Program structure & Detailed Syllabus

2023

For

Under Graduate Programme (B.Tech)

ELECTRONICS AND COMPUTER ENGINEERING

(Applicable For Batches Admitted From 2023 – 2024)

VIGNAN'S INSTITUTE OF INFORMATION TECHNOLOGY
(AUTONOMOUS)

DUVVADA - VISAKHAPATNAM – 530 049

(An Autonomous Institute, Accredited by NAAC, Affiliated to JNTUGV, Vizianagaram, AP)

VIGNAN'S INSTITUTE OF INFORMATION TECHNOLOGY(A)
VISAKHAPATNAM
Academic Regulations (VR23) for B. Tech (Regular/Honors)

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

The admissions of the students into B.Tech. course shall be as per the Govt. of Andhra Pradesh rules.

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 program 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.
   For lateral entry scheme admission: Pursue a program of study
   For not less than three academic years and not more than six Academic years.

   (iii) Lateral entry candidate has to register for 120 credits from second year onwards and shall secure 120 credits.

   (b) Award of B.Tech. degree with Honors

   if he/she fulfils the following:

   (i) Student secures additional 15 credits fulfilling all the requisites of a B.Tech. program i.e., 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 or any other order of merit approved by the A.P. Government/University, subject to reservations as prescribed by the Government/University from time to time.

4. Program related terms

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

Credit Definition:

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

(a) Academic Year:

Two consecutive (one odd + one even) semesters constitute one academic year.

(b) Choice Based Credit System (CBCS):

The CBCS provides a choice for students to select from the prescribed courses.

5. Programs of Study

The following B.Tech. Programs are offered:

S. No.	Program Code	Program & Abbreviation
01	01	Civil Engineering (CE)
02	02	Electrical and Electronics Engineering (EEE)
03	03	Mechanical Engineering (ME)
04	04	Electronics and Communication Engineering (ECE)
05	05	Computer Science and Engineering (CSE)
06	12	Information Technology (IT)
07	19	Electronics and Computer Engineering (E. Com E)
08	54	Artificial Intelligence and Data Science (AI&DS)
09	43	CSE–Artificial Intelligence
10	44	CSE –Data Science
11	46	CSE–Cyber Security

And any other Programs as approved by the authorities of the Institute from time to time.

6. Registration:

A student shall register for courses in each semester as per the courses offered in the specific B.Tech Program.

7. Curricular Program

The Curriculum of the four-year B. Tech Program has been designed to achieve a Healthy balance between theory and laboratory courses and Skills required for Industry. Further, focus is given to develop technical skills, Inter disciplinary skillsetc.,

8. Semester/Credits:

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

ii) The summer term is for minimum 4 weeks during summer vacation. Internship/ apprenticeship / work-based vocational education and training can be carried out during the summer term, especially by students who wish to exit after two semesters or four semesters of study.

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

9. Structure of the Undergraduate Programme

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

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

10. Course Classification:

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

S.No.	Broad Course Classification	Course Category	Description
1.	Foundation Courses	Foundation courses	Includes Mathematics, Physics and Chemistry; fundamental engineering courses; humanities, social sciences and management courses
2.	Core Courses	Professional Core 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. Project or Major Project
		Internships	Summer Internships – Community based and Industry Internships; Industry oriented Full Semester Internship
5.	Audit Courses	Mandatory non- credit courses	Covering subjects of developing desired attitude among the learners

11. Programme Pattern

i. Total duration of the of B. Tech (Regular/Honors) Programme is four academic years.

ii. Each academic year of study is divided into two semesters.

iii. Minimum number of instruction days in each semester is 90 days.

iv. There shall be mandatory student induction program for freshers, 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 / Communityservice activities are made mandatory as credit courses for all the under graduate students.

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

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

viii. Increased flexibility for students through the elective component of the curriculum, with 5 Professional Elective courses and 5 Open Elective courses.

ix. Professional Elective Courses, include the elective courses relevant to the chosen specialization/branch. Proper choice of professional elective courses can lead to students specializing in emerging areas within the chosen field of study.

x. A total of 4 Open Electives are offered in the curriculum. A student can complete the requirement for B.Tech. Degree with a Minor within the 160 credits by opting for the courses offered through various verticals/tracks under Open Electives.

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

xii. A pool of interdisciplinary/job-oriented/domain skill courses which are relevant to the industry are integrated into the curriculum of all disciplines. There shall be 5 skill-oriented courses offered during III to VII semesters. Among the five skill courses, four courses shall focus on the basic and advanced skills related to the domain/interdisciplinary courses and the other shall be a soft skills course.

xiii. Students shall undergo mandatory summer internships, for a minimum of 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. Institution take measures to implement Virtual Labs (https://www.vlab.co.in) which provide remote access to labs in various disciplines of Engineering and will help student in learning basic and advanced concept through remote experimentation. Student shall be made to work on virtual lab experiments during the regular labs.

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

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

12 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 400 marks, mandatory courses with no credits shall be evaluated for 30 mid semester marks.

For any course, student is considered to be passed upon securing minimum 35% marks in the external examination alone and minimum 40% marks from both internal and external examination put together for the theory, practical, design, drawing subject or project etc. In case of a mandatory course, he/she should secure 40% of the total marks.

Theory Courses

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

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

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

iii) If any course contains two different branch subjects, the syllabus shall be written in two parts with 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 'P' for practical subject.

(a) Continuous Internal Evaluation

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

ii) Objective paper shall contain for 05 short answer questions with 2 marks each 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 on the day of subjective paper test.
- Assignments shall be in the form of problems, mini projects, design problems, slip tests, quizzes etc., depending on the course content. It should be continuous assessment throughout the semester and the average marks shall be considered.

iii) If the student is absent for the mid semester examination, no re-exam shall be conducted and mid semester marks for that examination shall be considered as zero.

iv) First mid term examination shall be conducted for Two and Half units of syllabus with one either or type question from each unit. The second mid term examination shall be conducted for remaining two and half 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
Marks obtained in second mid: 20
Final mid semester Marks: (25x0.8) + (20x0.2) = 24

If the student is absent for any one mid term 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.
In each of the questions from 2 to 6, there shall be either/or type questions of 10 marks each. Student shall answer any one of them.

iv) The questions from 2 to 6 shall be set by covering one unit of the syllabus for each question.

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.

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

Practical Courses

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

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

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

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 3 either or type questions of equal weightage of 5 marks. There shall be no objective paper in mid semester examination. The sum of day-to-day evaluation and the mid semester marks will be the final sessional marks for the subject.

The end examination pattern for Engineering Graphics, shall consists of 5 questions, either/or type, of 14 marks each. There shall be no objective type questions in the end examination. 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 reexamination 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 and shall be produced to the Committees as and when the same are asked for.

13 Skill oriented Courses

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

b. 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.

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

d. 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.

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

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

g. In case a student fails in any skill course, he/she may be permitted to register for same course or alternative course decided by department committee. For the course opted by department committee minimum 32 hrs of the class work will be conducted. The internal marks secured earlier will be nullified if the course is changed. The assessment procedure of skill-oriented course remains same.

h. 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 Institution.

14. Massive Open Online Courses (MOOCs):

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

A student shall register for the course (Minimum of either 8 weeks for 2 credits or 12 weeks for 3 credits) 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 Institution

To award credits the student should get certificate after they have registered for written exam and successfully passed

(Or)

College will conduct the written examination / Viva – voce and award the credits and grades.

In case a student fails in any online course, he/she may be permitted to register for the same course or an alternate course decided by the department committee. For course opted by the department committee minimum 48 hours of class work will be conducted. The internal marks secured earlier will be nullified if the course is changed. The assessment procedure of MOOCs course remains same as general theory course.

Note:

1. The registered course must not be same as any of the courses listed in the program structure of their regulation till final year including electives.
2. Necessary amendments in rules and regulations regarding adoption of MOOC courses would be proposed from time to time.

15. Credit Transfer Policy

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

i. The University shall offer credit mobility for MOOCs and give the equivalent credit weightage to the students for the credits earned through online learning courses.
ii. Student registration for the MOOCs shall be only through the respective department of the institution, it is mandatory for the student to share necessary information with the department.
iii. Credit transfer policy will be applicable to the Professional & Open Elective courses only.
iv. The concerned department shall identify the courses permitted for credit transfer.
v. The institution shall notify at the beginning of semester the list of the online learning courses eligible for credit transfer.
vi. The institution shall designate a faculty member as a Mentor for each course to guide the students from registration till completion of the credit course.
vii. The Institution shall ensure no overlap of MOOC exams with that examination schedules.
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 maintain the following to the examination section:

a. List of students who have passed MOOC courses in the current semester along with the certificate of completion.

b. Undertaking form filled by the students for credit transfer.

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

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

16. 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 institutes 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.

17. Mini project (EPICS/CSP):

It is to be carried out during the second year. Students have an option to choose their own area of interest related to problems impacting the society. It is evaluated for 50 marks.

i) Internal assessment - 20 marks

ii) Project submission and Viva-Voce - 30 marks

18. Mandatory Internships

Summer Internships:

Two summer internships either onsite or virtual each with a minimum of 4 weeks duration, done at the end of second and third years, respectively are mandatory. It shall be completed in collaboration with local industries, Govt. Organizations, construction agencies, Power projects, software MNCs or any industries in the areas of concerned specialization of the Undergraduate program. One of the two summer internships at the end of second year (Community Service Project) shall be society oriented and shall be completed in collaboration with government organizations/NGOs & others. The other internship at the end of third year is Industry Internship and shall be completed in collaboration with Industries. The student shall register for the internship as per course structure after commencement of academic year. The guidelines issued by the APSCHE / University shall be followed for carrying out and evaluation of Community Service Project and Industry Internship.

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 50% of marks for successful completion. In case, if a student fails, he/she shall reappear as and when semester supplementary examinations are conducted by the Institution.

Full Semester Internship and Project work:

In the final semester, the student should mandatorily register and undergo internship 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.

18.1. Evaluation Procedure for Main Project:

Main project work shall be carried out in the IV-year, second semester and evaluated for **200 marks**. Out of a total of **200 marks** for the project work, **80 marks** shall be for Internal Evaluation and **120 marks** for the End Semester Examination.

18.2. Evaluation Procedure for Internship:

Internship work shall be carried out in the IV-year, second semester and evaluated for **200** marks. Out of a total of **200 marks** for the project work, **80** marks shall be for Internal Evaluation and **120 marks** for the End Semester Examination.

19. Attendance Requirements:

a. It is desirable for a candidate to have 100% attendance in the class in all the courses. However, a candidate shall be permitted to appear for the end semester examination if he/she has a minimum of 75% aggregate attendance in the semester. Student will not be permitted to write Mid examination if the attendance percentage is less than 75 % during the stipulated instruction duration. However, Academic Committee in the institute level shall review the situation and take appropriate decision.

   Note: Special cases for students having extra ordinary performance at National and International level will be considered by the Academic Committee.

b. Condonation of shortage of attendance may be considered on Medical grounds maximum up to 10%, if the student provides the medical certificate to the HOD immediately after he /she recovers from the illness. Medical Certificate submitted afterwards shall not be permitted. Shortage of attendance equal to or above 65% and below 75%will be condoned on payment of fee as fixed by the competent authority and the student concerned will be permitted to take the end semester examination. ***This privilege is given only three times for regular student and only two times for lateral entry student during the entire program of study***.

c. Shortage of attendance may be considered for the students who participate in prestigious sports, co and extra-curricular activities if their attendance is in the minimum prescribed limit.

d. A student will be promoted to the next semester if satisfies attendance and credits requirement.

20. Academic Requirements:

The following academic requirements have to be satisfied in addition to the attendance requirements. For any course, student is considered to be passed upon securing minimum 40% marks in the external examination alone and minimum 50% marks from both internal and external examination put together

21. Promotion Policy:

a. A student shall be promoted from first year to second year if he fulfills the minimum attendance requirements.

b. To promote to III year, a student has to secure minimum 40% of total credits from I &II- year courses

c. To promote to IV year, a student has to secure minimum 40% of total credits from I, II&III- year courses

d. In case of Lateral entry students, to promote to IV year, a student has to secure minimum 40% of total credits from II & III –year courses

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. An evaluation committee constituted by the Institution 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. Supplementary examinations:

Supplementary examinations for the odd Semester shall be conducted with the regular examinations of even semester and vice versa. In case a student fails in online courses/ industrial lecture(s), he/she may be permitted to register for another course /lecture(s).

24. Transitory Regulations

i. The student has to continue the course work along with the regular students of the respective semester in which the student getsre-admission.

ii. The student has to register for Substitute / Compulsory courses offered in place of courses studied earlier.

iii. The mode of internal evaluation and end-semester examinations shall be on par with the regular students, i.e., the student has to follow the mode of

internal evaluation and the then question paper model for the end – semester examinations along with the regular students of the respective semester in which the student gets re-admission. The marks secured in the internal and end-semester examinations will be pro-rated in accordance with the regulations under which the student was first admitted.

iv. For the courses studied under earlier regulations but failed, the student has to appear, pass and acquire credits from the supplementary examinations as and when conducted. The question paper model shall remain same as theone in which the student took examination during previous regulations.

v. The promotion criteria based on attendance as well as credits shall be in accordance with the regulations under which the student was first admitted.

vi. All other academic requirements shall be in accordance with the regulations under which the student was first admitted.

vii. The decision of the Principal is final on any other clarification in this regard.

viii. Transcripts: After successful completion of the entire program of study, a transcript containing performance of all academic years willbe issued as a final record. Partial transcript will also be issued up toany point of study to a student on request, after payment of requisitefee.

25. Minimum Instruction Days

The minimum instruction days for each semester shall be 16 weeks.

There shall be no branch transfers after the completion of the admission process.

26. Examinations and Evaluation

a. General guidelines

i. All the semester end examinations are conducted for duration of three hours

ii. External examination shall be conducted for 70 marks consist of five questions of internal choice carrying 12 marks each.

iii. For laboratory examinations, the evaluation is done by internal examiner and an external examiner.

b. Revaluation There is a provision for revaluation of theory courses if student fulfils the following norms.

The request for revaluation must be made in the prescribed format duly recommended by the Chief Superintendent of Examinations through Additional Controller along with the prescribed revaluation fee.

27. Grading System:

Structure of Grading of Academic Performance

Range in which the marks in the subject fall	Grade	Grade Point 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
	Ab (Absent)	0

Computation of SGPA

The following procedure is to be adopted to compute the Semester Grade Point Average.

(SGPA) and Cumulative Grade Point Average (CGPA):

The 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 (Si) = Σ (CixGi)/ΣCi

Where Ci is the number of credits of the i^{th} course and Gi is the grade point scored by the student in the i^{th}course.

Computation of CGPA

- The CGPA is also calculated in the same manner considering all the courses undergone by a student overall the semesters of a programme, i.e.

CGPA=Σ(CixSi)/Σ Ci

Where Si is the SGPA of the i^{th} semester and Ci is the total number of credits in that semester.

Conversion of CGPA to Percentage:

Equivalent Percentage= (CGPA– 0.75) X 10

28. 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 three classes:

Regular:

Class Awarded	CGPA to be secured	From the CGPA secured from160 Credits.
First Class with Distinction	≥7.75with no failures	
First Class	≥ 6.75	
Second Class	≥5.75to<6.75	

Lateral – entry scheme

Class Awarded	CGPA to be secured	From the CGPA secured
First Class with Distinction	≥7.75with no failures	
First Class	≥ 6.75	From 121 credits from II Year to IV Year
Second Class	≥5.75to<6.75	

29. General Instructions

i. Where the words 'he', 'him', 'his', occur, they imply 'she','her', 'hers', also.

ii. The academic regulations should be read as a whole for the purpose of any interpretation.

iii. In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Chairman, Academic Council is final.

iv. The college may change or amend the academic regulations or syllabi from time to time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the institution.

30. With holding of Results

If the student has not paid the dues, if any, to the institute or in any case of indiscipline is pending against him, the result of the student will be withheld. His degree will be withheld in such cases.

Note: All other regulations including attendance requirements related to four year **B.Tech Regular program will be applicable for B.Tech. Lateral Entry Scheme.**

31. Malpractices Rules

DISCIPLINARY ACTION FOR MAL PRACTICES / IMPROPER CONDUCT IN EXAMINATIONS

S.No	Nature of Malpractices/ Improper conduct	Punishment
1(a)	If the candidate possesses or keep accessible in examination hall, any paper, note book, programmable calculators,Cell phones, pager, palm computers or any other form of material concerned withor related to the course of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the course of the examination)	Expulsion from the examination hall and cancellation of the performance in that course only.
(b)	If the candidate gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that course only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2	If the candidate has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the course of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the courses of that Semester/year.
		The Hall Ticket of the candidate is to be cancelled.

3	If the candidate impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the courses of the examination (including practical's and project work) already appeared and shall not be allowed to appear for examinations of the remaining courses of that semester / year. The candidate is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection withfor feature of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4	If the candidate smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester / year. The candidate is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with for feature of seat.
5	If the candidate uses objection able, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that course.
6	If the candidate refuses too by the orders of the Chief Superintendent/Assistant - Superintendent / any Officer on dutyor misbehaves or creates disturbance of any kind in and around the examination hall or organizes a Walkout or instigates others to walkout,	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that course and all other courses the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the courses of that semester / year. The candidates also

	or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation , assaults the officer – in –charge ,or any person on duty in or outside the examination hall or any of his relations, or in dulges in any other act of mis conduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7	If the candidate leaves the exam hall taking away answer script or intentionally tears of the script or any part there of inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester / year. The candidate is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with for feature of seat.
8	If the candidate possesses any lethal weapon or fire are min the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester / year. The candidate is also debarred and forfeits the seat.
9	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6to8.	Student of the college, expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses

		of that semester / year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and. A police case will be registered against them.
10	If the candidate comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester / year.
11	Copying detected on the basis of internal evidence, such as, during valuation or during specials crutiny.	Cancellation of the performance in that course and all other courses the candidate has appeared including practical examinations and project work of that semester / year examinations.
12	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the Academic committee of the Institute for further action to award suitable punishment.	

32. UGC RECOMMENDED PUNISHMENT FOR RAGGING

i. Suspension from attending classes and academic privileges
ii. With holding / withdrawing scholarships / fellowship and other benefits.
iii. Debarring from appearing in any test / examination or other evaluation process with holding results
iv. Debarring from representing the institution in any regional, national or international meet, tournament, youth festival etc.
v. Suspension / expulsion from the hostel
vi. Cancellation of admission
vii. Rustication from the institution for period ranging from 1 to 4 semesters.
viii. Expulsion from the institution and consequent debarring from admission to any other institution for a specified period.
ix. Fine may extend upto Rs. 2.5lakh.

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B.TECH. –ECM –COURSE STRUCTURE–VR23

	I Year I Semester						
S.No.	**Course Code**	**Category**	**Course Name**	**L**	**T**	**P**	**Credits**
1.	1000231101	ES/MECH	Linear Algebra & Calculus	3	0	0	3
2.	1000231102	BS	Engineering Physics	3	0	0	3
3.	1000231104	ES/CSE	Communicative English	2	0	0	2
4.	1002231101	ES/EEE	Basic Electrical &Electronics Engineering	3	0	0	3
5.	1005231101	BS	Introduction to programming	3	0	0	3
6.	1000231110	BS	Engineering physics lab	0	0	2	1
7.	1002231110	ES/EEE	Electrical &Electronics Engineering workshop	0	0	3	1.5
8.	1005231111	ES/CSE	Computer Programming Lab	0	0	3	1.5
9.	1000231111	HS	Communicative English Lab	0	0	2	1
10.	1000231121	MC	Health and Wellness,Yoga and Sports	0	0	1	0.5
Total Credits							**19.5**

	I Year II Semester						
S.No.	**Course Code**	**Category**	**Course Name**	**L**	**T**	**P**	**Credits**
1.	1005231201	PC/CSE	Data Structures	3	0	0	3
2.	1003231101	PC	Engineering Graphics	1	0	4	3
3.	1000231103	BS	Chemistry	3	0	0	3
4.	1001231101	PC/CSE	Basic Civil & Mechanical Engineering	3	0	0	3
5.	1000231201	BS	Differential Equations and Vector calculus	3	0	0	3
6.	1000231112	BS	Chemistry Lab	0	0	2	1
7.	1005231210	PC/CSE	Data Structures Lab	0	0	3	1.5
8.	1005231110	PC/CSE	IT Workshop	0	0	2	1
9.	1003231110	ES/MECH	Engineering Workshop	0	0	3	1.5
10.	1000231120	MC	NSS/NCC/Scouts &Guides/Community Service	0	0	1	0.5
Total Credits							**20.5**

I Year I Semester

SYLLABUS

I Year – I Semester		L	T	P	C
Course Code (1000231101**)**	**LINEAR ALGEBRA& CALCULUS (Common to All Branches of Engineering)**	**3**	**0**	**0**	**3**

Course Objectives:
To equip the students with standard concepts and tools of mathematics to handle variousreal-world problems and their applications.

