2017.
2. Electrical Machinery Fundamentals by Stephen J Chapman McGraw Hill education 2017
3. Generalized TheoryofElectricalMachinesbyDr.PSBimbhra,7ᵗʰEdition, Khanna Publishers, 2021.
4. Theory & Performance of Electrical Machines by J.B.Gupta, S.K.Kataria&Sons,2013.
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
3. https://ekumbh.aicte-india.org

# DADI INSTITUTE OF ENGINEERING &TECHNOLOGY
## (An Autonomous Institute)

| B.Tech.– II Year – I SEMESTER | ELECTRICAL CIRCUIT ANALYSIS-II AND SIMULATION LAB | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 3 | 1.5 |

**Course Objectives:**
- To measure three phase Active and Reactive power
- To analyse transient behaviour of circuits
- To determine2-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:Simulate and analyse electrical circuits using suitable software.

## List of Experiments Any10 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 superposition 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.

Virtual labs Links:

- vlabs.co.in
- https://asnm-iitkgp.vlabs.ac.in

# DADI INSTITUTE OF ENGINEERING &TECHNOLOGY
## (An Autonomous Institute)

| B.Tech.– II Year – I SEMESTER | DC MACHINES & TRANSFORMERS LAB | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 3 | 1.5 |

**Pre-requisite:** Principles of Electromechanical Energy Conversion, Electromagnetic fields and Electrical Circuit Analysis.

**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: Demonstrate starting and speed control methods of DC Machines.
CO2: Apply theoretical concepts in analyzing the performance characteristic of DC Machines.
CO3: Determine the performance characteristics of DC machines using different testing methods.
CO4: Determine the performance parameters of single-phase transformer.

## 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'stest-PredeterminationofefficienciesasDCGeneratorandMotor.
4. Hopkinson's test on DC Shunt 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. Sumner'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:**

https://ems-iitr.vlabs.ac.in

# DADI INSTITUTE OF ENGINEERING &TECHNOLOGY
## (An Autonomous Institute)

| B.Tech.– II Year – I SEMESTER | DATA STRUCTURES LAB | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 1 | 2 | 2 |

**Pre-requisite:** Fundamentals in C Programming.

**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 Out comes:** 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.

**Course Topics**

**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 elementing given list of sorted element sin an array using Binary search.
4. Implement Selection and Quick sort techniques.

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

**UNIT III**
**Stacks:** Introduction to stacks:  properties and operations, implementing stacks using arrays and linked lists, Applications of stacks in expression evaluation, backtracking, reversing list etc.
**Sample Experiments:**
1. Implement stack operations using
   a.Arrays        b.Linkedlist

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.

## UNIT IV

**Queues:** Introduction to queues: properties and operations, Circular queues, implementing queues using arrays and linked lists, Applications of queues scheduling, etc.
**Deques:** Introduction to deques (double-ended queues), Operations on deques and their applications.
**Sample Experiments:**

1. Implement Queue operations using

   a. Arrays       b. Linked list

   Implement Circular Queue using

   a. Arrays       b. Linked list

   Implement Dequeue using linked list.

## UNIT V

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

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

**Textbooks:**

1. Data Structures and algorithm analysis in C,MarkAllenWeiss,Pearson,2ⁿᵈEdition.
2. Fundamentals of data structures in C,Ellis Horowitz, Sartaj Sahni ,Sus an 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.

# DADI INSTITUTE OF ENGINEERING &TECHNOLOGY
## (An Autonomous Institute)

| B.Tech.– II Year – I SEMESTER | ENVIRONMENTAL SCIENCE | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 0 | - |

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

**Course Topics**
**UNIT I**
**Multidisciplinary Nature of Environmental Studies: –**Definition, Scope and Importance – Need for Public Awareness.
**Natural Resources :**Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods,        drought,        conflicts        over water, dams –        benefits    and    problems–  Mineral    resources:  Use    and    exploitation, environmental effects of extracting and using   mineral resources, case studies– Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

**UNIT II**
**Ecosystems:** Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:
   a) Forest ecosystem.
   b) Grass land ecosystem
   c) Desert ecosystem.
   d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

**Biodiversity and its Conservation :**Introduction 0 Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive  use,
Productive use, social, ethical, aesthetic and option values– Bio diversity at global, National and local   levels–India asamega –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 biodiversity: In-situ and Ex-situ conservation of biodiversity.