Course Outcomes: At the end of the course, the student will be able to
- Develop matrix algebra techniques that is needed by engineers for practical applications.
- Familiarize with functions of several variables which is useful in optimization.
- Learn important tools of calculus in higher dimensions.
- Familiarize with double and triple integrals of functions of several variable sin two and three dimension.

UNIT I Matrices
Rank of a matrix by echelon form, normal form. Inverse of Non- singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-
Homogeneous
equations by Gauss elimination method, 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,
Reductionof Quadratic form to canonical forms by Orthogonal Transformation.

UNIT III Mean Value Theorems
Rolle's Theorem, Lagrange's mean value theorem with their geometrical interpretation, Cauchy'smean value theorem, Taylor's and Maclaurin theorems with remainders (without proof), problemson the above theorems.

UNIT IV Partial differentiation and Applications
Partial derivatives, total derivatives, chain rule, change of variables, Taylor's and Maclaurin'sseries expansion of functions of two variables. Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

UNIT V Multiple Integrals
Double integrals, triple integrals, change of order of integration, change of variables topolar coordinates. Finding areas and volumes in Cartesian coordinates.

Textbooks:

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

Reference Books:

1. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, 5/e, Alpha ScienceInternational Ltd., 2021 (9th reprint).
2. George B.Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 14/e, PearsonPublishers, 2018.
3. Glyn James, Advanced Modern Engineering Mathematics, 5/e, Pearson publishers, 2018.
4. Michael Green berg, 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
Course Code (1000231102**)**	**ENGINEERING PHYSICS (Common for all branches of Engineering)**	**3**	**0**	**0**	**3**

COURSE OBJECTIVES

1. Bridging the gap between the Physics in school at 10+2 level and UG level engineering courses.
2. To identify the importance of the optical phenomenon. interference, diffraction and polarization related to its Engineering applications
3. Enlighten the periodic arrangement of atoms in Crystalline solids by Bragg's law
4. To explain the significant concepts of dielectric and magnetic materials that leads to potential applications in the emerging micro devices.
5. Enlightenment of the concepts of Quantum Mechanics and to provide fundamentals of deBroglie matter waves, quantum mechanical wave equation and its application, the importance of free electron theory for metals.
6. To Understand the Physics of Semiconductors and their working mechanism, Concept utilization of transport phenomenon of charge carriers in semiconductors.

COURSE OUTCOMES

CO1. **Explain** the need of coherent sources and the conditions for sustained interference (L2). **Identify** the applications of interference in engineering (L3). **Analyze** the differences between interference and diffraction with applications (L4). **Illustrate** the concept of polarization of light and its applications (L2). **Classify** ordinary refracted light and extraordinary refracted rays by their states of polarization (L2)

CO2. **Classify** various crystal systems (L2). **Identify** different planes in the crystal structure (L3). **Analyze** the crystalline structure by Bragg's X-ray diffractometer (L4).

CO3. **Explain** the concept of dielectric constant and polarization in dielectric materials (L2). **Summarize** various types of polarization of dielectrics (L2). **Interpret** Lorentz field and Claussius-Mosotti relation in dielectrics (L2). **Classify** the magnetic materials based on susceptibility and their temperature dependence (L2).

CO4**.** **Describe** the dual nature of matter (L1). **Explain** the significance of wave function (L2). **Identify** the role of Schrodinger's time independent wave equation in studying particle in one- dimensional infinite potential well (L3). **Identify** the role of classical and quantum freeelectron theory in the study of electrical conductivity (L3).

CO5**. Classify** the crystalline solids (L2). **Outline** the properties of charge carriers in semiconductors (L2). **Identify** the type of semiconductor using Hall effect (L2). **Apply** the concept of effective mass of electron (L3).

Unit-I: Wave Optics

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

Unit Outcomes:
The students will be able to

- **Explain** the need of coherent sources and the conditions for sustained interference (L2)
- **Identify** engineering applications of interference ($_2L_73$)
- **Illustrate** the concept of polarization of light and its applications (L2)

- **Classify** ordinary polarized light and extraordinary polarized light (L2)

Unit II: Crystallography

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. Bragg's law - X-ray Diffractometer.

Unit Outcomes:
The students will be able to

- **Classify** various crystal systems (L2)
- **Identify** different planes in the crystal structure (L3)
- **Analyze** the crystalline structure by Bragg's X-ray diffractometer (L4)

Unit-III: Dielectric and Magnetic Materials

Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius-Mossotti equation.
Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability - Classification of magneticmaterials: Dia, para, Ferro, antiferro & Ferri magnetic materials - Domain concept for Ferromagnetism (Qualitative) - Hysteresis - soft and hard magnetic materials.

Unit Outcomes:
The students will be able to

- **Explain** the concept of dielectric constant and polarization in dielectric materials (L2)
- **Summarize** various types of polarization of dielectrics (L2)
- **Interpret** Lorentz field and Claussius- Mosotti relation in dielectrics(L2)
- **Classify** the magnetic materials based on susceptibility and their temperature dependence(L2)

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 freeelectron theory **-** Fermi-Dirac distribution and its temperature dependence.

Unit Outcomes:
The students will be able to

- **Explain** the concept of dual nature of matter (L2)
- **Understand** the significance of wave function (L2)
- **Interpret** the concepts of classical and quantum free electron theories (L2)

Unit – V: Semiconductors

Semiconductors: Formation of energy bands – classification of crystalline solids - Intrinsic semiconductors: Density of charge carriers – Electrical conductivity – Extrinsic semiconductors: density of charge carriers - Drift and diffusion currents – Einstein's equation - Hall effect and its Applications.

Unit Outcomes:
The students will be able to

- **Outline** the properties of charge carriers in semiconductors (L2)
- **Understand** the carrier transportation in semiconductors (L2)
- **Identify** the type of semiconductor using Hall effect (L2)

Text books:

- A Text book of Engineering Physics" - M. N. Avadhanulu, P.G.Kshirsagar & TVS ArunMurthy, S.Chand Publications, 11th Edition 2019.
- "Engineering Physics" - D.K.Bhattacharya and Poonam Tandon, Oxford press (2015).
- "Engineering Physics" - P.K.Palanisamy SciTech publications.

Reference Books:

- "Fundamentals of Physics" - Halliday, Resnick and Walker, John Wiley &Sons.
- "Engineering Physics" - M.R. Srinivasan, New Age international publishers (2009).
- "Engineering Physics" - Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.
- "Engineering Physics" - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press.
- "Semiconductor physics and devices:Basic principle" - A. Donald, Neamen, Mc GrawHill.
- "Engineering Physics" - B.K. Pandey and S. Chaturvedi, Cengage Learning
- "Solid state physics" – A.J.Dekker ,Pan Macmillan publishers
- "Introduction to Solid State Physics" -Charles Kittel ,Wiley

I Year – I Semester		L	T	P	C
Course Code (1000231104**)**	**COMMUNICATIVE ENGLISH** (Common to All Branches of Engineering)	**2**	**0**	**0**	**2**

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 the context, topic, and specificinformation from social or transactional dialogues.
- Remedially learn applying grammatical structures to formulate sentence sand use appropriate words andcorrect word forms.
- Using discourse markers to speak clearly on a specific topic in formal as well as informal discussions.
  (notrequired)
- Improved communicative competence in formal and informal contexts and for social and academicpurposes.
- Critically comprehending and appreciating reading/listening texts and to write summaries and reviews based on global comprehension of these texts.
- Writing coherent paragraphs, paraphrase, 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 class work for the students can be to discuss and critically evaluate the texts based on the context, purpose or writing the text and understandingit 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 unitand 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 know 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: E-Mail writing

Mechanics of Writing-Capitalization, Spellings, and 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 structure talks and Book/movie/article review.

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 to.

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

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

Writing: Summarizing, Note-making, Paraphrasing.

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

Vocabulary: Compound words, Collocations

UNIT IV

Lesson: INSPIRATION: The Toys of Peace by Saki

Listening: Making predictions while listening to conversations/ transactional dialogues without video;listening with video.

Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.

Reading: Studying the use of graphical elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.

Writing: Letter Writing: Official Letters

Grammar: 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 testcomprehension.

Speaking: Formal oral presentations on topics from academic contexts.

Reading: Reading comprehension.

Writing: Writings structured essays on specific topics.

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

Vocabulary: Technical Jargons.

Text books:

1. Pathfinder: Communicative English for Undergraduate Students, 1st Edition,Orient Black Swan, 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 to procure the 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 students to 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 a Superior Vocabulary.Anchor, 2014.

Web Resources:

GRAMMAR:

1. **www.bbc.co.uk/learningenglish**

https://dictionary.cambridge.org/grammar/british-grammar/

I Year – I Semester	BASIC ELECTRICAL & ELECTRONICS ENGINEERING (Common to All branches of Engineering)	L	T	P	Credits
Course Code: 1002231101		3	0	0	3

Course Objectives:
To expose to the field of electrical & electronics engineering, laws and principles of electrical/ electronicengineering and to acquire fundamental knowledge in the relevant field.
Course Outcomes: After the completion of the course students will be able to

	Course Outcome
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 **(8 Hours)**

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 (8 Hours)

Machines: Construction, principle and operation of (i) DC Generator, (ii) Single Phase Transformer and (iii)Three Phase Induction Motor, 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: Electricity Bill & Safety Measures (8 Hours)

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 ofelectricity bill for domestic consumers.

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

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

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 University Press, 2017
4. *Basic Electrical and Electronics Engineering*, S. K. Bhatacharya, Person Publications, 2018, SecondEdition.

E-Resources:

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

PART B: BASIC ELECTRONICS ENGINEERING

Course Objectives:

- To teach the fundamentals of semiconductor devices and its applications, principles of digitalelectronics

UNIT I SEMICONDUCTOR DEVICES

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

UNIT II BASIC ELECTRONIC CIRCUITS AND INSTRUMENTTAION

Rectifiers and power supplies: Block diagram description of a dc power supply, working of a fullwave bridge rectifier, capacitor filter (no analysis), working of simple zener voltage regulator. Amplifiers: Block diagram of Public Address system. Electronic Instrumentation: Block diagramof 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.

Textbooks:

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

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

I Year – I Semester		L	T	P	C
Course Code : (1005231101)	**INTRODUCTION TO PROGRAMMING** **(Common to All branches of Engineering)**	**3**	**0**	**0**	**3**

Course Objectives:

The objectives of this course are to acquire knowledge on the

i. To impart adequate knowledge on the need of programming languages and problem-solving techniques and develop programming skills.
ii. To enable effective usage of Control Structures and Implement different operations on arrays.
iii. To demonstrate the use of Strings and Functions.
iv. To impart the knowledge of pointers and understand the principles of dynamic memory allocation.
v. To understand structures and unions and illustrate the file concepts and its operations.
vi. 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, Pointers as 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, 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 of implementation**.**

Course Outcomes:

At the end of the Course, Student should be able to:

i . Illustrate the Fundamental concepts of Computers and basics of computer programming andproblem-solving approach

ii. Understand the Control Structures, branching and looping statements

iii. Use of Arrays and Pointers in solving complex problems.

iv. Develop Modular program aspects and Strings fundamentals.

v. 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/

I Year – I Semester		L	T	P	C
Course Code: (1000231110)	**ENGINEERING PHYSICS LAB** **(Common to All Branches of Engineering)**	**0**	**0**	**2**	**1**

Course Objectives:

To study the concepts of optical phenomenon like interference, diffraction etc., recognize theimportance 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: At the end of the course, the student will be able to:

CO1: Identify the mechanical behavior and mechanical parameters of materials.
CO2: Interpret some of the physical parameters based on optical phenomena.
CO3: Identify the characteristics of semiconducting materials, magnetic materials and dielectrics.
CO4: Estimate the parameters by diffraction techniques

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 usingdiffraction grating in normal incidence configuration.
3. Verification of Brewster's law
4. Determination of dielectric constant for a dielectric substance using dielectric constantapparatus
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 photo cell.
8. Determination of the resistivity of semiconductors by four probe methods.
9. To study V-I characteristics of a PN junction diode in forward and reverse biasingconditions.
10. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's Method.
11. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.
12. Determination of temperature coefficients of a thermistor.
13. Determination of acceleration due to gravity and radius of Gyration by using acompound pendulum.
14. Determination of magnetic susceptibility by Kundt's tube method.
15. Determination of rigidity modulus of the material of the given wire usingTorsional pendulum.
16. Sonometer: Verification of laws of stretched string.
17. Determination of young's modulus for the given material of wooden scale bynon-uniform bending (or double cantilever) method.
18. Determination of Frequency of electrically maintained tuning fork by Melde's experiment.
19. Study of V-I characteristics of solar cell
20. Determine of laser bean divergence and spot size of a diode laser beam

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

References:

- A Textbook of Practical Physics - S. Balasubramanian, M.N. Srinivasan, S. ChandPublishers, 2017.
- Physics Laboratory Manual for Undergraduate students – Dr. Santosh Kumar Alla, Dr. Ch. V. V. Ramana, Dr. T. Lakshmana Rao, Dr. R. Hanumantha Rao.

Web Resources

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

I Year – I Semester	ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP (Common to All branches of Engineering)	L	T	P	Credits
Course Code: 1002231110		0	0	3	1.5

Course Objectives:

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

Course Outcomes:

	Course Outcome
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 andpower factor.
CO4	Analyse various characteristics of electrical circuits, electrical machines and measuringinstruments.
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 used by the students.
2. Familiarization of Measuring Instruments like Voltmeters, Ammeters, multimeter, LCR-Q meter, Power Supplies, CRO, DSO, Function Generator, Frequency counter.
   - Provide some exercises so that measuring instruments are learned to be used by the students.
3. Components:
   - Familiarization/Identification of components (Resistors, Capacitors, Inductors, Diodes, transistors, IC's etc.) – Functionality, type, size, colour coding package, symbol, cost etc.
   - Testing of components like Resistor, Capacitor, Diode, Transistor, ICs etc. - Compare values of components like resistors, inductors, capacitors etc with the measured values by using instruments

PART-A: ELECTRICAL ENGINEERING 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, First Edition
2. *Power System Engineering*, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai& Co, 2013
3. *Fundamentals of Electrical Engineering*, Rajendra Prasad, PHI publishers, 2014, Third Edition

Note: Minimum Six Experiments to be performed.

PART B: ELECTRONICS ENGINEERING LAB

Course Objectives:

- To impart knowledge on the principles of digital electronics and fundamentals ofelectron devices & its applications.

Course Outcomes: At the end of the course, the student will be able toCO1: 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. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gatesusing ICs.
6. 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, PearsonEducation, 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: All the experiments shall be implemented using both Hardware and Software

I Year – I Semester	**COMPUTER PROGRAMMING LAB** **(Common to All branches of Engineering)**	L	T	P	C
Course Code (1005231111)		**0**	**0**	**3**	**1.5**

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

Suggested Experiments/Activities:

Tutorial4: Operators and the precedence and as associativity:

Lab4: Simple computational problems using the operator' precedence and associativity

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

WEEK 5

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

Suggested Experiments/Activities:

Tutorial 5: Branching and logical expressions:

Lab 5: Problems involving if-then-else structures.

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

WEEK 6

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

Suggested Experiments/Activities:

Tutorial 6: Loops, while and for loops

Lab 6: Iterative problems e.g., the sum of series

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

UNIT III

WEEK 7:

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

Suggested Experiments/Activities:

Tutorial 7: 1 D Arrays: searching.

Lab 7:1D Array manipulation, linear search

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

WEEK 8:

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

Suggested Experiments/Activities:

Tutorial 8: 2 D arrays, sorting and Strings.

Lab 8: Matrix problems, String operations, Bubble sort

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

UNIT IV

WEEK 9:
Objective: Explore pointers to manage a dynamic array of integers, including memory allocation value initialization, resizing changing and reordering the contents of an array and memory de-allocation using malloc (), calloc (), realloc () and free () functions. Gain experience processing command-line arguments received by C

Suggested Experiments/Activities:
Tutorial 9: Pointers, structures and dynamic memory allocation
Lab 9: Pointers and structures, memory dereference.

i) Write a C program to find the sum of a 1D array using malloc ()
ii) Write a C program to find the total, average of n students using structures
iii) Enter n students data using calloc() and display failed students list
iv) Read student name and marks from the command line and display the student details along with the total.
v) Write a C program to implement realloc()

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

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

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

UNIT V

WEEK 11:
Objective: Explore the Functions, sub-routines, scope and extent of variables, doing some experiments by parameter passing using call by value. Basic methods of numerical integration

Suggested Experiments/Activities:
Tutorial 11: Functions, call by value, scope and extent,
Lab 11: Simple functions using call by value, solving differential equations using Eulers theorem.

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

WEEK 12:

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

Suggested Experiments/Activities:

Tutorial 12: Recursion, the structure of recursive calls

Lab 12: Recursive functions

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

WEEK 13:

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

Suggested Experiments/Activities:

Tutorial 13: Call by reference, dangling pointers

Lab 13: Simple functions using Call by reference, Dangling pointers.

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

WEEK14:

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

Suggested Experiments/Activities:

Tutorial 14: File handling

Lab 14: File operations

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

Textbooks:

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

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice-Hall of India

C Programming, A Problem-Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE

I Year – I Semester		L	T	P	C
Course Code : (1000231111)	**COMMUNICATIVE ENGLISH LAB (Common to All Branches of Engineering)**	**0**	**0**	**2**	**1**

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. (That can be for theory paper) is to train the students in oral communication skills in real situations. Students will get trained in the basic communication skills and also make them ready to face job interviews. They will be helped to overcome the mother tongue/local language influence and neutralize their accent which makes their speech more intelligible to all listeners.

Course Outcomes:

By the end of the course, the students will be having

- Understand the different aspects of the English language oral communication with emphasis on Listening and Speaking Skills.
- Apply communication skills through various language learning activities.
- Analyze the English speech sounds, stress, rhythm and intonation for better listening and speaking comprehension.
- Evaluate and exhibit professionalism in participating in debates and group discussions with polite turn taking strategies and sound more professional while communicating with others.
- Create effective resonate and prepare them to face interviews communicate appropriately in corporate settings.

List of Topics:

1. Vowels & Consonants (Not rules but use of them in various syllable structures)
2. Neutralization/Accent Rules (No rules again, required more practice)
3. Communication Skills & JAM
4. Role Play or Conversational Practice
5. Resume Writing
6. Group Discussions-Methods & Practice
7. Debates- Methods & Practice
8. PPT Presentations/ Poster Presentation
9. Interviews Skills

Suggested Software:

- Walden InfoTech
- Young India Films

Reference Books:

1. Meenakshi Raman, Sangeeta-Sharma. Technical Communication. Oxford Press.2018. (This can be for theory and not for lab)
2. Samson T: Innovate with English, Foundations
3. Grant Taylor: English Conversation Practice, Tata McGraw-Hill Education India, 2016.
4. Jaya shree, M Let's Hear them speak: Developing Listening-Speaking skills in English. Sage Publications.
5. Hewing's, Martin. Cambridge Academic English (B2). CUP, 2012. (T h a t is for reading and writing and can be used in theory classes but not in Lab)
6. T.Bala Subramanyam, A Textbook of English Phonetics for Indian Students,(3rd Ed) Trinity Press. (This is all theory and can be for MA English students but not for B.Tech students)

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
12. https://www.linguahouse.com/en-GB
13. https://www.ted.com/watch/ted-ed

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/UCNfm92h83W2i2ijc5XwpIA

I Year – I Semester	HEALTH AND WELLNESS, YOGA AND SPORTS (Common to All branches of Engineering)	L	T	P	C
Course Code (1000231121)		0	0	1	0.5

Course Objectives:

The main objective of introducing this course is to make the students maintain their mental andphysical 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 cardiorespiratory fitness, treadmill, run test, 9 min walk, skipping and running.

Reference Books:

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

I Year II Semester

SYLLABUS

I Year – II Semester	DATA STRUCTURES (Common to CSE, IT & allied branches)	L	T	P	C
Course Code (1005231201**)**		**3**	**0**	**0**	**3**

Course Objectives:

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

UNIT I

Introduction to Linear Data Structures: Definition and importance of linear data structures, Abstract data types (ADTs) and their implementation, Overview of time andspace complexity analysis for linear data structures. **Searching Techniques**: Linear &Binary Search, **Sorting Techniques**: Bubble sort, Selection sort, Insertion Sort

UNIT II

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

UNIT III

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

UNIT IV

Queues: Introduction to queues: properties and operations, implementing queues using arrays and linked lists, Applications of queues in breadth-first search, scheduling, etc. Deques: Introduction to deques (double-ended queues), Operations on deques and their applications.

UNIT V

Trees: Introduction to Trees, Binary Search Tree – Insertion, Deletion & Traversals
Hashing: Brief introduction to hashing and hash functions, Collision resolution techniques: chaining and open addressing, Hash tables: basic implementation and operations, Applications of hashing in unique identifier generation, caching, etc.

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

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

Textbooks:

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

Reference Books:

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

I Year – II Semester	ENGINEERING GRAPHICS (Common to All branches of Engineering)	L	T	P	C
Course Code (1003231101)		1	0	4	3

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 infront, 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.

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 shapeof section, Sections of solids in simple position only.

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

UNIT V

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

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

Textbook:

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

Reference Books:

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

I Year – II Semesters	Chemistry (Common to EEE, ECE, CSE, IT & allied branches)	L	T	P	C
Course Code (1000231103)		3	0	0	3

Course objectives:

- To familiarize engineering chemistry and its applications
- To train the students on the principles and applications of electrochemistry and polymers
- 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 Ψ and Ψ2, particle in one dimensional box, molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules – energy level diagrams of O2 and CO, etc. π-molecular orbitals of butadiene and benzene, calculation of bond order.

UNIT- II

Modern Engineering materials
Semiconductors – Introduction, basic concept, application Super Conductors-Introduction basic concept, applications. Supercapacitors: Introduction, Basic Concept-Classification – Applications. Nano materials: Introduction, classification, properties and applications of Fullerenes, carbon Nanotubes and graphene's nanoparticles.

UNIT- III

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

UNIT- IV

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, Instrumentationand 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, OxfordUniversity 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 – II Semester		L	T	P	C
Course Code (1001231101**)**	**BASIC CIVIL & MECHANICAL ENGINEERING (Common to CE, ME, IT, CSE, CSE(DS), CSE(CS), CSE(AI)**	**3**	**0**	**0**	**3**

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, anglesand levels through surveying.

CO3: Realize the importance of Transportation in nation ' seconomy and the engineeringmeasures 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 knowledgeon prefabricated technology.

UNITI

Basics of Civil Engineering: Role of Civil Engineers in Society- Various Disciplines of CivilEngineering-Structural Engineering-Geo- technical Engineering-Transportation Engineering Hydraulics and Water Resources Engineering - Environmental Engineering-Scope of eachdiscipline-Building Construction and Planning – Construction Materials - Cement – Aggregate–Bricks – Cement concrete- Steel. Introduction to Prefabricated construction Techniques.

UNITII

Surveying: Objectives of Surveying - Horizontal Measurements – Angular Measurements- Introduction to Bearings leveling instruments used for level ling-Simple problem son levelingand bearings-Contour mapping.

UNITIII

Transportation Engineering Importance of Transportation in Nation's economic development- Types of Highway Pavements- Flexible Pavements and Rigid Pavements-SimpleDifferences. Basics of Harbour , Tunnel, Airport, and Railway Engineering

Water Resources and Environmental Engineering: Introduction, Sources of water-Quality ofwater- Specifications- Introduction to Hydrology– Rain water 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, KhannaPublishers, Delhi 2023. 38th Edition.
4. Highway Engineering, S. K. Khanna, C.E.G. Justo and Veera raghavan, Nem chand and Brothers Publications 2019. 10th Edition.
5. Indian Standard DRINKING WATER — SPECIFICATION IS 10500 -2012.

PARTB: 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.

UNITI

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

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

UNITII

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

Thermal Engineering–working principle of Boilers, Ottocycle, 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 them applications.

Introduction to Robotics- Joints & links, configurations, and application so frobotics.

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

I Year – II Semester	DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS (Common to All Branches of Engineering)	L	T	P	C
Course Code: (1000231201)		**3**	**0**	**0**	**3**

Course Objectives:

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

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

- Solve the differential equations related to various engineering fields.
- Identify solution methods for partial differential equations that model physical processes.
- Interpret the physical meaning of different operators such as gradient, curl and divergence.
- Estimate the work done against a field, circulation and flux using vector calculus.

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 Higher order Linear differential equations with Constant Coefficients

Definitions, homogenous and non-homogenous, complimentary function – particular integral ($Q(x) = e^{ax}, \sin ax, \cos ax, x^m$), general solution, method of variation of parameters. Simultaneous linear equations.

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. Second order Homogeneous Linear Partial differential equations with constant coefficients.

UNIT IV Vector differentiation

Scalar and vector point functions, del operator, Gradient – unit normal vector, angle between surfaces, directional derivative, Divergence - Solenoidal vector and Curl– irrotational., scalar potential.

UNIT V Vector integration

Lineintegral – circulation – work done, - flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), Divergence theorem (without proof) and problems on above theorems.

Text books:

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

Reference Books:

1. Dennis G.Zilland Warren S.Wright, Advanced Engineering Mathematics, Jones and Bartlett,2018.
2. Michael 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

I Year – II Semesters	Chemistry Laboratory (Common to EEE, ECE, CSE, IT & allied branches)	L	T	P	C
Course Code (1000231112)		0	0	2	1

Course Objectives:

- Verify the fundamental concepts with experiments.

Course Outcomes: At the end of the course, the students will be able toCO1: 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 – II Semester	DATA STRCTURES LAB (Common to CSE, IT & allied branches of Engineering)	L	T	P	C
Course Code (1005231210**)**		**0**	**0**	**3**	**1.5**

Course Objectives:

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

List of Experiments:

Exercise 1: Array Manipulation

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

Exercise 2: Linked List Implementation

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

Exercise 3: Linked List Applications

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

Exercise 4: Double Linked List Implementation

i) Implement a doubly linked list and perform various operations to understandits properties and applications.

ii)Implement a circular linked list and perform insertion, deletion, and traversal.

Exercise 5: Stack Operations

i) Implement a stack using arrays and linked lists.
ii)Write a program to evaluate a postfix expression using a stack.
iii) Implement a program to check for balanced parentheses using a stack.

Exercise 6: Queue Operations

i) Implement a queue using arrays and linked lists.

ii) Develop a program to simulate a simple printer queue system.

iii) Solve problems involving circular queues.

Exercise 7: Stack and Queue Applications

i) Use a stack to evaluate an infix expression and convert it to postfix.

ii) Create a program to determine whether a given string is a palindrome or not.

iii) Implement a stack or queue to perform comparison and check for symmetry

Exercise 8: Binary Search Tree

i) Implementing a BST using Linked List.

ii) Traversing of BST.

Exercise 9: Hashing

i) Implement a hash table with collision resolution techniques.

ii) Write a program to implement a simple cache using hashing.

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

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

Textbooks:

1. Data Structures and algorithm analysis in C, Mark Allen Weiss, Pearson, 2nd Edition.
2. Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, SiliconPress, 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,andClifford Stein
5. Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, andGraphAlgorithms by Robert Sedgewick.

I Year – II Semester		L	T	P	C
Course Code : (1005231110)	**IT WORKSHOP** (Common to All branches of Engineering)	**0**	**0**	**2**	**1**

Course Objectives:

To introduce the internal parts of a computer, peripherals, I/O ports, connecting cables

- To demonstrate configuring the system as Dual boot both Windows and other Operating Systems Viz. Linux, BOSS
- To teach basic command line interface commands on Linux.
- To teach the usage of Internet for productivity and self-paced life-long learning
- To introduce Compression, Multimedia and Antivirus tools and Office Tools such as Word processors, Spread sheets and Presentation tools.

Course Outcomes:

CO1: 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. Drawthe 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. Labinstructors should verify the work and follow it up with a Viva. Also, students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

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

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

Task 5: Every student should install BOSS on the computer. The system should be 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 areno internet connectivity preparations need to be made by the instructors to simulate the WWWon 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 customizetheir browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

La TeX 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 – Chat GPT

Task 1: Prompt Engineering: Experiment with different types of prompts to see how the modelresponds. 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 Dreamtech,2013, 3rd edition
4. Introduction to Information Technology, ITL Education Solutions limited,PearsonEducation, 2012, 2nd 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 andKenQuamme. – CISCO Press, Pearson Education, 3rd edition
8. IT Essentials PC Hardware and Software Labs and Study Guide, Patrick Regan–CISCOPress, Pearson Education, 3rd edition

I Year – II Semester		L	T	P	C
Course Code : (1003231110)	**ENGINEERING WORKSHOP** (Common to All branches ofEngineering)	**0**	**0**	**3**	**1.5**

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 wood working and make following joints.
   a) Half – Lap joint b) Mortise and Tenon joint c) Corner Dovetail joint or Bridle joint
3. **Sheet Metal Working**: Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets.
   a) Tapered tray b) Conical funnel c) Elbow pipe d) Brazing
4. **Fitting:** Familiarity with different types of tools used in fitting and do the following fitting exercises.
   a) V-fit b) Dovetail fit c) Semi-circular fit d) Bicycle tire puncture and change of two-wheeler tire
5. **Electrical Wiring**: Familiarity with different types of basic electrical circuits and makethe following connections.
   a) Parallel and series b) Two-way switch c) Go down 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. Raghu wanshi, 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.
   Wiring Estimating, Costing and Contracting; Soni P.M. & UpadhyayP.A.; Atul Prakashan,2021-22.

I Year – II Semester	NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE (Common to All branches of Engineering)	L	T	P	C
Course Code : (1000231120)		0	0	1	0.5

Course Objectives:

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

Course Outcomes: After completion of the course the students will be ableto

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

UNIT II

Nature & Care

Activities:

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

UNIT III
Community Service
Activities:

i) Conducting One Day Special Camp in a village contacting village-area leaders- Surveyin the village, identification of problems- helping them to solve via media-authorities- experts-etc.

ii) Conducting awareness programs on Health-related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS,
iii) Conducting consumer Awareness. Explaining various legal provisions etc.
iv) Women Empowerment Programmes- Sexual Abuse, Adolescent Health and Population Education.
v) Any other programmes in collaboration with local charities, NGOs etc.

Reference Books:

1. Nirmalya Kumar Sinha & Surajit Majumder, *A Text Book of National Service Scheme* Vol;.I, Vidya Kutir Publication, 2021 (ISBN 978-81-952368-8-6)
2. *Red Book - National Cadet Corps* – Standing Instructions Vol I & II, 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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Department of Electronics and Computer Engineering

COURSE STRUCTURE

(Applicable from the academic year 2023-24 onwards)

B.Tech. – II Year I Semester

S. No	Course codes	Category	Title	L	T	P	Credits
1	1000232105	BS	Probability & Statistics	3	0	0	3
2	1099232101	HSMC	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
3	1004232103	ES	Digital Circuits Design	3	0	0	3
4	1019232101	PCC	Electronic Devices and Basic Circuits	3	0	0	3
5	1005232103	PCC	Object Oriented Programming Through JAVA	3	0	0	3
6	1019232110	PCC	Electronic Devices and Basic Circuits Lab	0	0	3	1.5
7	1019232111	PCC	Object Oriented Programming Through JAVA & Digital Circuits Design Lab	0	0	3	1.5
8	1019232180	SEC	Python Programming	0	1	2	2
9	1001232125	Audit Course	Environmental Science	2	0	0	-
			Total	**16**	**02**	**08**	**20**

PROBABILITY & STATISTICS

(Common to CSE, CSE (AI &ML), CSE (IoT), CSE (AI), AI &ML, CS, IT)

Course Outcomes:

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

- Acquire knowledge in finding the analysis of the data quantitatively or categorically and various statistical elementary tools
- Develop skills in designing mathematical models involving probability, random variables and the critical thinking in the theory of probability and its applications in real life problems.
- Apply the theoretical probability distributions like binomial, Poisson, and Normal in the relevant application areas.
- Analyze to test various hypotheses included in theory and types of errors for large samples.
- Apply the different testing tools like t-test, F-test, chi-square test to analyze the relevant real-life problems.

UNIT I:

Descriptive statistics and methods for data science:

Data science – Statistics Introduction – Population vs Sample – Collection of data – primary and secondary data – Type of variable: dependent and independent Categorical and Continuous variables– Data visualization – Measures of Central tendency – Measures of Variability (spread or variance) –Skewness Kurtosis.

UNIT II:

Probability and Distributions:

Probability – Conditional probability and Baye's theorem – Random variables – Discrete and Continuous random variables – Distribution function – Mathematical Expectation and Variance –Binomial, Poisson, Uniform and Normal distributions.

UNIT III:

Sampling Theory:

Introduction – Population and samples – Sampling distribution of Means and Variance (definition only) – Central limit theorem (without proof) – Introduction to t, chi-square and F-distributions – Point and Interval estimations –Standard error and Maximum error of estimate.

UNIT IV:

Tests of Hypothesis:

Introduction – Hypothesis – Null and Alternative Hypothesis – Type I and Type II errors – Level of significance- Confidence limits -Test of significance for large samples-single and two means – single and two proportions- Student's t- distribution- significance test of a sample mean – significance test of difference between sample means, F-test, chi-square test and test of goodness of fit.

UNIT V:

Regression analysis:

Method of least squares – Straight line – Parabola – Exponential – Power curves. Regression -Regression coefficients and properties – Curvilinear Regression, Multiple Regression - Correlation –Correlation coefficient – Rank correlation

Textbooks:

1. Miller and Freunds, Probability and Statistics for Engineers,7/e, Pearson, 2008.
2. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.

Reference Books:

1. Shron L. Myers, Keying Ye, Ronald E Walpole, Probability and Statistics Engineers and the Scientists,8th Edition, Pearson 2007.
2. S. Ross, a First Course in Probability, Pearson Education India, 2002.
3. W. Feller, an Introduction to Probability Theory and its Applications, 1/e, Wiley, 1968.
1. https://onlinecourses.nptel.ac.in/noc21_ma74/preview
2. https://onlinecourses.nptel.ac.in/noc22_mg31/preview

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UNIVERSAL HUMAN VALUES – UNDERSTANDING HARMONY AND ETHICAL HUMAN CONDUCT

Course Objectives:

- To help the students appreciate the essential complementary between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- To facilitate the development of a Holistic perspective among students towards life andprofession as well as towards happiness and prosperity based on a correct understandingof the Human reality and the rest of existence. Such holistic perspective forms the basisof Universal Human Values and movement towards value-based living in a natural way.
- To highlight plausible implications of such a Holistic understanding in terms of ethicalhuman 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 reallife (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 proposedduring 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 thestudents 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 andthe 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: Practice

Session PS3 Exploring Natural Acceptance

UNIT II

Harmony in the Human Being (6 lectures and 3 tutorials for practice session)

Lecture 7: Understanding Human being as the Co-existence of the self and the body.

Lecture 8: Distinguishing between the Needs of the self and the body

Tutorial 4: Practice Session PS4 Exploring the difference of Needs of self and body.

Lecture 9: The body as an Instrument of the self

Lecture 10: Understanding Harmony in the self

Tutorial 5: Practice Session PS5 Exploring Sources of Imagination in the self

Lecture 11: Harmony of the self with the body

Lecture 12: Programme to ensure self-regulation and Health

Tutorial 6: Practice Session PS6 Exploring Harmony of self with the body

UNIT III

Harmony in the Family and Society (6 lectures and 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 Session PS7 Exploring the Feeling of Trust

Lecture 15: 'Respect' – as the Right Evaluation

Tutorial 8: Practice Session PS8 Exploring the Feeling of Respect

Lecture 16: Other Feelings, Justice in Human-to-Human Relationship

Lecture 17: Understanding Harmony in the Society

Lecture 18: Vision for the Universal Human Order

Tutorial 9: Practice Session PS9 Exploring Systems to fulfil 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: Interconnectedness, self-regulation and Mutual Fulfilment 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

Tutorial 11: Practice Session PS11 Exploring Co-existence in Existence.

UNIT V

Implications of the Holistic Understanding – a Look at Professional Ethics (6 lectures and3 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 HumanOrder

Lecture 26: Competence in Professional Ethics

Tutorial 13: Practice Session PS13 Exploring Humanistic 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 bodyPS5

Exploring Sources of Imagination in the self

PS6 Exploring Harmony of self with the body

Practice Sessions for

UNIT III – Harmony in the Family and Society

PS7 Exploring the Feeling of Trust PS8

Exploring the Feeling of Respect

PS9 Exploring Systems to fulfil Human Goal

Practice Sessions for

UNIT IV – Harmony in the Nature (Existence)

PS10 Exploring the Four Orders of Nature

PS11 Exploring Co-existence in Existence

Practice Sessions for

UNIT V – Implications of the Holistic Understanding – a Look atProfessional Ethics

PS12 Exploring Ethical Human Conduct

PS13 Exploring Humanistic Models in Education

PS14 Exploring Steps of Transition towards Universal Human Order

Readings:

Textbook and Teachers Manual

a. The Textbook R R Gaur, R Asthana, G P Bagaria *A Foundation Course in Human Values and Professional Ethics*, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1

b. The Teacher's Manual R R Gaur, R Asthana, G P Bagaria, *Teachers' Manual for A Foundation Course in Human Values and Professional Ethics,* 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

Reference Books

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj – Pandit Sunderlal
9. Rediscovering India - by Dharampal
10. Hind Swaraj or 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. Dependingon the nature of topics, worksheets, home assignment and/or activity are included. The practicesessions (tutorials) would also provide support to a student in performing actions commensurate to his/her beliefs. It is intended that this would lead to development of commitment, namely behaving and working based on basic human values.

It is recommended that this content be placed before the student as it is, in the form of a basic foundation course, without including anything else or excluding any part of this content. Additional content may be offered in separate, higher courses. This course is to be taught by faculty from every teaching department, not exclusively by any one department.

Teacher preparation with a minimum exposure to at least one 8-day Faculty Development Program on Universal Human Values is deemed essential.

Online Resources:

1. https://fdp-si.aicte-india.org/UHV- II %20 Class %20 Notes %20 & %20 Handouts /UHV %20 Handout %20 1- Introduction %20 to %20 Value %20 Education.pdf
2. https://fdp-si.aicte-india.org/UHV- II %20 Class %20 Notes %20 & %20 Handouts / UHV %20 Handout %202- Harmony %20 in %20 the %20 Human %20 Being.pdf
3. https://fdp-si.aicte-india.org/UHV- II %20 Class %20 Notes %20 & %20 Handouts / UHV %20 Handout %203- Harmony %20 in %20 the %20 Family.pdf
4. https://fdp-si.aicte-india.org/UHV %201 %20 Teaching %20 Material / D3- S2 %20 Respect %20 July %2023.pdf
5. https://fdp-si.aicte-india.org/UHV- II %20 Class %20 Notes %20 & %20 Handouts / UHV %20 Handout %205-Harmony %20 in %20 the %20 Nature %20 and %20 Existence.pdf
6. https://fdp-si.aicte-india.org/download/FDP Teaching Material / 3-days %20 FDP- SI %20 UHV %20 Teaching %20 Material / Day %203 %20 Handouts / UHV %203D %20 D3-S2 A %20 U and %20 Nature-Existence.pdf
7. https://fdp-si.aicte- india.org /UHV %20 II %20 Teaching %20 Material / UHV %20 II %20 Lecture %2023-25 %20 Ethics %20 v1.pdf
8. https://www.studocu.com/in/document/kiet-group-of-institutions/universal-human-values/chapter-5-holistic-understanding-of-harmony-on-professional-ethics/62490385
9. https://onlinecourses.swayam2.ac.in/aic22_ge23/preview

DIGITAL CIRCUITS DESIGN

Course Objectives:

- Understand the properties of Boolean algebra, logic operations, and minimization ofBoolean functions.
- Analyze the design concepts of combinational circuits
- Analyze the concepts of sequential logic circuits.
- Understand the concepts of FSM and compare various Programmable logic devices.
- Apply Verilog HDL on implementing Combinational and Sequential circuits.