**UNIT III**
**Environmental Pollution:** Definition, Cause, effects and control measures of:
   a) Air Pollution.
   b) Water pollution
   c) Soil pollution
   d) Marine pollution
   e) Noise pollution
   f) Thermal pollution
   g) Nuclear hazards

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

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

### UNIT V
**Human Population and the Environment:** Population growth, variation among nations. Population explosion–Family Welfare Programmed.–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, hill slopes, etc..

**Textbooks**:
1. Textbook of Environmental Studies for Undergraduate Courses Erach Bharuchafr University Grants Commission, Universities Press.
2. Palaniswamy,"Environmental Studies",Pearson education
3. S.AzeemUnnisa,"Environmental Studies" Academic Publishing Company
4. K.RaghavanNambiar,"Textbook of Environmental Studies for Undergraduate Courses as per UGC model syllabus", Scitech Publications (India), Pvt. Ltd.

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

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# DADI INSTITUTE OF ENGINEERING &TECHNOLOGY
## (An Autonomous Institute)

| B.Tech.– II Year – II SEMESTER | MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 0 | 2 |

**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)

## 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 Iscosts, Cost & Break-Even Analysis - Cost concepts and Cost behavior- 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 Competition - 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-term Capital, Estimating Working capital requirements. Capital Budgeting– Features, Proposals, Methods and Evaluation. Projects – Pay Back Method, Accounting Rate of Return (ARR) Net Present Value (NPV) Internal Rate Return (IRR) Method (sample problems)

## UNIT-V
### 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. Aryasri: Business Economics and Financial Analysis, 4/e, MGH.

**Reference Books:**
1. Ahuja Hl Managerial economics Schand.
2. S.A. Siddiquiand A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International.
3. Joseph G.Nellisand David Parker:PrinciplesofBusinessEconomics,Pearson,2/e,New  Delhi.
4. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage.

**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
https://ekumbh.aicte-india.org

# DADI INSTITUTE OF ENGINEERING &TECHNOLOGY
## (An Autonomous Institute)

| B.Tech- IIYear– II SEMESTER | ENGINEERING SCIENCE/BASICSCIENCE | 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 concepts of feedback amplifiers.
- To know the operation of oscillators and operational amplifier.
- To understand the applications of operational amplifier.
- To acquire the knowledge on IC555timer and their applications and 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, operational amplifiers.
CO4**:** Analyze the op-amp applications, comparators and waveform generators.
CO5**:** Use 555 timers in multi-vibrators, Schmitt Trigger and PLL applications and describe the operation of different ADC's and DAC's.


**Unit– 1:**
**Diode clipping and clamping circuits:** Diode Clippers-Positive and Negative clippers, Diode Clampers - Positive and Negative Clampers. Transfer characteristics of clippers and clampers.
**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 Modelling 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 Multivibrator, 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, 4th Edition,2015.
2. Linear Integrated Circuits– D. RoyChoudhury, New Age International (p)Ltd, 5th Edition, 2018.

**Reference Books:**

1. Electronic Devices and Circuit Theory– Robert L.Boylestad and Lowis Nashelsky, Pearson Edition, 2021.
2. Electronic Devices and Circuits– G.K.Mithal, Khanna Publisher,23rdEdition,2017.
3. Electronic Devices and Circuits –DavidBell, Oxford Publications,2010.
4. Electronic Principles–Malvino, Albert Paul, and David J.Bates, Mc Graw-Hill/Higher Education, 9th Edition 2021..
5. Operational Amplifiers and Linear Integrated Circuits– Gayakwad R.A, Pearson,4th edition, 2021.
6. Operational Amplifiers and Linear Integrated Circuits –Sanjay Sharma, Kataria& Sons, 2ndEdition, 2010.

**Online Learning Resources:**

1. https://nptel.ac.in/courses/122106025
2. https://nptel.ac.in/courses/108102112
3. https://ekumbh.aicte-india.org

| B.Tech-IIYear– II SEMESTER | PROFESSIONAL CORE | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| | POWER SYSTEMS – I | | | | |

**Pre-requisite:** Fundamentals of Basic Electrical Engineering and electrical materials.

**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: Understand the different types of power plants, operation of hydroelectric and thermal power plants.
CO2: Understand the operation of Nuclear power plants.
CO3: Describe the different components of air and gas insulated substations.
CO4: Discuss the construction of single core and three core cables and describe distribution system configurations.
CO5: Analyse different economic factors of power generation and tariffs.

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

**Unit IV: 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.

### UNIT V: Economic Aspects & Tariff:

**Economic Aspects**–load curve, load duration and integrated load duration curves, discussion on economic aspects: connected load, maximum demand, demand factor, load factor, diversity factor, plant capacity factor and plant use factor, base and peak load plants.

**Tariff Methods**– Costs of generation and their division into fixed, semi-fixed and running costs, desirable characteristics of a tariff method, tariff methods: simple rate, flat rate, block-rate, two- part, three–part, and power factor tariff methods.

### Text Books:

1. I.J.Nagarath & D.P. Kothari, Power System Engineering, McGraw-HillEducation,3rd Edition, 2019.
2. C.L.Wadhwa, Generation, Distribution and Utilization of Electrical Energy, New Age International Publishers, 6th Edition, 2018.
3. Turan Gonen, Electric Power Distribution System Engineering, McGraw-Hill, 3rd edition 2014.

### Reference Books:

1. S. N. Singh, Electric Power Generation, Transmission and Distribution, PHIL earning 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
3. V.K.Mehta and Rohit Mehta, Principles of PowerSystem, S.Chand,4thEdition,2005.
4. Handbook of Switchgear, BHEL,McGraw-HillEducation,2007.

### Online Learning Resources:

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

2. https://ekumbh.aicte-india.org

| B.Tech-IIYear– II SEMESTER | PROFESSIONAL CORE | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| | INDUCTION AND SYNCHRONOUSMACHINES | | | | |

**Pre-requisite:** Principles of Electromechanical Energy Conversion, Electromagnetic fields and Transformers.

**Course Objectives:**
Students will get exposure to understand the concepts of
- operation and performance of three phase induction motor
- performance of induction motor and their performance parameters.
- Torque producing mechanism of single phase induction motor
- Performance parameters of synchronous generators
- Operation performance and starting methods of synchronous motors

**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: Describe the working of single-phase induction motors.
CO4: Analyse the performance of Synchronous generators
CO5: Analyse the performance of Synchronous motors

**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 and Potier triangle method –two reaction analysis 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,KhannaPublishing,2021,FirstEdition.
2. Performance and analysis of AC machines by M.G.Say,CBS,2002.

**Reference Books:**

1. Electrical machines, D.P.KothariandI.J.Nagrath,McGrawHillEducation,2017, Fifth Edition.
2. Theory & Performance of Electrical Machines by J.B.Gupta,S.K.Kataria & Sons, 2013.
3. Electric Machinery, A.E.Fitzgerald, Charles kingsley, StephenD.Umans, McGraw- Hill, 2020, Seventh edition.

**Online Learning Resources:**

1. nptel.ac.in/courses/108/105/108105131
2. https://nptel.ac.in/courses/108106072
3. https://ekumbh.aicte-india.org

| B.Tech-IIYear–<br>II SEMESTER | PROFESSIONAL CORE | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |
| | **CONTROL SYSTEMS** | | | | |

**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.
- To obtain the mathematical models of physical systems using state space approach and determine the response.

**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. Analyze the absolute and relative stability of LTI systems using Routh's stability criterion and root locus method.
**CO3:** Analyze the stability of LTI systems using frequency response methods.
**CO4:** Design Lag, Lead, Lag-Lead compensators to improve system performance using Bode Diagrams.
**CO5:** Apply state space analysis concepts to represent physical systems as state models, derive transfer function and determine the response. Understand the concepts of controllability and observability

**UNIT-I**
**Mathematical Modelling 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- block diagram reduction techniques – representation by signal flow graph – reduction using Mason's gain formula.

**UNIT-II**
**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.
**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 –III: 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 –IV: Classical Control Design Techniques**
Lag, lead, lag-lead compensators - physical realization - design of compensators using Bode plots.