UNIT-I

Boolean algebra, logic operations, and minimization of Boolean functions

Number Systems and Codes, Representation of unsigned and signed integers, Floating Point representation of real numbers, Laws of Boolean Algebra, Theorems of Boolean Algebra, Realization of functions using logic gates, Canonical forms of Boolean Functions, Minimization of Functions using Karnaugh Maps, QM algorithm.

UNIT-II

Combinational Logic Circuits

Combinational circuits, Design with basic logic gates, design procedure, adders, subtractors, 4-bit binary adder/ subtractor circuit, BCD adder, carry look- a-head adder, magnitude comparator, multiplexers, demultiplexers, decoders, encoders and priority encoders.

UNIT-III

Sequential Logic Circuits

Basic architectural distinction between combinational and sequential circuits, Design procedure, latches, flip-flops, truth tables and excitation tables, timing and triggering consideration,

conversion of flip- flops, registers, shift registers, universal shift register, design of synchronous and asynchronous counters, ring counter, Johnson counter.

UNIT-IV

Finite State Machines and Programmable Logic Devices

Types of FSM, capabilities and limitations of FSM, state assignment, realization of FSM usingflip-flops, Mealy to Moore conversion and vice-versa, reduction of state tables using partitiontechnique, Design of sequence detector, Introduction to logic families, Types of PLD's: PROM,PAL, PLA, basic structure of CPLD and FPGA, advantages of FPGAs.

UNIT-V

Hardware Description Language

Introduction to Verilog- gate level, behavioral level and structural level modeling of logic circuits, specification of logic circuits, hierarchical Verilog Code, Verilog for combinational

circuits - conditional operator, if-else statement, case statement, for loop, Verilog Operators, using Verilog constructs for storage elements, Blocking and Non-blocking Assignments, flip-flop with clear capability, Using Verilog Constructs for Registers and Counters.

Text Books:

1. M. Morris Mano, "Digital Design", 3rd Edition, PHI. (Unit I to IV)
2. Stephen Brown and Zvonko Vranesic, "Fundamentals of Digital Logic with VerilogDesign", 3rd Edition, McGraw-Hill (Unit V)

Reference Books:

1. Charles H. Roth, Jr, "Fundamentals of Logic Design", 4th Edition, Jaico Publishers.
2. Zvi Kohavi and Niraj K. Jha, "Switching and Finite Automata Theory, 3rd Edition,Cambridge University Press, 2010.
3. Samir Palnitkar, "Verilog HDL: A Guide to Digital Design and Synthesis", 2nd Edition,Prentice Hall PTR.
4. D.P. Leach, A.P. Malvino, "Digital Principles and Applications", TMH, 7th Edition.

Course Outcomes:

After completing the course, the student should be able to

- Understand the properties of Boolean algebra, logic operations, and minimization of the Boolean functions (L2)
- Analyze combinational circuits (L3)
- Analyze sequential circuits (L4)
- Analyze the concepts of finite state machines and Compare various Programmable logic devices. (L4)
- Design and Model combinational and sequential circuits using HDLs. (L5, L6)

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ELECTRONIC DEVICES & BASIC CIRCUITS

Course Objectives:

- The students can understand the basic principles and characteristics of semiconductor devices like Diode, BJT, JFET and MOSFET.
- The students can able to analyze diode & transistor circuits, various biasing methods,equivalent circuits of transistor amplifiers and their comparison.
- The students can able to study and analyze various applications such as rectifiers, filters,transistor amplifiers with necessary equivalent circuits.

UNIT-I:

P-N Junction Diode Characteristics

Qualitative theory of the p-n junction, open circuited p-n Junction, the p-n junction as a Diode,Diode act as a Rectifier, V-I characteristics and its temperature dependence, the current components in a p-n Diode, Diode Resistance and Diode Capacitance**,** piece-wise linear model**,** Diode current equation, Quantitative analysis of Half-wave and Full-wave Rectifiers with andwithout filters, Breakdown mechanisms, Zener diode, Zener diode as a voltage Regulator, LED, LCD, photo diode, solar cell.

UNIT-II:

Bipolar Junction Transistor (BJT) Characteristics

The junction transistor-construction, symbols and operation, transistor current components, transistor current equation, transistor configurations, characteristics of CB, CE and CC configurations and their comparison, the early effect, punch through/reach through, transistor as an amplifier, Ebers-Moll model of a transistor, large signal, dc and small signal CE values of current gain, analytical expressions for transistor characteristics, typical transistor-junction voltages, transistor as a switch, transistor switching times, maximum voltage rating, photo transistor.

UNIT-III:

Field Effect Transistor (FET) Characteristics

The Junction Field-effect Transistor (JFET)-types, construction and operation, the pinch-off voltage, JFET characteristics, JFET parameters, JFET equivalent circuits, JFET applications, comparison between BJT and JFET, Metal-oxide-Semiconductor FET (MOSFET)- types, Construction, operation and characteristics, comparison between JFET and MOSFET.

UNIT-IV:

Transistor Biasing and Thermal Stabilization

Need for biasing, the operating point, load line analysis, BJT biasing- methods, fixed bias, collector to base bias, self-bias, bias stability, stabilization against variations in V_{BE}, I_C, and β,stability factors, (S, S', S''), bias compensation, thermal runaway, thermal stability, Biasing of FETs.

UNIT-V:

Small Signal Transistor Amplifier Circuits

Introduction to two-port network, transistor hybrid model, determination of h- parameters, conversion of h-parameters, generalized analysis of transistor amplifier using h- parameters (exact analysis & approximate analysis).

Low Frequency BJT & FET Amplifier Circuits: Analysis of CB, CE and CC amplifiers using h-parameter model, comparison of BJT transistor amplifiers, FET small signal model, analysisof CG, CS and CD amplifiers, comparison of FET amplifiers.

Text Books:

1. Integrated Electronics – Jacob Millman, C. Halkias, C.D. Parikh, Tata Mc-Graw HillEducation (India) Private Limited, Second Edition, 2011.

2. Electronic Devices and Circuits- J. Millman, C. Halkias, Mc-Graw Hill Education(India) Private Limited, Fourth Edition, 2015.

References:

1. Electronic Devices and Circuits- S Salivahanan, N Suresh Kumar, Tata Mc-Graw Hill,Third Edition, 2012.

2. Electronic Devices and Circuit Theory-R.L. Boylestad and Louis Nashelsky, Pearson Publications, Tenth Edition.

Course Outcomes:

After the completion of the course students could be able to

- Understand the principle of operation and characteristics of semiconductor devices ofDiode, BJT, JFET and MOSFET.

- Analyze the diode & transistor circuits with respect to various biasing methods andequivalent circuits and their performance comparison.

- Analyze various applications of electronic circuits like rectifiers, rectifiers with filters,transistor amplifiers with relevant equivalent circuits.

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OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Course Objectives:
The learning objectives of this course are to:

- Identify Java language components and how they work together in applications
- Learn the fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries.
- Learn how to extend Java classes with inheritance and dynamic binding and how to use exception handling in Java applications
- Understand how to design applications with threads in Java
- Understand how to use Java APIs for program development

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

1. Analyse problems, design solutions using OOP principles, and implement them efficiently in Java. (L4)
2. Design and implement classes to model real-world entities, with a focus on attributes, behaviours, and relationships between objects (L4)
3. Demonstrate an understanding of inheritance hierarchies and polymorphic behaviour, including method overriding and dynamic method dispatch. (L3)
4. Apply Competence in handling exceptions and errors to write robust and fault-tolerant code. (L3)
5. Perform file input/output operations, including reading from and writing to files using Java I/O classes, graphical user interface (GUI) programming using JavaFX. (L3)

UNIT I

Object Oriented Programming: Basic concepts, Principles, Program Structure in Java: Introduction, Writing Simple Java Programs, Elements or Tokens in Java Programs, Java Statements, Command Line Arguments, User Input to Programs, Escape Sequences Comments, Programming Style.

Data Types, Variables, and Operators: Introduction, Data Types in Java, Declaration of Variables, Data Types, Type Casting, Scope of Variable Identifier, Literal Constants, Symbolic Constants, Formatted Output with printf() Method, Static Variables and Methods, Attribute Final,

Introduction to Operators, Precedence and Associativity of Operators, Assignment Operator (=), Basic Arithmetic Operators, Increment (++) and Decrement (--) Operators, Ternary Operator, Relational Operators, Boolean Logical Operators, Bitwise Logical Operators.

Control Statements: Introduction, if Expression, Nested if Expressions, if–else Expressions, Ternary Operator? Switch Statement, Iteration Statements, while Expression, do–while Loop, for Loop, Nested for Loop, for–Each for Loop, Break Statement, Continue Statement.

UNIT II

Classes and Objects: Introduction, Class Declaration and Modifiers, Class Members, Declaration of Class Objects, Assigning One Object to Another, Access Control for Class Members, Accessing Private Members of Class, Constructor Methods for Class, Overloaded
Constructor Methods, Nested Classes, Final Class and Methods, Passing Arguments by Value and by Reference, Keyword this.

Methods: Introduction, Defining Methods, Overloaded Methods, Overloaded Constructor Methods, Class Objects as Parameters in Methods, Access Control, Recursive Methods, Nesting of Methods, Overriding Methods, Attributes Final and Static.

UNIT III

Arrays: Introduction, Declaration and Initialization of Arrays, Storage of Array in Computer Memory, Accessing Elements of Arrays, Operations on Array Elements, Assigning Array to Another Array, Dynamic Change of Array Size, Sorting of Arrays, Search for Values in Arrays, Class Arrays, Two-dimensional Arrays, Arrays of Varying Lengths, Three-dimensional Arrays, Arrays as Vectors.

Inheritance: Introduction, Process of Inheritance, Types of Inheritances, Universal Super Class-Object Class, Inhibiting Inheritance of Class Using Final, Access Control and Inheritance, Multilevel Inheritance, Application of Keyword Super, Constructor Method and Inheritance, Method Overriding, Dynamic Method Dispatch, Abstract Classes, Interfaces and Inheritance.

Interfaces: Introduction, Declaration of Interface, Implementation of Interface, Multiple Interfaces, Nested Interfaces, Inheritance of Interfaces, Default Methods in Interfaces, Static Methods in Interface, Functional Interfaces, Annotations.

UNIT IV

Packages and Java Library: Introduction, Defining Package, Importing Packages and Classes into Programs, Path and Class Path, Access Control, Packages in Java SE, Java.lang Package and its Classes, Class Object, Enumeration, class Math, Wrapper Classes, Auto-boxing and Auto-unboxing, Java util Classes and Interfaces, Formatter Class, Random Class, Time Package, Class Instant (java.time.Instant), Formatting for Date/Time in Java, Temporal Adjusters Class, Temporal Adjusters Class.

Exception Handling: Introduction, Hierarchy of Standard Exception Classes, Keywords throws and throw, try, catch, and finally Blocks, Multiple Catch Clauses, Class Throwable, Unchecked Exceptions, Checked Exceptions.
Java I/O and File: Java I/O API, standard I/O streams, types, Byte streams, Character streams, Scanner class, Files in Java (Text Book 2)

UNIT V

String Handling in Java: Introduction, Interface Char Sequence, Class String, Methods for Extracting Characters from Strings, Comparison, Modifying, Searching; Class String Buffer.

Multithreaded Programming: Introduction, Need for Multiple Threads Multithreaded Programming for Multi-core Processor, Thread Class, Main Thread-Creation of New Threads, Thread States, Thread Priority-Synchronization, Deadlock and Race Situations, Inter-thread Communication - Suspending, Resuming, and Stopping of Threads.

Java FX GUI: Java FX Scene Builder, Java FX App Window Structure, displaying text and image, event handling, laying out nodes in scene graph, mouse events (Text Book 3)

Text Books:

1) JAVA one step ahead, Anitha Seth, B.L. Juneja, Oxford.

2) Joy with JAVA, Fundamentals of Object Oriented Programming, Debasis Samanta, Monalisa Sarma, Cambridge, 2023.

3) JAVA for Programmers, Paul Deitel, Harvey Deitel, 4th Edition, Pearson.

References Books:

1) The complete Reference Java, 11th edition, Herbert Schildt, TMH

2) Introduction to Java programming, 7th Edition, Y Daniel Liang, Pearson

Online Resources:

1) https://nptel.ac.in/courses/106/105/106105191/

2)https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012880464547618816347_shared/overview

ELECTRONIC DEVICES & BASIC CIRCUITS LAB

Course Objectives:

- Verify the theoretical concepts by conduct suitable experiment using necessary hardware.
- Analyze the characteristics of Diodes, Rectifiers, BJT, FET by conduct experiments.
- Design an amplifier circuit using specifications and obtain the performance parameters experimentally.
- Simulate the electronic circuits using EDA tools like PSPICE/Multisim.

PART A: Electronic Workshop Practice

1. Identification, Specifications, Testing of R, L, C Components (Color Codes),Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of active devices like Diode, LED, BJT, FET and MOSFET.
3. Soldering Practice- Simple circuits using active and passive components.
4. Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multimeter, Function Generator, Regulated Power Supply and CRO.

PART B: List of Experiments: (Minimum Twelve Experiments has to be performed)

1. P-N Junction Diode Characteristics

Part A: Germanium Diode (Forward bias& Reverse bias)

Part B: Silicon Diode (Forward Bias only)

2. Zener Diode Characteristics

Part A: V-I Characteristics

Part B: Zener Diode as Voltage Regulator

3. Rectifiers (without and with c-filter)

Part A: Half-wave Rectifier

Part B: Full-wave Rectifier

4. BJT Characteristics (CE Configuration)

Part A: Input Characteristics

Part B: Output Characteristics

5. FET Characteristics (CS Configuration)

Part A: Drain Characteristics

Part B: Transfer Characteristics

6. Transistor Biasing

Part A: Operating Point

Part B: Load line analysis

7. Design and analysis of voltage- divider bias/self-bias circuit using BJT.
8. Design and analysis of self-bias circuit using FET/MOSFET.
9. CRO Operation and its Measurements
10. Determination of h-parameters of a given BJT using hybrid model.
11. Frequency response of BJT-CE Amplifier
12. Frequency response of Emitter Follower-CC Amplifier
13. Frequency response of FET-CS Amplifier
14. Frequency response of FET-CD Amplifier

PART C:

Hardware Required: Regulated Power supplies, Analog/Digital Storage Oscilloscopes, Analog/Digital Function Generators, Digital Multimeters, Decade Résistance Boxes/Rheostats, Decade Capacitance Boxes, Ammeters (Analog or Digital), Voltmeters (Analog or Digital), Active & Passive Electronic Components

Software Required: Software like Multisim/ PSPICE or Equivalent EDA Tool.

Course Outcomes:

After completing the course, the student should be able to

- The theoretical concepts shall be verified by conducting experiment using hardware.
- Analyze the characteristics of Diodes, Rectifiers, BJT, FET by conducting experiments.
- Design an amplifier circuit using specifications and obtain the performance parameters using hardware equipment.
- Simulate the electronic circuits using EDA tools like PSPICE/Multisim or equivalent.

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OBJECT ORIENTED PROGRAMMING THROUGH JAVA & DIGITAL CIRCUITS DESIGN LAB

Part A: Course Objectives:

The aim of this course is to

- Practice object-oriented programming in the Java programming language
- Implement Classes, Objects, Methods, Inheritance, Exception, Runtime Polymorphism, User defined Exception handling mechanism and to Illustrate inheritance, Exception handling mechanism, JDBC connectivity
- Construct Threads, Event Handling, implement packages, Java FX GUI
- Verify the truth tables of various logic circuits.
- Design sequential/combinational circuit using Hardware Description Language and verify their functionality.

Experiments covering the Topics:

- Object Oriented Programming fundamentals- data types, control structures
- Classes, methods, objects, Inheritance, polymorphism,
- Exception handling, Threads, Packages, Interfaces
- Files, I/O streams, JavaFX GUI

Sample Experiments:

Note: Any six experiments are to be done

Exercise – 1:

a) Write a JAVA program to display default value of all primitive data type of JAVA

b) Write a java program that display the roots of a quadratic equation $ax^2+bx=0$. Calculate the discriminate D and basing on value of D, describe the nature of root.

Exercise - 2

a) Write a JAVA program to search for an element in a given list of elements using binary search mechanism.

b) Write a JAVA program to sort for an element in a given list of elements using bubble sort

c) Write a JAVA program using String Buffer to delete, remove character.

Exercise - 3

a) Write a JAVA program to implement class mechanism. Create a class, methods and invoke them inside main method.

b) Write a JAVA program implement method overloading.

c) Write a JAVA program to implement constructor.

d) Write a JAVA program to implement constructor overloading.

Exercise - 4

a) Write a JAVA program to implement Single Inheritance

b) Write a JAVA program to implement multi-level Inheritance

c) Write a JAVA program for abstract class to find areas of different shapes

Exercise - 5

a) Write a JAVA program give example for “super” keyword.

b) Write a JAVA program to implement Interface. What kind of Inheritance can be achieved?

c) Write a JAVA program that implements Runtime polymorphism

Exercise - 6

a) Write a JAVA program that describes exception handling mechanism

b) Write a JAVA program Illustrating Multiple catch clauses

c) Write a JAVA program for creation of Java Built-in Exceptions

d) Write a JAVA program for creation of User Defined Exception

Exercise - 7

a) Write a JAVA program that creates threads by extending Thread class. First thread display "Good Morning "every 1 sec, the second thread displays "Hello "every 2 seconds and the third display "Welcome" every 3 seconds (Repeat the same by implementing Runnable)

b) Write a program illustrating **is Alive** and **join ()**

c) Write a Program illustrating Daemon Threads.

d) Write a JAVA program Producer Consumer Problem

Exercise – 8

- a) Write a JAVA program that import and use the user defined packages
- b) Without writing any code, build a GUI that display text in label and image in an Image View (use JavaFX)
- c) Build a Tip Calculator app using several JavaFX components and learn how to respond to user interactions with the GUI

References Books:

1. P. J. Deitel, H. M. Deitel, "Java for Programmers", Pearson Education, PHI, 4th Edition, 2007.
2. P. Radha Krishna, "Object Oriented Programming through Java", Universities Press, 2nd Edition, 2007
3. Bruce Eckel, "Thinking in Java", Pearson Education, 4th Edition, 2006.
4. Sachin Malhotra, Saurabh Chaudhary, "Programming in Java", Oxford University Press, 5th Edition, 2010.

Online Learning Resources:

https://java-iitd.vlabs.ac.in/
http://peterindia.net/JavaFiles.html

Part B:

List of Experiments:

1. Design a simple combinational circuit with four variables and obtain minimal SOP expression and verify the truth table.

2. Verify the of functionality of 3 to 8-line Decoder

3. 4 variable logic function verification using 8 to1 multiplexer.

4. Design and verify the functionality of full adder circuit, full subtractor.

5. Draw the circuit diagram of a single bit comparator and verify the output.

6. Design and verify the functionality of different flipflops.

7. Design and verify the operation of 4-bit Universal Shift Register for different Modes of operation.

8. Design up counter and down counters.

Note: Any six experiments are to be simulated using Hardware Description Language.

References:

1. M. Morris Mano, "Digital Design", 3rd Edition, PHI

Course Outcomes:

After completing the course, the student should be able to:

1. Demonstrate a solid understanding of Java syntax, including data types, control structures, methods, classes, objects, inheritance, polymorphism, and exception handling. (L2)

2. Apply fundamental OOP principles such as encapsulation, inheritance, polymorphism, and abstraction to solve programming problems effectively. (L3)

3. Develop problem-solving skills and algorithmic thinking, applying OOP concepts to design efficient solutions to various programming challenges. (L3).

4. Design and verify the functionality of various combinational logic circuits using HDL. (L2)

5. Design and verify the functionality of various sequential logic circuits using HDL. (L2)

Python Programming

(Skill Enhancement Course)

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:

After completion of the course, students will be able to

1. Showcase adept command of Python syntax, deftly utilizing variables, data types, control structures, functions, modules, and exception handling to engineer robust and efficient code solutions. (L4)
2. Apply Python programming concepts to solve a variety of computational problems(L3)
3. Understand the principles of object-oriented programming (OOP) in Python, including classes, objects, inheritance, polymorphism, and encapsulation, and apply them to design and implement Python programs (L3)
4. Become proficient in using commonly used Python libraries and frameworks such as JSON, XML, NumPy, pandas (L2)
5. Exhibit competence in implementing and manipulating fundamental data structures such as lists, tuples, sets, dictionaries (L3)

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...elseif…else, Nested if statement, while Loop, for Loop, continue and break Statements, Catching Exceptions Using try and except Statement.