**UNIT–V: State Space Analysis of LTI Systems**

Concepts of state - state variables and state model - state space representation of transfer function: Controllable Canonical Form - Observable Canonical Form- Diagonal Canonical Form diagonalization using linear transformation - solving the time invariant state equations State Transition Matrix and its properties- concepts of controllability and observability.

**Text Books**:

1.	Modern Control Engineering by Kotsuhiko Ogata,PrenticeHallofIndia,5ᵗʰ edition, 2015.
2.	Automatic control systems by Benjamin C.Kuo,PrenticeHallofIndia,9ᵗʰEdition,2014.

**Reference Books:**

1.	Control Systems principles and design by M.Gopal, TataMcGrawHilleducationPvt Ltd., 4ᵗʰ Edition.
2.	Control Systems Engineering by Norman S.Nise, Wiley Publications,7ᵗʰedition
3.	Control Systems by Manik Dhanesh N,C engage publications.
4.	Control Systems Engineering by I.J. Nagarath and M.Gopal, New age International Publications, 5ᵗʰ Edition.
5.	Control Systems Engineering by S.Palani, Tata Mc Graw 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
4.	https://ekumbh.aicte-india.org

# DADI INSTITUTE OF ENGINEERING &TECHNOLOGY
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| B.Tech- IIYear–II SEMESTER | PROFESSIONAL CORE | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 3 | 1.5 |
| | INDUCTION AND SYNCHRONOUS MACHINES LAB | | | | |

**Pre-requisite:** Principles of Electro mechanical Energy Conversion, Electromagnetic fields.

**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:**
At the end of the course, the student will be able to,
CO1: Analyse the speed control methods on3-phaseInduction 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-determine the regulation of 3-phase alternator
CO5: Determine the synchronous machine reactance of 3-phase alternator

### List of Experiments Any10 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.
8. Regulation of a three-phase alternator by MMF method.
9. Regulation of three-phase alternator by Potier triangle method.
10. V and Inverted V curves of a three-phase synchronous motor.
11. Determination of $X_d$, $X_q$ &Regulation of a salient pole synchronous generator.
12. Determination of efficiency of three phase alternator by loading with three phase induction motor.
13. Parallel operation of three-phase alternator under no-load and load conditions.

### Online Learning Resources:

1. https://em-coep.vlabs.ac.in

Virtual lab Links

| S.No | Experiment Name | Link |
|---|---|---|
| 1 | Determination of V and Inverted V curves of a three phase | https://em-coep.vlabs.ac.in/exp/synchronous-motor/procedure.html |

| | | |
|---|---|---|
| | synchronous motor | |
| 2 | Determination of equivalent circuit parameters of single phase induction motor | https://em-coep.vlabs.ac.in/exp/blocked-rotor-test-induction-motor/theory.html |
| 3 | Parallel operation of three-phase alternator under no-load and load conditions | https://em-coep.vlabs.ac.in/exp/load-test-phase-alternator/theory.html |
| 4 | Determination of efficiency of a single-phase Induction Motor by conducting Brake  test. | https://em-coep.vlabs.ac.in/exp/no-load-test-induction-motor/ |

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| B.Tech-IIYear– II SEMESTER | PROFESSIONAL CORE | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 3 | 1.5 |
| | CONTROL SYSTEMS LAB | | | | |

**Pre-requisite**: Basic Engineering Mathematics and Fundamentals of MATLAB.

**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 Synchro's.
- 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: Analyse the performance of  Magnetic amplifier, D.C and A.C. servo motors and synchro's.
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 examine the truth table of logic gates using PLC.
CO5: Judge the stability in time and frequency domain and Kalman's test for controllability and observability.

### List of Experiments Any10 of the following experiments are to be conducted:
1. Analysis of First order system in time domain (For Step, Ramp Inputs)
2. Analysis of Second order system in time domain (For Step, Ramp Inputs)
3. Effect of P, PD, PI, PID Controller on a second order systems
4. Design of Lag Compensation –Magnitude and phase plot
5. Design of Lead Compensation- Magnitude and phase plot
6. Transfer function of DC Motor
7. Stability analysis of Linear Time Invariant system using Root Locus Technique (MATLAB)
8. Stability analysis of Linear Time Invariant system using Bode Plot Technique (MATLAB)
9. Stability analysis of Linear Time Invariant system using Nyquist Plot Technique (MATLAB)
10. Kalman's test of Controllability and Observability using MATLAB.
11. Potentio meter as an error detector
12. State space model for classical transfer function using MATLAB.