Sample Experiments:

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

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

5. Write a program to add and multiply complex numbers
6. Write a program to print multiplication table of a given number.

UNIT-II:

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

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

Lists: Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In FunctionsUsed on Lists, List Methods, del Statement.

Sample Experiments:

7. Write a program to define a function with multiple return values.
8. Write a program to define a function using default arguments.
9. Write a program to find the length of the string without using any library functions.
10. Write a program to check if the substring is present in a given string or not.
11. Write a program to perform the given operations on a list:
    i. Addition ii. Insertion iii. Slicing
12. 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, Frozenset.

Sample Experiments:

10. Write a program to create tuples (name, age, address, college) for at least two members and concatenate the tuples and print the concatenated tuples.
11. Write a program to count the number of vowels in a string (No control flow allowed).
12. Write a program to check if a given key exists in a dictionary or not.
13. Write a program to add a new key-value pair to an existing dictionary.
14. 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:

15. Write a program to sort words in a file and put them in another file. The output filesshould have only lower-case words, so any upper-case words from source must be lowered.
16. Python program to print each line of a file in reverse order.
17. Python program to compute the number of characters, words and lines in a file.
18. Write a program to create, display, append, insert and reverse the order of the items inthe array.
19. Write a program to add, transpose and multiply two matrices.
20. 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, NumPywith Python, Pandas.

Sample Experiments:

21. Python program to check whether a JSON string contains complex object or not.
22. Python Program to demonstrate NumPy arrays creation using array () function.
23. Python program to demonstrate use of ndim, shape, size, dtype.
24. Python program to demonstrate basic slicing, integer and Boolean indexing.
25. Python program to find min, max, sum, cumulative sum of array
26. Create a dictionary with at least five keys and each key represent value as a list where this list contains at least ten values and convert this dictionary as a pandas data frame and explore the data through the data frame as follows:

Apply head () function to the pandas data frame

a) Perform various data selection operations on Data Frame

27. Select any two columns from the above data frame, and observe the change in oneattribute with respect to other attribute with scatter and plot operations in matplotlib

Reference Books:

1. Gowri shankar S, Veena A., Introduction to Python Programming, CRC Press.
2. Python Programming, S Sridhar, J Indumathi, V M Hariharan, 2nd Edition, Pearson,2024
3. Introduction to Programming Using Python, Y. Daniel Liang, Pearson.

Online Learning Resources/Virtual Labs:

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

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ENVIRONMENTAL SCIENCE

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.

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 – Waterresources – 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. Grassland 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 – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of 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. – Environment Protection Act. –Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

UNIT V

Human Population and the Environment: Population growth, variation among nations. Population explosion – Family Welfare Programmes – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

Field Work: Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc.

Textbooks:

1. Textbook of Environmental Studies for Undergraduate Courses Erach Bharucha forUniversity Grants Commission, Universities Press.
2. Palani swamy, “Environmental Studies”, Pearson education
3. S. Azeem Unnisa, “Environmental Studies” Academic Publishing Company
4. K. Raghavan Nambiar, “Text book of Environmental Studies for Undergraduate Coursesas per UGC model syllabus”, Scitech Publications (India), Pvt. Ltd.

References:

1. Deeksha Dave and E. Sai Baba Reddy, “Textbook of Environmental Science”, Cengage Publications.
2. M. Anji Reddy, “Text book of Environmental Sciences and Technology”, BSPublication.
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, “A Text Book of Environmental Studies” Himalaya Publishing House
6. Gilbert M. Masters and Wendell P. Ela, “Introduction to Environmental Engineeringand Science, Prentice Hall of India Private limited.

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Department of Electronics and Computer Engineering

COURSE STRUCTURE
(Applicable from the academic year 2023-24 onwards)

B.Tech. – II Year II Semester

S. No	Course codes	Category	Title	L	T	P	Credits
1	1099232201	HSMC	Managerial Economics and Financial Analysis	2	0	0	2
2	1004232101	ES	Signals and Systems	3	0	0	3
3	1004232203	PCC	Analog Circuits Design	3	0	0	3
4	1054232101	PCC	Database Management Systems	3	0	0	3
5	1004232204	PCC	Analog and Digital Communications	3	0	0	3
6	1004232210	PCC	Analog Circuits Design Lab	0	0	3	1.5
7	1005232211	PCC	Database Management Systems Lab	0	0	3	1.5
8	1005232180	SEC	Full Stack Development –I	0	1	2	2
9	1003232104	ES	Design Thinking and Innovation	1	0	2	2
			Total	**15**	**01**	**10**	**21**

II Year – IISemester	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	L	T	P	C
Course Code: 1099232201		2	0	0	2

Course Objectives:

- To inculcate the basic knowledge of microeconomics and financial accounting
- To make the students learn how demand is estimated for different products, input-outputrelationship 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 learnhow to plan long-term investment decisions.
- To provide fundamental skills on accounting and to explain the process of preparing financial statements.

Course Outcomes:

At the end of the course, the student will have the ability to:		Bloom's Taxonomy Level
CO1	Define the concepts related to Managerial Economics, financial accounting and management.	L2
CO2	Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets.	L2
CO3	Apply the Concept of Production cost and revenues for effective Business decision.	L3
CO4	Analyze how to invest their capital and maximize returns.	L4
CO5	Evaluate the capital budgeting techniques and Develop the accounting statements and evaluate the financial performance of business entity.	L5

UNIT - I

Managerial Economics **8 Hours**

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 **10 Hours**

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

UNIT - III

Business Organizations and Markets **8 Hours**

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 **8 Hours**

Introduction – Nature, meaning, significance. Types of Working Capital, Components, Sourcesof Short-term and Long-term Capital, Estimating Working capital requirements. CapitalBudgeting– 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 **10 Hours**

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

Online 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

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II Year – IISemester	SIGNALS and SYSTEMS	L	T	P	C
Course Code: 1004232101		3	0	0	3

Course Overview:

This course integrates the basic concepts of both continuous and discrete time signals and systems. It covers the linear time invariant systems and their analysis in time and frequency domain, mathematical tools, correlation and convolution of signals, sampling techniques. It provides the necessary background needed for understanding the signal processing and communications.

Course Objective:

The representation, classification and analysis of continuous, discrete time signals in time and frequency domains. The Fourier transform, Laplace and Z- transforms and their properties to analyze the signals and systems. Development of the mathematical skills to solve problems involving convolution, correlation and sampling.

Course Outcomes:

After completion of the course students can able to:

	Course outcome	Bloom's taxonomy	Bloom's Taxonomy Level	PO
CO1	Understand the mathematical description and representation of continuous-time and discrete-time signals and systems.	Understanding Applying	L2 L3	PO-1, PO-2, PO3
CO2	Classify systems based on their properties and determine the response of LTI system using convolution.	Understanding Applying	L2 L3	PO-1, PO-2, PO-3, PO-4
CO3	Apply the Fourier transform, Laplace transform and Z- transform for analyze of continuous-time and discrete-time signals and systems.	Understanding Evaluating	L2 L4	PO-1, PO-2, PO-3, PO-5
CO4	Apply sampling theorem to convert continuous-time signals to discrete-time signals and reconstruct back, different transform techniques to solve signals and system related problems.	Understanding Evaluating	L2 L3	PO-1, PO-2, PO-3, PO-5

UNIT- I **9 Hours**

Signals & Systems: Definition of signal & system, Basic operations on signals, Classification of signals, Basic continuous time signals and continuous time systems, Classification of discrete time signals and systems Complex exponential and sinusoidal signals, Singularity function and related functions: impulse function, unit step, ramp function.

Unit-II: **9 Hours**

Linear Time Invariant (LTI) Systems: Time-Domain representation & Characterization of LTI systems, Impulse response representation, Convolution integral & Convolution sum, Properties of LTI systems, Stability criteria for LTI systems, Elements of Continuous time & Discrete-time LTI systems. Circular Convolution. Concepts of Correlation of signals, Properties, applications.

Unit-III: **9 Hours**

Fourier Representation of Signals: Fourier representation of Signals, Continuous -time Fourier series and their properties, Application of Fourier series to LTI systems, Fourier Transform & its properties, Applications of Fourier Transform to LTI systems, Relationship to other transforms. Hilbert transform and its properties.

Unit-IV: **10 Hours**

Laplace Transform: Introduction & Definition, Region-of- convergence, Properties of Laplace transform, Inverse Laplace Transform, Applications of Laplace Transform in analysis of LTI systems, Unilateral Laplace transform & its applications to solve differential equations, Analysis of Electric circuits.

Z-Transform: The Z-Transform, Region-of-convergence, properties of Z-Transform, Inverse Z-Transform, Transform Analysis of Discrete-time LTI systems, Unilateral Z-Transform & its applications to LTI systems described by difference equations.

Unit-V: **8 Hours**

Sampling: Graphical & Analytical proof of Band-limited signals, Low pass and band pass sampling theorems, Sampling and reconstruction of band limited signals, Aliasing, Anti- aliasing filter, Illustrative Problems.

Text Books:

A.V. Oppenheim, A.S. Willsky and S.H. Nawab, “Signals and Systems”, 2nd Edition, PHI, 2009.
Signals, Systems & Communications - B.P. Lathi, B S Publications, 2003.
S. Haykin and B.VanVeen “Signals and Systems, Wiley, 1998.

Reference Books:

Signals and Systems – K Deergha Rao, Springer International Edition, 2018.
Principles of Linear Systems and Signals – BP Lathi, Oxford University Press, 2015
Hwei Hsu, “Schaum's Outline of Signals and Systems”, 4thEdition, TMH, 2019.
Fundamentals of Signals and Systems- Michel J. Robert, MGH International Edition, 2008.

II Year – IISemester	ANALOG CIRCUITS DESIGN	L	T	P	C
Course Code: 1004232203		3	0	0	3

Course Overview:
This course covers the basics you need to know when starting out with analog circuits. The fundamentals of analyzing DC analog circuits are explained through the use of worked out examples.

Course Objective:
• Understand the characteristics of multi stage, differential amplifiers, feedback, power and tuned amplifiers.
• Analyze the performance parameters of various amplifier circuits.
• Analyze different oscillator circuits based on the frequency of operation.
• Study and analyze the various wave shaping circuits.

Course Outcomes:

After completion of the course students able to		Bloom's taxonomy	Bloom's Taxonomy Level	PO
CO1	Examine the frequency response of multistage and differential amplifier circuits using BJT at low and high frequencies.	Applying	L3	PO1, PO2, PO3, PO5, PO12
CO2	Investigate different feedback and power amplifier circuits based on the application.	Analyzing	L4	PO1, PO2, PO3, PO4, PO5, PO12
CO3	Analyze the effects of cascading on single, double tuned amplifiers	Analyzing	L4	PO1, PO2, PO3, PO4, PO5
CO4	Classify and observe the various types of wave shaping circuits	Analyzing	L4	PO1, PO2, PO3, PO5

UNIT- I **8-Hours**
Multistage Amplifiers: Classification of amplifiers, distortion in amplifiers, frequency response of an amplifier, step response of an amplifier, methods of coupling, band pass of cascaded stages, analysis of cascaded transistor amplifier, two stage RC coupled amplifier, Darlington pair amplifier, Boot-strap emitter follower, Cascode amplifier, differential amplifier.

Unit-II: **14-Hours**
Feedback Amplifiers: Classification of basic amplifiers, Feedback concept, types of feedback, feedback topologies, characteristics of negative feedback amplifiers, generalized analysis of feedback amplifiers, performance comparison of feedback amplifiers, method of analysis of feedback amplifiers.
Oscillators: Oscillator principle, condition for oscillations, types of oscillators, RC-phase shift and Wein bridge oscillators using BJT, generalized analysis of LC oscillators, Hartley and Colpitt's oscillators using BJT, crystal oscillator, frequency stability of oscillators.

Unit-III: **8-Hours**

Power Amplifiers: Classification of amplifiers, Class A power Amplifiers, harmonic distortions, Class B amplifier, Push-pull amplifier, Complementary symmetry push pull amplifier, Class AB amplifier, Class-C amplifier, thermal stability and heat sink, distortion in power amplifiers.

Unit-IV: **8-Hours**

Tuned Amplifiers: Introduction, Q-Factor, small signal tuned amplifiers, effect of cascading single tuned and doubled tuned amplifiers on band width, stagger tuned amplifiers, comparison of tuned amplifiers, stability of tuned amplifiers.

Unit-V: **14-Hours**

Linear wave shaping: High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square, and ramp inputs. RC network as differentiator and integrator, Attenuators.

Non-linear wave shaping: Diode clippers, clipping at two independent levels, Transfer characteristics of clippers, clamping operation, clamping circuits using diode with different inputs, Clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage, Transfer characteristics of clampers.

Text Books:

1. Electronic Devices and Circuits - J.Millman, C.C. Halkias & S.Jit, TMH, 4thEdition, 2015.
2. Pulse and Digital Circuits- A.Anand Kumar, PHI Learning Private Limited, 2012.

Reference Books:

1. Integrated Electronics- Jacob Millman, C. Halkies & C.D.Parikh, TMH, 2nd Edition,2010.
2. Electronic Devices and Circuits- S. Salivahanan & N.Suressh Kumar,TMH,3rd Edition, 2012.
3. Electronic Devices and Circuits – A.K.Maini & V.Agarawal, Wiley India Pvt.Ltd., First Edition, 2009.

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II Year – IISemester	DATABASE MANAGEMENTSYSTEMS	L	T	P	C
Course Code: 1054232101		3	0	0	3

Course Objectives:

The main objectives of the course is to

- Introduce database management systems and to give a good formal foundation on the relational model of data and usage of Relational Algebra
- Introduce the concepts of basic SQL as a universal Database language
- Demonstrate the principles behind systematic database design approaches by covering conceptual design, logical design through normalization
- Provide an overview of physical design of a database system, by discussing Database indexing techniques and storage techniques

Course Outcomes:

After completion of the course, students will be able to

1. Understand the basic concepts of database management systems (L2)
2. Analyze a given database application scenario to use ER model for conceptual design of the database (L4)
3. Utilize SQL proficiently to address diverse query challenges (L3).
4. Employ normalization methods to enhance database structure (L3)
5. Assess and implement transaction processing, concurrency control and databaserecovery protocols in databases. (L4)

UNIT I:

Introduction: Database system, Characteristics (Database Vs File System), Database Users, Advantages of Database systems, Database applications. Brief introduction of different Data Models; Concepts of Schema, Instance and data independence; Three tier schema architecture for data independence; Database system structure, environment, Centralized and Client Server architecture for the database.

Entity Relationship Model: Introduction, Representation of entities, attributes, entity set, relationship, relationship set, constraints, sub classes, super class, inheritance,specialization, generalization using ER Diagrams.

UNIT II:

Relational Model: Introduction to relational model, concepts of domain, attribute, tuple, relation, importance of null values, constraints (Domain, Key constraints, integrity constraints) and their importance, Relational Algebra, Relational Calculus. BASIC SQL: Simple Database schema, data types, table definitions (create, alter), different DML operations (insert, delete, update).

UNIT III:

SQL: Basic SQL querying (select and project) using where clause, arithmetic & logical operations, SQL functions (Date and Time, Numeric, String conversion). Creating tables with relationship, implementation of key and integrity constraints, nested queries, sub queries, grouping, aggregation, ordering, implementation of different types of joins, view (updatable and non-updatable), relational set operations.

UNIT IV:

Schema Refinement (Normalization): Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency Lossless join and dependency preserving decomposition, (1NF, 2NF and 3 NF), concept of surrogate key, Boyce-Codd normal form (BCNF), MVD, Fourth normal form(4NF), Fifth Normal Form (5NF).

UNIT V:

Transaction Concept: Transaction State, ACID properties, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for Serializability, lock based, time stamp based, optimistic, concurrency protocols, Deadlocks, Failure Classification, Storage, Recovery and Atomicity, Recovery algorithm.

Introduction to Indexing Techniques: B+ Trees, operations on B+Trees, Hash Based Indexing:

Text Books:

1) Database Management Systems, 3rd edition, Raghurama Krishnan, Johannes Gehrke,TMH (For Chapters 2, 3, 4)
2) Database System Concepts,5th edition, Silberschatz, Korth, Sudarsan, TMH (For Chapter 1 and Chapter 5)

Reference Books:

1) Introduction to Database Systems, 8thedition, C J Date, Pearson.
2) Database Management System, 6th edition, Ramez Elmasri, Shamkant B. Navathe,Pearson
3) Database Principles Fundamentals of Design Implementation and Management, 10th edition, Corlos Coronel, Steven Morris, Peter Robb, Cengage Learning, 2022

Web-Resources:

1) https://nptel.ac.in/courses/106/105/106105175/
2) https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012758066672820 22456_shared/overview

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II Year – II Semester	ANALOG AND DIGITAL COMMUNICATIONS	L	T	P	C
Course Code: 1004232204		3	0	0	3

Course Objectives:

- To develop a fundamental understanding on Communication Systems.
- To analyse various analog modulation & demodulation schemes.
- Analyze the performance of various modulation techniques in the presence of AWGN.
- To understand operation of AM & FM radio receivers.

Course Outcomes:

CO's	At the end of the course, the student will have the ability to:	Bloom's taxonomy	Bloom's Taxonomy Level
CO1	Understand the basics of communication system and analog modulation techniques	Applying	L2
CO2	Apply the basic knowledge of signals and systems and understand the concept of Frequency modulation.	Analyzing	L3
CO3	Apply the basic knowledge of electronic circuits and understand the effect of Noise in communication system and noise performance of AM and FM systems.	Analyzing	L4
CO4	Understand TDM and Pulse Modulation techniques and evaluate the performance of digital modulation techniques.	Analyzing	L4

UNIT – I **08-Hours**

Amplitude Modulation- Basic blocks of Communication System, Need for modulation, Amplitude (Linear) Modulation – AM, DSB-SC, SSB-SC and VSB-SC. Methods of generation and detection, Comparison of different AM techniques, Application of different AM techniques.

UNIT II **08-Hours**

Angle (Non-Linear) Modulation - Frequency and Phase modulation. Frequency Modulation: Single tone frequency modulation, Narrow band FM, Wide band FM, Transmission bandwidth of FM signals. Generation: Direct Method, Indirect Method. Detection: Balanced Frequency discriminator, Zero crossing detector, Phase locked loop, Comparison of FM & AM, Applications.

UNIT III **10 Hours**

Transmitters& Receivers: Classification of Transmitters, AM Transmitters, FM Transmitters. Tuned radio frequency receiver, Super heterodyne receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, Image frequency, AGC, Amplitude limiting, FM Receiver, Comparison of AM and FM Receivers.

Noise Analysis - Internal and External Noise, Noise Calculation, Noise Figure, Noise temperature, Noise analysis in AM receivers, Noise analysis in FM receivers, Threshold effect, Pre-emphasis and De-emphasis.

UNIT IV **10-Hours**

Pulse Analog Modulation techniques – Pulse Amplitude Modulation, Pulse width Modulation, Pulse Position Modulation, Methods of generation and detection. Time division multiplexing, Frequency Division Multiplexing, Noise performance.

Pulse Digital Modulation techniques- Elements of digital communication systems, Elements of PCM: Sampling, Quantization & Coding, Quantization error, Companding in PCM systems. Differential PCM systems (DPCM). Delta modulation and its drawbacks, adaptive delta modulation, comparison of PCM and DM systems, noise in PCM and DM systems.

UNIT V **10-Hours**

Digital Modulation Techniques: BASK, BFSK, BPSK, QPSK, generation and detection.

Baseband transmission: Base band signal receiver, probability of error and its mathematical analysis, the optimum receiver, matched filter, coherent and non-coherent reception.

Text Books:

1. Communication Systems - Simon Haykin, John Wiley& Sons, 2ndEdition.
2. B. P. Lathi, Zhi Ding "Modern Digital and Analog Communication Systems", Oxford press, 2011.
3. Digital Communication- Simon Haykin, John Wiley, 2005.

Reference Books:

1. Digital Communications – John Proakis, TMH, 1983
2. Digital and Analog Communication Systems - Sam Shanmugam, John Wiley& Sons, 1999.
3. Digital Communications: Fundamentals and Applications -Bernard Sklar, F. J. Harris, Pearson Publications, 2020.
4. Principles of Communication Systems- Taub and Schilling, Tata McGraw Hill, 2007.

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II Year – IISemester	ANALOG CIRCUITS DESIGN LAB	L	T	P	C
Course Code: 1004232210		0	0	3	1.5

COURSE OBJECTIVES:

- To analyze the frequency response of single and multistage amplifiers.
- To analyze the output waveforms of Oscillators.
- To analyze and observe power amplifier circuits.
- To analyze and observe wave shaping circuits.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Develop the frequency response multistage amplifiers using BJT
CO2	Design and observe the waveforms of AF & RF Oscillators.
CO3	Construct and verify the outputs of power amplifiers.
CO4	Analyze and verify the output of wave shaping circuits

LIST OF EXPERIMENTS

1. Design and analysis of Two-Stage RC-Coupled Amplifier
2. Design and Analysis of Darlington Pair Amplifier.
3. Design and Analysis of Cascode Amplifier.
4. Design and analysis of Differential Amplifier.
5. Design and Analysis of Voltage-Series/Voltage-Shunt Feedback Amplifier.
6. Design and Analysis of Current-Series/Current-Shunt Feedback Amplifier.
7. Design and Analysis of RC Phase Shift Oscillator
8. Design and Analysis of LC Heartley/Colpitts Oscillator
9. Design and Analysis of Class A power amplifier
10. Design and Analysis of Class AB amplifier
11. Design and analysis of Single Tuned amplifier.
12. Diode Clippers and Diode clampers
13. Response of low pass RC circuit for Different inputs.
14. Response of high pass RC circuit for Different inputs.

TEXT BOOKS

1. "Integrated Electronics", J. Millman and C.C. Halkias and C.Parikh, Tata McGraw- Hill, 2010.
2. "Pulse, Digital and Switching Waveforms", J.Millman and H. Taub, McGraw-Hill, 2008.

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II Year – II Semester	DATABASE MANAGEMENT SYSTEMS LAB	L	T	P	C
Course Code: 1005232211		**0**	**0**	**3**	**1.5**

Course Objectives:

This Course will enable students to

- Populate and query a database using SQL DDL/DML Commands
- Declare and enforce integrity constraints on a database
- Writing Queries using advanced concepts of SQL
- Programming PL/SQL including procedures, functions, cursors and triggers

Course Outcomes:

After completion of the course, students will be able to

1. Utilizing Data Definition Language (DDL), Data Manipulation Language (DML), and Data Control Language (DCL) commands effectively within a database environment (L3)
2. Constructing and execute queries to manipulate and retrieve data from databases. (L3)
3. Develop application programs using PL/SQL. (L3)
4. Analyze requirements and design custom Procedures, Functions, Cursors, and Triggers, leveraging their capabilities to automate tasks and optimize databasefunctionality (L4)
5. Establish database connectivity through JDBC (Java Database Connectivity) (L3)

Experiments covering the topics:

- DDL, DML, DCL commands
- Queries, nested queries, built-in functions,
- PL/SQL programming- control structures
- Procedures, Functions, Cursors, Triggers,
- Database connectivity- ODBC/JDBC

Sample Experiments:

1. Creation, altering and droping of tables and inserting rows into a table (use constraintswhile creating tables) examples using SELECT command.
2. Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints. Example:- Select the roll number and name of the student who secured fourth rank in the class.
3. Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.
4. Queries using Conversion functions (to_char, to_number and to_date), string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions (Sysdate, next_day, add_months, last_day, months_between,least, greatest, trunc, round, to_char, to_date)
5.

   i. Create a simple PL/SQL program which includes declaration section, executable section and exception –Handling section (Ex. Student marks can beselected from the table and printed for those who secured first class and an exception can be raised if no records were found)

ii. Insert data into student table and use COMMIT, ROLLBACK and SAVE POINT inPL/SQL block.

5. Develop a program that includes the features NESTED IF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions.
6. Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, USE defined Exceptions, RAISE- APPLICATION ERROR.
7. Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES.
8. Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions.
9. Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.
10. Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers
11. Create a table and perform the search operation on table using indexing and non-indexing techniques.
12. Write a Java program that connects to a database using JDBC
13. Write a Java program to connect to a database using JDBC and insert values into it
14. Write a Java program to connect to a database using JDBC and delete values from it

Reference Books:

1. Oracle: The Complete Reference by Oracle Press
2. Nilesh Shah, "Database Systems Using Oracle", PHI, 2007
3. Rick F Vander Lans, "Introduction to SQL", Fourth Edition, Pearson Education, 2007
4. Ramez Elmasri, Shamkant, B. Navathe, "Database Systems", Pearson Education, 6th Edition, 2013.
5. Database Principles Fundamentals of Design Implementation and Management, 10th edition, Corlos Coronel, Steven Morris, Peter Robb, Cengage Learning, 2022

Online Learning Resources:

1. http://www.scoopworld.in
2. http://vlabs.iitb.ac.in/vlabs-dev/labs/dblab/index.php

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II Year – II Semester	FULL STACK DEVELOPMENT – 1 (Skill Enhancement Course)	L	T	P	C
Course Code: 1005232180		1	0	2	2

Course Objectives:

The main objectives of the course are to

- Make use of HTML elements and their attributes for designing static web pages
- Build a web page by applying appropriate CSS styles to HTML elements
- Experiment with JavaScript to develop dynamic web pages and validate forms

Course Outcomes:

1. Design Websites. (L6)
2. Apply Styling to web pages. (L3)
3. Make Web pages interactive. (L3)
4. Design Forms for applications. (L6)
5. Choose Control Structure based on the logic to be implemented. (L4)

Experiments covering the Topics:

- Lists, Links and Images
- HTML Tables, Forms and Frames
- HTML 5 and Cascading Style Sheets, Types of CSS
- Selector forms
- CSS with Color, Background, Font, Text and CSS Box Model
- Applying JavaScript - internal and external, I/O, Type Conversion
- JavaScript Conditional Statements and Loops, Pre-defined and User-defined Objects
- JavaScript Functions and Events

Sample Experiments:

1. Lists, Links and Images

a. Write a HTML program, to explain the working of lists.
Note: It should have an ordered list, unordered list, nested lists and ordered list in an unordered list and definition lists.

b. Write a HTML program, to explain the working of hyperlinks using <a> tag and href, target Attributes.

c. Create a HTML document that has your image and your friend's image with a specific height and width. Also, when clicked on the images it should navigate to their respective profiles.

d. Write a HTML program, in such a way that, rather than placing large images on a page, the preferred technique is to use thumbnails by setting the height and width parameters to something like to 100*100 pixels. Each thumbnail image is also a link to a full sized versionof the image. Create an image gallery using this technique

1. HTML Tables, Forms and Frames

a. Write a HTML program, to explain the working of tables. (use tags: <table>, <tr>, <th>, <td> and attributes: border, rowspan, colspan)

b. Write a HTML program, to explain the working of tables by preparing a timetable. (Note: Use <caption> tag to set the caption to the table & also use cell spacing, cell padding, border,rowspan, colspan etc.).

c. Write a HTML program, to explain the working of forms by designing Registration form. (Note: Include text field, password field, number field, date of birth field, checkboxes, radio buttons, list boxes using <select>&<option> tags, <text area> and two buttons ie: submit and reset. Use tables to provide a better view).

d. Write a HTML program, to explain the working of frames, such that page is to be divided into 3 parts on either direction. (Note: first frame → image, second frame → paragraph, third frame →hyperlink. And also make sure of using "no frame" attribute such that framesto be fixed).

2. HTML 5 and Cascading Style Sheets, Types of CSS

a. Write a HTML program, that makes use of <article>, <aside>, <figure>, <figcaption>, <footer>, <header>, <main>, <nav>, <section>, , tags.

b. Write a HTML program, to embed audio and video into HTML web page.

c. Write a program to apply different types (or levels of styles or style specification formats) - inline, internal, external styles to HTML elements. (identify selector, property and value).

3. Selector forms

a. Write a program to apply different types of selector forms

i. Simple selector (element, id, class, group, universal)
ii. Combinator selector (descendant, child, adjacent sibling, general sibling)
iii. Pseudo-class selector
iv. Pseudo-element selector
v. Attribute selector

4. CSS with Color, Background, Font, Text and CSS Box Model

a. Write a program to demonstrate the various ways you can reference a color in CSS.

b. Write a CSS rule that places a background image halfway down the page, tilting it horizontally. The image should remain in place when the user scrolls up or down.

c. Write a program using the following terms related to CSS font and text:
i. font-size ii. font-weight iii. font-style
iv. text-decoration v. text-transformation vi. text-alignment

d. Write a program, to explain the importance of CSS Box model using
i. Content ii. Border iii. Margin iv. Padding

2. Applying JavaScript - internal and external, I/O, Type Conversion

a. Write a program to embed internal and external JavaScript in a web page.

b. Write a program to explain the different ways for displaying output.

c. Write a program to explain the different ways for taking input.

d. Create a webpage which uses prompt dialogue box to ask a voter for his name and age. Display the information in table format along with either the voter can vote or not

1. JavaScript Pre-defined and User-defined Objects

a. Write a program using document object properties and methods.
b. Write a program using window object properties and methods.
c. Write a program using array object properties and methods.
d. Write a program using math object properties and methods.
e. Write a program using string object properties and methods.
f. Write a program using regex object properties and methods.
g. Write a program using date object properties and methods.
h. Write a program to explain user-defined object by using properties, methods, accessors, constructors and display.

2. JavaScript Conditional Statements and Loops

a. Write a program which asks the user to enter three integers, obtains the numbers from the user and outputs HTML text that displays the larger number followed by the words "LARGER NUMBER" in an information message dialog. If the numbers are equal, output HTML text as "EQUAL NUMBERS".
b. Write a program to display week days using switch case.
c. Write a program to print 1 to 10 numbers using for, while and do-while loops.
d. Write a program to print data in object using for-in, for-each and for-of loops
e. Develop a program to determine whether a given number is an 'ARMSTRONG NUMBER' or not. [Eg: 153 is an Armstrong number, since sum of the cube of the digits is equal to thenumber i.e.,13 + 53+ 33 = 153]
f. Write a program to display the denomination of the amount deposited in the bank in terms of 100's, 50's, 20's, 10's, 5's, 2's & 1's. (Eg: If deposited amount is Rs.163, the output should be 1-100's, 1-50's, 1- 10's, 1-2's & 1-1's)

3. JavaScript Functions and Events

a. Design a appropriate function should be called to display

i. Factorial of that number
ii. Fibonacci series up to that number
iii. Prime numbers up to that number
iv. Is it palindrome or not

b. Design a HTML having a text box and four buttons named Factorial, Fibonacci, Prime, and Palindrome. When a button is pressed an appropriate function should be called to display

i. Factorial of that number
ii. Fibonacci series up to that number
iii. Prime numbers up to that number
iv. Is it palindrome or not

c. Write a program to validate the following fields in a registration page

i. Name (start with alphabet and followed by alphanumeric and the length should notbeless than 6 characters)
ii. Mobile (only numbers and length 10 digits)
iii. E-mail (should contain format like xxxxxxx@xxxxxx.xxx)

Text Books:

1. John Dean, Web Programming with HTML5, CSS and JavaScript, Jones & BartlettLearning, 2019.

Reference Books:

1. Programming the World Wide Web, 7th Edition, Robet W Sebesta, Pearson, 2013.
2. Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node, Vasan Subramanian, 2nd edition, APress, O'Reilly.

Online Learning Resources:

1. https://www.w3schools.com/html
2. https://www.w3schools.com/css
3. https://www.w3schools.com/js/
4. https://www.w3schools.com/nodejs
5. https://www.w3schools.com/typescript

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II Year – IISemester	DESIGN THINKING & INNOVATION	L	T	P	C
Course Code: 1003232104		**1**	**0**	**2**	**2**

Course Objectives:
The objective of this course is to familiarize students with design thinking process as a tool for breakthrough innovation. It aims to equip students with design thinking skills and ignite the minds to create innovative ideas, develop solutions for real-time problems.

Course Outcomes:
- Define the concepts related to design thinking. (L1, L2)
- Explain the fundamentals of Design Thinking and innovation (L1, L2)
- Apply the design thinking techniques for solving problems in various sectors. (L3)
- Analyse to work in a multidisciplinary environment (L4)
- Evaluate the value of creativity (L5)
- Formulate specific problem statements of real time issues (L3, L6)

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

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

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

UNIT III
Innovation
Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations- Creativity to Innovation- Teams for innovation- Measuring the impact and value of creativity.
Activity: Debate on innovation and creativity, Flow and planning from idea to innovation,Debate on value-based innovation.

UNIT IV
Product Design
Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications- Innovation towards product design- Case studies
Activity: Importance of modelling, how to set specifications, Explaining their own product design.

UNIT V

Design Thinking in Business Processes

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

Activity: How to market our own product, About maintenance, Reliability and plan for startup.

Textbooks:

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

Reference Books:

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

Online Learning Resources:

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

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B.Tech – III Year I Semester

S. No	Course code	Category	Title	L	T	P	Credits
1	**1019233101**	Professional Core	Linear and Digital IC Applications	3	0	0	3
2	**1004233102**	Professional Core	Microprocessors and Microcontrollers	3	0	0	3
3	**1005233101**	Professional Core	Data Warehousing and Data Mining	3	0	0	3
4	**1004233130**	Professional Elective - I	Electronic Measurements and Instrumentation	3	0	0	3
	1004233131		CMOS Analog IC Design				
	1004233132		Computer Architecture and Organization				
	1019233130		Bio Medical Signal Processing				
5	**1005233150**	Open Elective-I	Principles of Operating Systems	3	0	0	3
	1005233151		Scripting Languages				
	1005233152		Web Services				
6	**1019233110**	Professional Core Lab -1	Linear and Digital IC Applications Lab	0	0	3	1.5
7	**1004233111**	Professional Core Lab -2	Microprocessors & Microcontrollers Lab	0	0	3	1.5
8	**1005233180**	Skill Enhancement course	Full Stack development- 2	0	1	2	2
9	**1004233181**	Engineering Science	PCB Design Practice	0	0	2	1
10	**1019233170**	Evaluation of Community Service Project		-	-	-	2
11	**1000233125**	Audit Course	Constitution of India	2	0	0	0
Total				**17**	**01**	**10**	**23**

III Year I Semester	LINEAR AND DIGITAL IC APPLICATIONS	L	T	P	C
1019233101		3	0	0	3

Course Overview:

This course introduces the theoretical & circuit aspects of op-amp, timer, which are the backbone for the basics of analog integrated circuits and to understand the various linear & non-linear applications of op-amp. Also learn various digital circuits which are highly performed in day to day commercial and household devices.

Course Objectives:

1. To introduce the basic building blocks of analog and digital integrated circuits.
2. To teach the linear and non-linear applications of operational amplifiers.
3. To teach the theoretical concepts of ADC and DAC.
4. To introduce the concepts of waveform generators and some special function ICs.
5. To understand and implement the applications of basic digital logic circuits using HDL.

Course Outcomes:

After completion of the course students able to

CO's	Course Outcomes	Bloom's taxonomy	Bloom's Taxonomy Level	PO
CO1	Interpret the Characteristics and various linear and non-linear applications of Operational amplifier.	Understanding Applying	L2 L3	PO1, PO2, PO3
CO2	Analyze the different types of active filters and their design with operational amplifier & examine the functionalities of IC 555 Timer.	Applying Analyzing	L3 L4	PO2, PO3, PO4
CO3	Compare different types of ADC and DACs.	Understanding Applying	L2 L3	PO3, PO4
CO4	Design combinational and sequential circuits using ICs.	Applying Analyzing	L3 L4	PO3, PO4, PO5

UNIT - I

INTEGRATED CIRCUITS: Differential Amplifier- DC and AC analysis of Dual input Balanced output Configuration, Properties of other differential amplifier configuration (Dual Input Unbalanced Output, Single Ended Input – Balanced/ Unbalanced Output), DC Coupling and Cascade Differential Amplifier Stages, Level translator.

UNIT - II

Characteristics of OP-Amps, Integrated circuits -Types, Classification, Package Types and Temperature ranges, Power supplies, Op-amp Block Diagram, ideal and practical Op-amp

Specifications, DC and AC characteristics, 741 op-amp & its features, FET input. Op-Amps, Op-Amp parameters & Measurement, Input & Out put Off set voltages & currents, slew rates, CMRR, PSRR, drift, Frequency Compensation technique.

UNIT - III

LINEAR and NON-LINEAR APPLICATIONS OF OP- AMPS: Inverting and Non-inverting amplifier, Integrator and differentiator, Difference amplifier, Instrumentation amplifier, AC amplifier, V to I, I to V converters, Buffers. Non- Linear function generation, Comparators, Multivibrators, Triangular and Square wave generators, Log and Anti log Amplifiers.

ACTIVE FILTERS: Butter worth filters – 1st order, 2nd order LPF, HPF filters.

UNIT - IV

TIMERS & PHASE LOCKED LOOPS: Introduction to 555 timer, functional diagram, Monostable and Astable operations, Schmitt Trigger.

DIGITAL TO ANALOG AND ANALOG TO DIGITAL CONVERTERS: Introduction, Basic DAC techniques- weighted resistor DAC, R-2R ladder DAC, Different types of ADCs – Counter type ADC, Successive approximation ADC and Dual slope ADC.

UNIT – V

DIGITAL INTEGRATED CIRCUITS-COMBINATIONAL LOGIC ICS: Familiarity with commonly available TTL-74XX Series ICs pertaining to 4-bit parallel adder (74LS83A/74LS283), 4-bit comparator (74HC85), 8X1 multiplexer (74LS151), 1-to-16 demultiplexer (74HC154), 4-line-to-16-line decoder(74HC154) (Qualitative approach of designing and modeling the logic circuits using HDL)

Digital Integrated Circuits-Sequential Logic ICs and Memories: Familiarity with commonly available TTL-74XX Series ICs pertaining to S-R latch (74LS279), quad gated D-latch (74LS75), 4-bit synchronous binary counter(74HC163) (Qualitative approach of designing and modeling the logic circuits using HDL).

Text Books:

1. Linear Integrated Circuits: D. Roy Chowdhury, New Age International (p) Ltd, 2nd Edition,2003.
2. Op-Amps & Linear ICs: Ramakanth A. Gayakwad, PHI, 2003.
3. Digital Fundamentals: Floyd and Jain, Pearson Education,8th Edition,2005.

Reference Books:

1. Linear Integrated Circuits and Applications-Salivahanan, TMH.
2. Modern Digital Electronics-RP Jain-4/e-TMH, 2010.
3. Digital design principles and practices-John. F. Wakerly 3/e,2005.

III Year I Semester	Microprocessors and Microcontrollers	L	T	P	C
1004233102		3	0	0	3

Course Overview:

Microprocessors and Microcontrollers provides a solid foundation in the architecture, programming, and interfacing techniques of microprocessors and microcontrollers. The subject primarily focuses on the 8086 microprocessors and the 8051 microcontrollers, enabling to understand their internal architecture, instruction sets, and applications. This course also provides an introduction to ARM (Advanced RISC Machine) processors, focusing on their architecture, programming, and application in embedded systems. Overall, this course plays a crucial role in bridging the gap between hardware fundamentals and embedded application development, for careers in embedded systems, IoT, and consumer electronics.

Course Objectives:

1. To impart knowledge of the architecture and functioning of 8086 microprocessor and 8051 microcontrollers.
2. To familiarize students with assembly language programming concepts and their practical implementation.
3. To understand memory interfacing and peripheral device interfacing with 8086 and 8051.
4. To develop the ability to interface microcontrollers with external hardware components and sensors.
5. To understand the architecture and functioning of ARM Processors.

Course Outcomes:

CO's	After completion of the course students able to	Bloom's taxonomy	Bloom's Taxonomy Level	PO
CO1	Understand the architecture of microprocessor/ microcontroller and their operation.	Understanding Applying	L2 L3	PO1, PO2, PO12
CO2	Demonstrate programming skills in assembly language for processors and Controllers.	Understanding Applying	L2 L3	PO1, PO2, PO3, PO4, PO5
CO3	Analyze various interfacing techniques and apply them for the design of processor/ Controller based systems.	Understanding Applying	L2 L4	PO2, PO3, PO5
CO4	Interface 8051 with external peripherals such as LCDs, motors, keypads, ADCs/DACs.	Understanding Applying	L2 L3	PO1, PO2, PO3, PO4, PO5

UNIT–I

Introduction: Basic Microprocessor architecture, Harvard and Von Neumann architectures with examples, Microprocessor Unit versus Microcontroller Unit, CISC and RISC architectures.