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| B.Tech-IIYear–II SEMESTER | SKILL ENHANCEMENT CORE | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 1 | 2 | 2 |
| | **PYTHON PROGRAMMING LAB** | | | | |

**Pre-requisite:** Fundamentals of Programming Language

**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:**
The student able to
- Analyze core concepts of conditional control statements.
- Usage of functions, strings and Lists
- Create built in functions, dictionaries and Tuple operations
- Access files and modules in object oriented programming
- Createthedifferenttypesofdataformatsforstoringandtransmittinginformation

**UNTI-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 try and except Statement.

**Sample Experiments:**
1. Write a program to find the largest element among three Numbers.
2. Write a Program to display all prime numbers with in an interval
3. Write a program to swap two numbers without using a temporary variable.
4. Demonstrate the following Operators in Python with suitable examples.

    i) Arithmetic Operators ii) Relational Operators iii) Assignment Operators iv) Logical Operators

    v) Bit wise Operators vi) Ternary Operator vii) Membership Operators viii) Identity Operators

    Write a program to add and multiply complex numbers

    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 to find the length of the string without using any library functions.

4. Write a program to check if the substring is present in a given string or not.

5. Write a program to perform the given operations on a list: i. addition        ii. insertion       iii. slicing

6. Write a program to perform any 5 built- in functions by taking any list.

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

**Sample Experiments:**

1. Write a program to create tuples (name, age, address, college) for at least two members and concatenate the tuples and print the concatenated tuples.

2. Write a program to count the number of vowels in a string (No control flow allowed).

3. Write a program to check if a given key exists in a dictionary or not.

4. Write a program to add a new key-value pair to an existing dictionary.

5. 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, Num Py with Python, Pandas.

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**Sample Experiments:**

1. Python program to check whether a JSON string contains complex object or not.
2. Python Program to demonstrate Num Py arrays creation using array () function.
3. Python program to demonstrate use of ndim, shape, size, d type.
4. Python program to demonstrate basics licing, 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 p and as data frame and explore the data through the data frame as follows:
   a.    Apply head () function to the p and as data frame
   b.    Perform various data selection operations on Data Frame
   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,VM Hariharan,2ⁿᵈEdition,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

| Course Code: | Design Thinking & Innovation (Circuit design using ETAP/PWSIM/ECAD software) | Credits 1-0-2:2 |
|---|---|---|

**List of Experiments**

Design and implementation of the following CMOS digital/analog circuits using Cadence/Mentor Graphics / Synopsys /Equivalent CAD tools.

The design shall include Gate-level design, Transistor-level design, Hierarchical design, Verilog HDL/VHDL design, Logic synthesis, Simulation and verification, Scaling of CMOS Inverter for different technologies, study of secondary effects (temperature, power supply and process corners), Circuit optimization with respectto area, performance and/or power, Layout, Extraction of parasitic and back annotation, modifications in circuit parameters and layout consumption, DC/transient analysis, Verification of layouts (DRC, LVS)

**E-CAD programs:**

Programming can be done using any compiler. Download the programs on FPGA/CPLD boards and performance testing may be done using pattern generator (32 channels) and logic analyzer apart from verification by simulation with any of the front end tools.

1. HDL code to realize all the logic gates
2. Design of 2-to-4 decoder
3. Design of 8-to-3 encoder (without and with priority)
4. Design of 8-to-1 multiplexer and 1-to-8 de-multiplexer
5. Design of 4 bit binary to gray code converter
6. Design of 4 bit comparator
7. Design of Full adder using 3 modeling styles
8. Design of flip flops: SR, D, JK, T
9. Design of 4-bit binary, BCD counters (synchronous/ asynchronous reset) or any sequence counter
10. Finite State Machine Design

**ETAP TASKS:**

1. Introduction to Electrical Transient Analyzer Program (ETAP).
2. Design a Power System (Generation, Transmission, Distribution includes switch gear protection) using ETAP software.
3. Solve simple electrical transient analysis problem using ETAP software
4. Motor Acceleration Analysis using ETAP software.

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