8086 Architecture: Main features, pin diagram/description, 8086 microprocessor family, internal architecture, bus interfacing unit, execution unit, interrupts and interrupt response, 8086 system timing, minimum mode and maximum mode configuration.

UNIT–II

8086 Programming: Program development steps, instructions, addressing modes, assembler directives, writing simple programs with an assembler, assembly language program development tools.

UNIT-III

8086 Interfacing: Semiconductor memories interfacing (RAM, ROM), Intel 8255 programmable peripheral interface, Interfacing switches and LEDS, Interfacing seven segment displays, software and hardware interrupt applications, Intel 8251 USART architecture and interfacing, Intel 8237a DMA controller, stepper motor, A/D and D/A converters, Need for 8259 programmable interrupt controllers.

UNIT-IV

Intel 8051 MICROCONTROLLER

Architecture, Hardware concepts, Input/output ports and circuits, external memory, counters/timers, serial data input/output, interrupts. Assembly language programming: Instructions, addressing modes, simple programs. Interfacing to 8051: A/D and D/A Convertors, Stepper motor interface, keyboard, LCD Interfacing, Traffic light controls.

UNIT–V

ARM Architectures and Processors: Introduction to ARM Processors, Families, ARM7 architecture, Programming models, Pipeline Concepts, Instruction sets.

TEXTBOOKS:

1. A. K Ray, K. M. Bhurchandhi, Advanced Microprocessor and Peripherals", Tata McGraw Hill Publications, 2000.
2. The 8051 Microcontrollers and Embedded systems Using Assembly and C, Muhammad Ali Mazidi and Janice Gillespie Mazidi and Rollin D. McKinlay; Pearson 2-Edition, 2011.
3. ARM7 Reference Manual.

REFERENCE BOOKS:

1. Embedded Systems Fundamentals with Arm Cortex-M based Microcontrollers: A Practical Approach in English, by Dr. Alexander G. Dean, Published by Arm Education Media, 2017.
2. Microprocessors and Interfacing – Programming and Hardware by Douglas V Hall, SSSP Rao, Tata McGraw Hill Education Private Limited, 3rd Edition, 1994.

III Year I Semester	DATA WAREHOUSING & DATA MINING	L	T	P	C
1005233101		3	0	0	3

Course Objectives:

Students undergoing this course are expected to:

1. Understand the concepts of Data Ware housing and Data Mining
2. Master data mining techniques in various applications like social, scientific and environmental context.
3. Develop skill in selecting the appropriate data mining algorithm for solving practical problems.

Course Outcomes:

After completion of the course, students should be able to:

1. Understand Data Warehouse fundamentals, Data Mining concepts, principles and its functionalities
2. Preprocess the data using various Data Preprocessing Techniques for mining applications
3. Design and deploy appropriate classification techniques to solve real world problems and further be able to assess the strengths and weaknesses of various methods and algorithms to analyze their behavior.
4. Demonstrate Association analysis techniques for generating association rules from data.
5. Use different Clustering techniques to cluster data and Cluster the high dimensional data for better organization of the data

UNIT –I: Data Mining Systems and Knowledge Discovery Process:

Data Warehouse and OLAP Technology: An Overview- What Is a Data Warehouse. A Multidimensional Data Model - Need for Online Analytical Processing - OLTP V/s OLAP -OLAP Operations in Multidimensional Data Model. Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehousing to Data Mining.

Need and Usage of Data Mining Technologies - Overview of Knowledge Discovery Process from Databases–What Motivated Data Mining - Why Is It Important - Data Mining Functionalities—What Kinds of Patterns Can Be Mined? Are All of the Patterns Interesting Classification of Data Mining Systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or Data Warehouse System, Major Issues in Data Mining.

UNIT–II: Data Pre-processing:

Data Exploration: Data Objects and attribute types -Statistical description of data- Descriptive Data Summarization-Data Visualization - Data similarity and dissimilarity measures.

Data Pre-processing: Why Pre-process the Data -Data Cleaning-Data Integration-Data Reduction-Data Transformation and Data Discretization.

UNIT–III: Classification:

Basic issues regarding classification and predication - General Approach to solving a classification problem- Decision Tree Classification, Attribute Selection Measures, Tree Pruning- Bayesian

Classification – Rule Based Classification – Support Vector Machines.
Classification Model Evaluation and Selection - Accuracy and Error measures, Holdout, Random Sampling, Cross Validation, Bootstrap, Comparing Classifier performance using ROC Curves.

UNIT–IV: Mining Frequent Patterns and Association Rules:
Basic Concepts-Problem Definition- Market Basket Analysis- Frequent Itemsets- Closed Itemsets and Association Rules - Frequent Pattern Mining - Efficient and Scalable Frequent Itemset Mining Methods- the Apriori Algorithm for finding Frequent Itemsets Using Candidate Generation - Generating Association Rules from Frequent Itemsets - A pattern growth approach for mining Frequent Itemsets- FP-Growth Algorithm

UNIT V: Cluster Analysis:
Basics and Importance of Cluster Analysis- Clustering techniques- Different Types of Clusters- Partitioning Methods (K-Means, K Medoids) -Strengths and Weaknesses. Hierarchical Methods (Agglomerative, Divisive) - Density-Based Methods (DBSCAN, OPTICS)-

Text Books:

i. Introduction to Data Mining: Pang-Ning Tan & Michael Steinbach, Vipin Kumar, Pearson.
ii. Data Mining concepts and Techniques, 3/e, Jiawei Han, Michel Kamber, Elsevier.

References:

i. Data Mining Techniques and Applications: An Introduction, Hongbo Du, Cengage Learning.
ii. Data Mining : VikramPudi and P. Radha Krishna, Oxford.
iii. Data Mining and Analysis - Fundamental Concepts and Algorithms; Mohammed J.Zaki, Wagner Meira, Jr, Oxford
iv. Data Warehousing Data Mining & OLAP, Alex Berson, Stephen Smith,TMH.

E-resources:

i. http://onlinecourses.nptel.ac.in/noc18_cs14/preview (NPTEL course by Prof.Pabitra Mitra)
ii. http://onlinecourses.nptel.ac.in/noc17_mg24/preview
(NPTEL course by Dr. Nandan Sudarshanam & Dr. Balaraman Ravindran)
iii. http://www.saedsayad.com/data_mining_map.htm

III Year I Semester	Professional Core Elective-I ELECTRONIC MEASUREMENTS AND INSTRUMENTATION	L	T	P	C
1004233130		3	0	0	3

Course Overview:
This course will help to develop skills to measure electrical parameters using various instruments. By learning this course students will able to know basics of various Instruments, transducers and working of electronic circuits used in electronic test and measuring instruments.

Course Objectives:
- It provides an understanding of various measuring system functioning and metrics for performance analysis.
- Provides understanding of principle of operation, working of different electronic instruments viz. signal generators, signal analyzers, recorders and measuring equipment.
- Understanding the concepts of various measuring bridges and their balancing conditions.
- Provides understanding of use of various measuring techniques for measurement of different physical parameters using different classes of transducers.

Course Outcomes:
After completion of the course students able to

CO's	Course outcome	Bloom's Taxonomy Level	PO
CO1	Measure electrical parameters with different meters and understand the basic definition of measuring parameters.	L3	PO1, PO2
CO2	Use various types of signal generators and signal analyzers for generating and analyzing various real-time signals and Operate an Oscilloscope to measure various signals.	L4	PO1, PO2, PO5
CO3	Interpret the measurement of passive component values using bridges.	L4	PO1, PO2, PO4
CO4	Measure various physical parameters by appropriately selecting the transducers.	L3	PO1, PO3, PO4

UNIT 1:
Basic Instruments: Block Schematics of Measuring Systems: Performance characteristics, Static characteristics, Accuracy, Precision, Resolution, Types of Errors, Gaussian Error, Root Sum Squares formula, Dynamic Characteristics, Repeatability, Reproducibility, Fidelity, Lag; Measuring Instruments: DC Voltmeters, DC Current Meters, AC Voltmeters and Current Meters, Ohmmeters, Multimeters, Extension of Range, True RMS Responding Voltmeters.

UNIT 2:

Signal Generators and Analyzers: Signal Analyzers: AF, HF Wave Analyzers, Harmonic Distortion, Heterodyne wave Analyzers, Spectrum Analyzers, Signal Generators: AF, RF Signal Generators, Sweep Frequency Generators, Pulse and Square wave Generators, Function Generators, Arbitrary waveform Generator.

UNIT 3:

Cathode Ray Oscilloscope: Oscilloscopes: CRT, Block Schematic of CRO, Time Base Circuits, Lissajous Figures, CRO Probes, Delay lines, Applications: Measurement of Time, Period and Frequency Specifications. Special Purpose Oscilloscopes: Dual Trace, Dual Beam CROs, Sampling Oscilloscopes, Storage Oscilloscopes, Digital Storage CROs.

Unit 4:

Transducers: Transducers: Classification, Strain Gauges, Bounded, unbounded; Force and Displacement Transducers, Resistance Thermometers, LVDT, Thermocouples, Thermistor Piezoelectric Transducers, Variable Capacitance Transducers, gyroscopes, accelerometers.

Unit 5:

Bridges and Measurement of Physical parameters.

Bridges: Wheatstone bridge, Kelvin Bridge, Maxwell Bridge

Measurement of Physical Parameters: Flow Measurement, Displacement Meters, Liquid level Measurement, Measurement of Humidity and Moisture, Velocity, Force, Data Acquisition Systems.

Text Books:

1. H.S. Kalsi, Electronic instrumentation, Tata McGraw Hill, 2nd Edition, 2004.
2. A. D. Helfrick and W.D.Cooper, Modern Electronic Instrumentation and Measurement Techniques, PHI, 5th Edition, 2002.

Reference Books:

1. David A. Bell, Electronic Instrumentation &Measurements, PHI, 2nd Edition, 2003
2. Robert A. Witte Electronic Test Instruments, Analog and Digital Measurements, Pearson Education, 2nd Edition, 2004.
3. K. Lal Kishore, Electronic Measurements & Instrumentations, Pearson Education
4. Bell Electronic measurements and Instrumentation – B. M. Oliver and J.M. Cage, TMH, 2009.

III Year I Semester	Professional Core Elective-I	L	T	P	C
1004233131	CMOS ANALOG IC DESIGN	3	0	0	3

Course Overview:

This course focuses on the principles, design techniques, and analysis of analog integrated circuits using CMOS (Complementary Metal-Oxide-Semiconductor) technology. It explores the behavior of CMOS devices, analog circuit building blocks, and practical design considerations in the context of modern IC development. Students will gain both theoretical understanding and hands-on experience through simulation tools and design projects.

Course Objective:

- To understand the physical principles of CMOS devices and how they apply to analog circuit design.
- To analyze and design basic analog building blocks such as current mirrors, differential pairs, and amplifiers.
- To study the impact of noise, mismatches, and layout on analog circuit performance.
- To develop design skills using industry-standard EDA tools for simulation and layout.

Course Outcomes:

After completion of the course students able to

CO's	Course outcome	Bloom's taxonomy	Bloom's Taxonomy Level	PO
CO1	Understand the principles and characteristics of CMOS devices and their analog behavior.	Understanding	L2	PO1, PO2
CO2	Analyze and design CMOS analog building blocks like current mirrors and differential pairs.	Analyzing	L4	PO1, PO2
CO3	Design basic analog circuits such as biasing circuits, current sources, and amplifiers using CMOS technology.	Analyzing	L4	PO3, PO5
CO4	Simulate CMOS analog circuits using EDA tools and interpret the results for performance optimization.	Evaluate	L5	PO5, PO12

UNIT- I **11-Hours**

Basic MOS Device physics – General considerations MOS I/V Characteristics, Second Order effects, MOS Device models. Short Channel Effects and Device Models, Single Stage Amplifiers –Basic Concepts, Common Source Stage, Source Follower, Common Gate Stage, Cascode Stage.

Unit-II: **10-Hours**

Differential Amplifiers – Single Ended and Differential Operation, Basic Differential Pair, Common Mode Response, Differential Pair with MOS loads, Gilbert Cell. Passive and Active Current Mirrors– Basic Current Mirrors, Cascode Current Mirrors.

Unit-III: **10-Hours**

Frequency Response of Amplifiers – General Considerations, Common Source Stage, Source Followers, Common Gate Stage, Cascode Stage, Differential Pair, Noise – Types of Noise, Representation of Noise in circuits, Noise in single stage amplifiers.

Unit-IV: **10-Hours**

Feedback Amplifiers – General Considerations, Feedback Topologies, Effect of Loading, Operational Amplifiers – General Considerations, One Stage Op Amps, Two Stage Op-Amps, Gain Boosting, Common– Mode Feedback, Input Range limitations, Slew Rate, Power Supply Rejection.

Unit-V: **9-Hours**

Characterization of Comparator, Two-Stage, Open-Loop Comparators, Other Open-Loop Comparators, Improving the Performance of Open-Loop Comparators.

Text Books:

1. B.Razavi, "Design of Analog CMOS Integrated Circuits", 2nd Edition, McGraw Hill Edition 2016.
2. Paul. R.Gray&Robert G. Meyer, "Analysis and Design of Analog Integrated Circuits", Wiley, 5th Edition, 2009.

Reference Books:

1. T. C. Carusone, D. A. Johns & K. Martin, "Analog Integrated Circuit Design", 2nd Edition, Wiley, 2012. 2.P.E.Allen&D.R. Holberg, "CMOS Analog Circuit Design", 3rd Edition, Oxford University Press, 2011.
3. R. Jacob Baker, "CMOS Circuit Design, Layout, and Simulation", 3rd Edition, Wiley, 2010.

e-Resources:

1. https://nptel.ac.in/courses/108106105/NPTEL.

III Year I Semester	Professional Core Elective-I COMPUTER ARCHITECTURE & ORGANIZATION	L	T	P	C
1004233132		3	0	0	3

Course Overview:

The **Computer Architecture & Organization** course explores the structure, functionality, and design of computer systems. Topics include CPU architecture, memory hierarchy, instruction sets, input/output systems, and performance optimization. Students learn how hardware and software interact, enabling efficient computing.

Course Objective:

1. To impart basic concepts of computer architecture and organization,
2. To explain key skills of constructing cost-effective computer systems.
3. To familiarize the basic CPU organization.
4. To help students in understanding various memory devices.
5. To facilitate students in learning IO communication

Course Outcomes:

After completion of the course students able to

CO's	Course outcome	Bloom's taxonomy	Bloom's Taxonomy Level	PO
CO1	Explain various components of computer and their interconnection	Understanding	L2	PO1, PO2
CO2	Compare and select various Memory devices as per requirement	Applying	L3	PO2, PO3, PO5
CO3	Compare various types of IO mapping techniques	Applying	L3	PO3, PO4
CO4	Critique the performance issues of cache memory and virtual memory.	Evaluating	L4	PO3, PO4

Unit-I: **8-Hours**

Structure of Computers: Computer types, Functional units, Basic operational concepts, Generations of computer, Von Neumann Architecture, Bus Structures, Software, Performance, Multiprocessors and Multicomputer, Data representation, Fixed and Floating point.

Computer Arithmetic: Addition and Subtraction, Multiplication and Division algorithms, Floating-point Arithmetic Operations.

Unit-II: **8-Hours**

Basic Computer Organization and Design: Instruction codes, Computer Registers, Computer Instructions and Instruction cycle. Timing and Control, Memory-Reference Instructions, Input-Output and interrupt. Central processing unit: Stack organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Complex Instruction Set Computer (CISC) Reduced Instruction Set Computer (RISC), CISC vs RISC.

Unit-III: **8-Hours**

Register Transfer and Micro-Operations: Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro-Operations, Logic Micro-Operations, Shift Micro-Operations, Arithmetic logic shift unit. **Micro-Programmed Control:** Control Memory, Address Sequencing, Micro-Program example, Design of Control Unit.

Unit-IV: **9-Hours**

Memory Management System: Memory Hierarchy, Semiconductor Memories, RAM (Random Access Memory), Read Only Memory (ROM), Types of ROM, Cache Memory, Performance considerations, Virtual memory, Paging, Secondary Storage.

Unit-V: **8-Hours**

Input Output Organization: I/O interface, Programmed IO, Memory Mapped IO, Interrupt Driven IO, DMA. MULTIPROCESSORS: Characteristics of multiprocessors, Interconnection structures, Inter processor Communication and Synchronization.

Text Books:

1.M. Moris Mano (2006), Computer System Architecture, 3rd edition, Pearson/PHI, India.
2. David A. Patterson and John L. Hennessey, "Computer organization and design: The hardware /software interface", Morgan Kauffman / Elsevier, Fifth edition, 2014.

Reference Books:

1. Carl Hamacher, Zvonks Vranesic, SafeaZaky (2002), Computer Organization, 5th edition, McGraw Hill, New Delhi, India.
2. William Stallings (2010), Computer Organization and Architecture- designing for performance, 8th edition, Prentice Hall, New Jersy.
3. Anrew S. Tanenbaum (2006), Structured Computer Organization, 5th edition, Pearson Education Inc,
4. John P. Hayes (1998), Computer Architecture and Organization, 3rd edition, Tata McGrawHill.

III Year I Semester	Professional Core Elective-I BIOMEDICAL SIGNAL PROCESSING	L	T	P	C
1019233130		3	0	0	3

Course Overview:

This course introduces the fundamentals of biomedical signal processing, focusing on signals like ECG, EEG, and EMG. Students will learn techniques for analyzing cardiological and neurological signals. It covers noise removal using adaptive filtering methods and real-time signal analysis. The course also explores the integration of biomedical signals with diagnostic imaging systems.

Course Objective:

1. To introduce the nature, types, and characteristics of biomedical signals.

2. To explain the techniques for processing ECG and EEG signals for clinical applications.

3. To provide knowledge on noise and artifact removal using adaptive filtering methods.

4. To understand neurological signal analysis, including sleep studies and brain wave interpretation.

5. To explore the role of signal processing in diagnostic imaging and biomedical data integration.

Course Outcomes:

After completion of the course students able to

CO's	Course outcome	Bloom's taxonomy	Bloom's Taxonomy Level	PO
CO1	Identify and describe various biomedical signals.	Understand	L2	PO1, PO2
CO2	Interpret cardiological and neurological signals using signal processing techniques.	Apply	L3	PO2, P03, PO4
CO3	Understand adaptive filtering methods to remove noise and improve signal quality	Understand	L2	PO1, PO2
CO4	Illustrate the integration of biomedical signals with diagnostic imaging for clinical use	Apply	L3	PO2, PO3

UNIT- I **9-Hours**

Introduction to Biomedical Signals: The nature of biomedical signals, action potential, objectives of biomedical signal analysis, Difficulties in biomedical signal analysis, computer aided diagnosis, Basic electrocardiography, the brain and its potentials, the electrophysiological origin of brain waves, EEG signals and its characteristics, EEG analysis. Basic EMG. Electroneurogram, Phono cardiogram.

Unit-II: **8-Hours**

Cardiological Signal Processing: Basic ECG, Electrical Activity of the heart, ECG data acquisition, ECG lead system, ECG parameters & their estimation, Use of multiscale analysis for ECG parameters estimation, Noise & Artifacts, arrhythmia analysis monitoring, long-term continuous ECG recording, direct ECG data compression techniques. Cardiotocography.

Unit-III: **10-Hours**

Neurological Signal Processing: Basic EEG, Linear prediction theory, the autoregressive method, adaptive segmentation, Sleep EEG: data acquisition and classification of sleep stages, the markov model and markov chains, template matching for EEG-spike-and-wave detection.

Unit-IV: **10-Hours**

Adaptive Interference/Noise Cancellation: The wiener filtering problem, principle of an adaptive filter, the Widrow Hoff least mean square adaptive algorithm, Adaptive noise canceller: cancellation of 50/60hz interference in ECG, cancelling donor heart interference in heart-transplant ECG, cancellation of high frequency noise in electro-surgery.

Unit-V: **10-Hours**

Diagnostic Imaging and Integration: Overview of diagnostic imaging modalities: X-ray imaging, Computed Tomography (CT), Magnetic Resonance Imaging (MRI), Role of signal processing in imaging, Integration of biomedical signals and imaging data.

Text Books:

1. D.C.Reddy, Biomedical Signal Processing: Principles and Technique's Tata McGraw Hill, 2005.
2. E.N. Bruce, Biomedical Signal Processing and Signal Modelling, John Wiley and Sons, 2007.
3.MetinAkay, Biomedical Signal Processing, Academic Press, 2012.

Reference Books:

1. Sörnmo, Bioelectrical Signal Processing in Cardiac & Neurological Applications, Academic Press, 2005.
2. Rangayyan,Biomedical Signal Analysis,Wiley 2002.
3. I Enderle, Introduction to Biomedical Engineering, Elsevier, 2nd Edition, 2005

III Year – I Semester	PRINCIPLES OF OPERATING SYSTEMS (Open Elective -I)	L	T	P	C
1005233150		3	0	0	3

Course Objectives:

1.Provide knowledge about the services rendered by operating systems.

2.Present detail discussion on processes, threads and scheduling algorithms.

3.Discuss various file-system implementation issues and memory management techniques.

Course Outcomes:

1.Understand the importance of operating systems and different types of system calls.

2.Analyze the communication between processes and various process scheduling algorithms.

3.Understand the process synchronization, different ways for deadlocks handling.

4.Analyze various memory mapping techniques and different page replacement methods.

5.Evaluate various file allocation and disk scheduling algorithms.

UNIT-I: Operating Systems Overview:

Introduction: what is an operating system, Types of operating systems, operating systems concepts, operating systems services, Introduction to System call, System call types, Operating System Generation.

UNIT–II: Process Management:

Process Concept: Process Concept, Process Scheduling, Operations on Processes, Inter process Communication.

Multithreaded Programming: Overview, Multithreading models, Threading Issues.

Process scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms.

UNIT-III: Synchronization:

Process Synchronization: The Critical-Section Problem, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization examples.

Principles of deadlock – System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery from Deadlock.

UNIT-IV: Memory Management:

Memory Management strategies: Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table.

Virtual Memory Management: Virtual Memory, Demand Paging, Page-Replacement Algorithms, Thrashing.

UNIT-V: File system Interface- The concept of a file, Access Methods, Directory and Disk structure, File system mounting.

File System implementation: File system structure, allocation methods, free-space management.

Mass-storage structure: Overview of Mass-storage structure, Disk scheduling, Device drivers.

Text Books:

1.Silberschatz A, Galvin P B, and Gagne G, Operating System Concepts, 9th edition, Wiley, 2013.

2.Tanenbaum A S, Modern Operating Systems, 3rd edition, Pearson Education, 2008. (for Inter process Communication and File systems).

References:

i. Tanenbaum A S, Woodhull A S, Operating Systems Design and Implementation, 3rd edition, PHI, 2006.

ii.Dhamdhere D M, Operating Systems A Concept Based Approach, 3rd edition, Tata McGraw-Hill, 2012.

iii.Stallings W, Operating Systems -Internals and Design Principles, 6th edition, Pearson Education, 2009.

iv.Nutt G, Operating Systems, 3rd edition, Pearson Education, 2004.

Course Code	SCRIPTING LANGUAGES (OPEN ELECTIVE-I)	L	T	P	C
1005233151		3	0	0	3

Course Objectives:

1. Introduces scripting languages such as Perl, Ruby, PHP and TCL.
2. Design, code, and test applications using scripting languages.
3. An ability to create PHP scripts to store and manipulate user data.

Course Outcomes:

1. Acquire programming skills in RUBY scripting language.
2. Ability to create and run scripts using PERL.
3. To gain some fluency programming in Perl and PHP and related languages.
4. To improve knowledge of advanced concepts in PHP.
5. Gain knowledge of the strengths and weakness of Perl, TCL and Ruby; and select an appropriate language for solving a given problem.

UNIT-I:

Introduction: Ruby, Rails, the structure and Execution of Ruby Programs, Package Management with RUBYGEMS.

Ruby and Web: Writing CGI scripts, cookies, Choice of Web servers, SOAP and web services

Ruby Tk: Simple Tk Application, widgets, Binding events, Canvas, scrolling

UNIT-II:

Introduction to PERL and Scripting:

Scripts and Programs, Origin of Scripting, Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines.

UNIT-III:

Advanced PERL:

Finer points of looping, pack and unpack, file system, eval, data structures, packages, modules, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Issues.

PHP Basics : PHP Basics- Features, Embedding PHP Code in your Web pages, Outputting the data to the browser, Data types, Variables, Constants, expressions, string interpolation, control structures, Function, Creating a Function, Function Libraries, Arrays, strings and Regular Expressions.

UNIT-IV:

Advanced PHP Programming: PHP and Web Forms, Files, PHP Authentication and Methodologies - Hard Coded, File Based, Database Based, IP Based, Login Administration, Uploading Files with PHP, Sending Email using PHP, PHP Encryption Functions, the Mcrypt package and Building Web sites for the World.

UNIT -V:

TCL: Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures, strings, patterns, files, Advance TCL, eval, source, exec and uplevel commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, CInterface.

Tk: Visual Tool Kits, Fundamental Concepts of Tk, Tk by example, Events and Binding, Perl-Tk.

Text Books:

i. The World of Scripting Languages, David Barron, Wiley Publications.
ii. Ruby Programming language by David Flanagan and Yukihiro Matsumoto O'Reilly
iii. Beginning PHP and MySQL, 3rd Edition, Jason Gilmore, Apress Publications (Dream tech)

Reference Books:

i. Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP, J.Lee and B.Ware (Addison Wesley) Pearson Education.
ii. Perl by Example, E.Quigley, Pearson Education.
iii. PHP 6 Fast and Easy Web Development, Julie Meloni and Matt Telles, Cengage Learning Publications.

III Year I Semester	LINEAR AND DIGITAL IC APPLICATIONS LAB	L	T	P	C
1019233110		0	0	3	1.5

Course Objective:

The main objectives of the course are:

1. To introduce the basic building blocks of analog and digital integrated circuits.
2. To observe the input and output waveforms of various applications of analog and digital integrated circuits.
3. To determine the performance parameters of various applications of analog and digital integrated circuits.
4. To understand the design concepts and simulation process of analog and digital integrated circuits.
5. To teach the qualitative approach of designing and modelling various logic circuits using HDL.

Course Outcomes:

After completion of the course students able to

CO's	Course outcome	Bloom's Taxonomy Level	PO
CO1	Interpret different linear and non-linear applications of Op-Amp.	L2	PO1, PO2, PO3
CO2	Design and analysis of filters and DAC using op-amp and IC555 applications	L4	PO2, PO3, PO4
CO3	Construct combinational circuits using digital ICs and simulate using Xilinx	L3	PO3, PO4, PO5
CO4	Construct sequential circuits using digital ICs and simulate using Xilinx	L3	PO3, PO4, PO5

List of Experiments:

PART-A: LINEAR INTEGRATED CIRCUITS APPLICATIONS (HARDWARE)

1. Operational Amplifier (OP-AMP) Frequency Response in Inverting and Non- Inverting configurations using IC 741.
2. OP-AMP as an Integrator and Differentiator using IC 741.
3. First order LPF & HPF Active Filters using OP-AMP. (IC 741).
4. Astable and Monostable Multivibrators using 555 Timer.
5. Schmitt trigger using IC 741 OP-AMP & IC 555 Timer.
6. R-2R ladder type DAC using OP-AMP. (IC 741)

PART-B: DIGITAL INTEGRATED CIRCUITS APPLICATIONS (SOFTWARE)

1. 4-bit Parallel Adder using IC 74LS83A/IC 74LS283
2. 4-bit Comparator using IC 74HC85
3. 8 X 1 Multiplexer using IC 74LS151 and 2 X 1 De-Multiplexer using IC 74LS155
4. 4-line-to-16-line Decoder using IC 74HC154 or 3 to 8 Decoder using IC 74LS138
5. The S-R Latch using IC 74LS279
6. 4-bit synchronous binary counter(74HC163)

Text Books:

1. Linear Integrated Circuits – D. Roy Chowdary, New Age International (P) Ltd, 2nd edition, 2003.
2. Op-Amp and Linear IC's – Ramakanth A Gayakwad, PHI, 4th edition, reprint 2000.
3. VHDL Primer, J. Bhasker, Pearson Education/ PHI, 3rd Edition, 1995.

III Year I Semester	Microprocessors and Microcontrollers Lab	L	T	P	C
1004233111		0	0	3	1.5

Course Objectives:

- To understand the architecture and operation of 8086 microprocessor and 8051 Microcontroller.
- To develop assembly language programs for 8086 and 8051.
- To interface peripherals with 8086 and 8051.
- To understand the operation of programmable interface devices like 8255.
- To implement real-time applications using microcontrollers interfaced with sensors, motors, and displays.

Course Outcomes:

After completion of the course students able to

CO's	Course Outcome	Bloom's Taxonomy Level	PO
CO1	Describe the internal architecture of 8086 and 8051.	L2	PO1, PO2
CO2	Develop and execute assembly language programs for 8086 and 8051.	L3	PO2, PO3, PO5
CO3	Interface peripheral devices such as ADC, DAC, LEDs, keypads, and motors with 8051.	L3	PO3, PO4
CO4	Analyze and implement microcontroller-based real-world applications.	L4	PO3, PO4

List of Experiments: (Minimum of 12 Experiments has to be performed)

1. Write a data transfer program using different addressing modes in assembly language programming.
2. Perform arithmetic operations on 8 bit and 16-bit numbers in assembly language programming.
3. Data transfer program using string instruction in assembly language programming.
4. Program for data conversion in assembly language programming.
5. Implement stack operations using PUSH and POP instructions.
6. Program to reject negative numbers from a series of bytes.
7. Interfacing 8086 with 8255 PPI to display data on LEDs.
8. Perform Arithmetic operations on 8bit numbers in assembly language programming using 8051 microcontrollers.
9. Write assembly language program for factorial of given n- numbers.
10. Write assembly language program for finding number of 1's and number of 0's in a given 8-bit number.

11. Program to toggle the LED.
12. Programming and interfacing of traffic light logic.
13. Program to generate square wave using interrupts.
14. Programming and interfacing of the key pad matrix.
15. Programming and interfacing of seven-segment display.
16. Programming and interfacing of the LCD
17. Programming and interfacing of the relay.
18. Programming and interfacing of the dc/Stepper motor.

Text Books

1 Douglas V. Hall, Microprocessors and Interfacing: Programming and Hardware, Tata McGraw-Hill.

2 Ramesh S. Gaonkar, Microprocessor Architecture, Programming and Applications with the 8085, Penram International.

3 Muhammad Ali Mazidi & Janice Gillispie Mazidi, The 8051 Microcontroller and Embedded Systems, Pearson Education.

Reference Books:

1 Kenneth Ayala, The 8051 Microcontroller, Cengage Learning.

2 Barry B. Brey, The Intel Microprocessors 8086/88, 80186/188, 80286, 80386, and 80486, Pearson Education.

3 Krishna Kant, Microprocessors and Microcontrollers: Architecture, Programming and System Design, PHI.

III Year I Semester	FULL STACK DEVELOPMENT - 2 (SKILL ENHANCEMENT COURSE)	L	T	P	C
1005233180		0	1	2	2

Course Objectives:

The main objectives of the course are to

1. Make use of router, template engine and authentication using sessions to develop application in ExpressJS.
2. Build a single page application using RESTful APIs in ExpressJS
3. Apply router and hooks in designing ReactJS application

Course Outcomes:

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

1. Apply core concepts of ExpressJS to build web applications
2. Design and develop web applications using ExpressJS by connecting to MongoDB with Mongoose
3. Creating reusable components using both function-based and class-based approaches.
4. Implement dynamic user interfaces in ReactJS
5. Install and configure MongoDB (including Atlas) and perform essential database operations

Experiments covering the Topics:

1. ExpressJS – Routing, HTTP Methods, Middleware, Templating, Form Data
2. ExpressJS – Cookies, Sessions, Authentication, Database, RESTful APIs
3. ReactJS – Render HTML, JSX, Components – function & Class, Props and States, Styles, Respond to Events
4. ReactJS – Conditional Rendering, Rendering Lists, React Forms, React Router, Updating the Screen
5. ReactJS – Hooks, Sharing data between Components, Applications – To-do list and Quiz
6. MongoDB – Installation, Configuration, CRUD operations, Databases, Collections and Records

Sample Experiments:

1. ExpressJS – Routing, HTTP Methods, Middleware.

a. Write a program to define a route, Handling Routes, Route Parameters, Query Parameters and URL building.

b. Write a program to accept data, retrieve data and delete a specified resource using http methods.

c. Write a program to show the working of middleware.

2. ExpressJS – Templating, Form Data

a. Write a program using templating engine.

b. Write a program to work with form data.

3. ExpressJS – Cookies, Sessions, Authentication

a. Write a program for session management using cookies and sessions.
b. Write a program for user authentication.

4. ExpressJS – Database, RESTful APIs

a. Write a program to connect MongoDB database using Mangoose and perform CRUD operations.
b. Write a program to develop a single page application using RESTful APIs.

5. ReactJS – Render HTML, JSX, Components – function & Class

a. Write a program to render HTML to a web page.
b. Write a program for writing markup with JSX.
c. Write a program for creating and nesting components (function and class).

6. ReactJS – Props and States, Styles, Respond to Events

a. Write a program to work with props and states.
b. Write a program to add styles (CSS & Sass Styling) and display data.
c. Write a program for responding to events.

7. ReactJS – Conditional Rendering, Rendering Lists, React Forms

a. Write a program for conditional rendering.
b. Write a program for rendering lists.
c. Write a program for working with different form fields using react forms.

8. ReactJS – React Router, Updating the Screen

a. Write a program for routing to different pages using react router.
b. Write a program for updating the screen.

9. ReactJS – Hooks, Sharing data between Components

a. Write a program to understand the importance of using hooks.
b. Write a program for sharing data between components.

10. MongoDB – Installation, Configuration, CRUD operations

a. Install MongoDB and configure ATLAS
b. Write MongoDB queries to perform CRUD operations on document using insert(), find(), update(), remove()

11. MongoDB – Databases, Collections and Records

a. Write MongoDB queries to Create and drop databases and collections.
b. Write MongoDB queries to work with records using find(), limit(), sort(), createIndex(), aggregate().

12. Augmented Programs: (Any 2 must be completed)

a. Design a to-do list application using NodeJS and ExpressJS.

III Year I Semester	PCB Design Practice Lab	L	T	P	C
1004233181		0	0	3	1

Course Objective:

1. To introduce students to the fundamentals of PCB design, layout, and fabrication processes using industry-standard EDA (Electronic Design Automation) tools.
2. To develop competency in schematic capture, circuit simulation, and PCB layout creation for analog and digital circuits such as power supplies, amplifiers, filters, and control systems.
3. To enable students to understand the practical aspects of PCB design, including parameter setting, component placement, routing, and thermal management.
4. To promote hands-on experience in designing real-world application circuits, such as sensor-based systems and security circuits, using both simulation and physical prototyping.
5. To provide exposure to thermal design concepts and heat dissipation techniques in PCB design to ensure circuit reliability and performance.

Course Outcomes:

After completion of the course students able to

CO's	Course outcome	Bloom's Taxonomy Level	PO
CO1	Determine appropriate components to make circuits.	L2	PO1, PO2, PO5
CO2	Design of types of Rectifiers	L3	PO2, PO3, PO5
CO3	Analyse the Design of a Security System	L4	PO3, PO4, PO5
CO4	Design of an electronic printed circuit board for a specific application using standard software.	L3	PO3, PO4, PO5

List of Experiments:

1. Introduction to PCB DESIGN and EDA Tool Software
2. Parameter setting for PCB Design.
3. Design of a ±5V Power supply.
4. Schematic Creation and simulation of an electronic circuit
5. Design and Simulate ON/OFF Switches Circuits
6. Design and simulation of a Half and Full Wave Rectifier
7. Design of a PCB layout of Low pass filter
8. Design of a PCB layout of CE Amplifier
9. Design and Simulate Simple 7 Segment Circuits
10. Design of an IR Proximity Sensor – Touchless Door Bell using Zero PCB

11. Design of a Laser Light Security Alarm.
12. Design of a Mobile Phone Detector Circuit.
13. Study of PCB Thermal management techniques.
14. Study of Transistor Heat dissipation using PCB.

Textbooks:

1. Simon Monk, "Make Your Own PCBs with EAGLE: From Schematic Designs to Finished Boards (Electronics)" 2017

Reference books:

1. S. Yogesh, "OSCAD: An Open-Source EDA Tool for Circuit Design, Simulation, Analysis and PCB Design", Shroff Publishers & Distributors Pvt. Ltd, 2013.

e. sourses:

1. https://www.udemy.com/course/circuit-design-simulation-and-pcb-manufacturing-bundle
2. https://www.allaboutcircuits.com/technical-articles/pcb-thermal-management-techniques/

Software Required:

1. Proteus Software / Equivalent Industry Standard Software.
2. Personal computer system with necessary software to run the simulation of design

III Year I Semester	Constitution of India (AUDIT COURSE)	L	T	P	C
1000233125		2	0	0	-

Course Overview: This course provides foundational knowledge of the Indian Constitution, covering its history, features, structure, and key provisions. It explores fundamental rights, duties, directive principles, and the roles of the legislature, executive, and judiciary, fostering awareness of democratic values, governance, and citizen responsibilities in India.

Course Objective:

- Understand the historical development and philosophy behind the Indian Constitution.
- Gain insights into the structure, functioning, and powers of Union and State Governments.
- Comprehend the scope of fundamental rights, duties, and directive principles.
- Recognize the functioning of constitutional bodies and their roles in governance.
- Appreciate the significance of local self-governance and recent constitutional amendments

Course Outcomes: After completion of the course students able to

CO	Course outcome	Bloom's taxonomy	Bloom's Taxonomy Level	PO
CO1	Explain the evolution and salient features of the Indian Constitution	Understanding Applying	L2 L3	PO1, PO2, PO3
CO2	Describe the structure of the Indian Government and its functioning at the Union and State levels.	Applying Analyzing	L3 L4	PO2, PO3, PO4
CO3	Analyze the significance of the Preamble, Fundamental Rights, and Duties	Understanding Applying	L2 L3	PO3, PO4
CO4	Interpret the importance of decentralization through Panchayati Raj and urban local bodies.	Applying Analyzing	L3 L4	PO3, PO4, PO5

Unit- I **7-Hours**

Constitutional Foundation and Historical Background

Constitutional history and the making of the Indian Constitution, Role of the Constituent Assembly, Salient features of the Indian Constitution, Significance of the Preamble, Process of constitutional amendments (Article 368)

Unit II **8-Hours**

Fundamental Rights, Duties, and Directive Principles

Citizenship provisions under the Constitution, Fundamental Rights (Articles 12–35), Directive Principles of State Policy (Articles 36–51), Fundamental Duties (Article 51A)

Unit-III **8 -Hours**

Union Government

President and Vice President: election, powers, and removal, Prime Minister and Council of Ministers, Structure and functions of Parliament, Judiciary: Structure and powers of the

Supreme Court, Centre-State relations: legislative, administrative, and financial, Emergency provisions (Articles 352, 356, 360)

Unit-IV **9-Hours**

State Government and Local Governance Governor:

Appointment, powers, and functions, State Legislature and Chief Minister, Role of High Courts, Rural and Urban Local Governments, 73rd and 74th Constitutional Amendment Acts (Panchayati Raj and Municipalities)

Unit-V **8-Hours**

Constitutional and Statutory Bodies

Comptroller and Auditor General (CAG), Election Commission of India, Finance Commission, Attorney General and Advocate General, Union and State Public Service Commissions (UPSC & SPSC), Tribunals and National Human Rights Commission (NHRC)

Text Books:

1. J. C. Johari, Indian Government and Politics, Vishal Publications, Delhi, 2009. Machine Learning: A Probabilistic Perspective, Kevin P. Murphy, 2012, MIT Press (Unit-2&3)

2. M. V. Pylee, Introduction to the Constitution of India, 5th Ed., Vikas Publishing House, Mumbai, 2007J. Raj Indian Government and Politics

Reference Books:

1. D.D. Basu, Introduction to the Indian Constitution, 21st Ed., Lexis Nexis, Gurgaon, India, 2011.

2. Subhas C. Kashyap, Our Constitution, 2nd Ed., National Book Trust India, New Delhi, 2013

e-Resources: https://onlinecourses.nptel.ac.in/noc20_lw02/preview Evaluation of Industry Internship