Program structure & Detailed Syllabus

2023

For

Under Graduate Programme (B.Tech)

ELECTRONICS AND COMMUNICATION 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. -ECE –COURSE STRUCTURE–VR23

	I Year I Semester						
S.No.	**Course Code**	**Category**	**Course Name**	**L**	**T**	**P**	**Credits**
1.	1000231101	BS	Linear Algebra & Calculus	3	1	0	3
2.	1001231101	ES/CIVIL	Basic Civil & Mechanical Engineering	3	1	0	3
3.	1000231102	BS	Engineering Physics	3	1	0	3
4.	1000231104	HS	Communicative English	2	0	0	2
5.	1002231101	ES/EEE	Basic Electrical &Electronics Engineering	3	1	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.	1005231110	PC/CSE	IT Workshop	0	0	2	1
9.	1000231111	HS	Communicative English Lab	0	0	2	1
10.	1000231120	MC	NSS/NCC/Scouts &Guides/Community Service	0	0	1	0.5
Total Credits							**19**

	I Year II Semester						
S.No.	**Course Code**	**Category**	**Course Name**	**L**	**T**	**P**	**Credits**
1.	1003231101	ES/MECH	Engineering Graphics	1	0	4	3
2.	1000231103	BS	Chemistry	3	1	0	3
3.	1005231101	ES/CSE	Introduction to Programming	3	1	0	3
4.	1000231201	BS	Differential Equations and Vector calculus	3	1	0	3
5.	1002231202	PC/EEE	Network Analysis	3	1	0	3
6.	1000231112	BS	Chemistry Lab	0	0	2	1
7.	1005231111	ES/CSE	Computer Programming Lab	0	0	3	1.5
8.	1003231110	ES/MECH	Engineering Workshop	0	0	3	1.5
9.	1002231211	PC/EEE	Network Analysis and Simulation Lab	0	0	3	1.5
10.	1000231121	MC	Health and Wellness,Yoga and Sports	0	0	1	0.5
Total Credits							**21**

I Year I Semester

SYLLABUS

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

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

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

- Develop matrix algebra techniques that 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 dimensions.

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, Reduction of 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's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof), and problems on the above theorems.

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

UNIT V Multiple Integrals
Double integrals, triple integrals, change of order of integration, change of variables to polar 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 Science International Ltd., 2021 (9th reprint).
2. George B.Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 14/e, Pearson Publishers, 2018.
3. Glyn James, Advanced Modern Engineering Mathematics, 5/e, Pearson publishers, 2018.
4. Michael Green berg, Advanced Engineering Mathematics, 9th edition, Pearson edn

I Year – I Semester	BASIC CIVIL & MECHANICAL ENGINEERING (Common to CE, ME, IT, CSE, CSE(DS), CSE(CS), CSE(AI)	L	T	P	C
Course Code (1001231101)		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's economy.
- Get familiarized with the importance of quality, conveyance and storage of water.
- Introduction to basic civil engineering materials and construction techniques.

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

CO1: Understand various sub-divisions of Civil Engineering and to appreciate their role in ensuring better society.

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

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

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

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

UNIT I

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

UNITII

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

UNIT III

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

Water Resources and Environmental Engineering: Introduction, Sources of water- Quality of water- Specifications- Introduction to Hydrology– 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. Fifth Edition.
2. Hydrology and Water Resources Engineering, Santosh Kumar Garg, Khanna Publishers, Delhi.2016
3. Irrigation Engineering and Hydraulic Structures-Santosh Kumar Garg, Khanna Publishers, Delhi 2023. 38th Edition.
4. Highway Engineering, S. K. Khanna, C.E.G. Justoand Veeraraghavan, Nemchandand 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.

UNIT I

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

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

UNIT II

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

Thermal Engineering–working principle of Boilers, 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 their 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.Shanmugam and M.S.Palanisamy, Basic Civil and the Mechanical Engineering,Tata McGraw Hill publications (India) Pvt. Ltd.

I Year – I Semester	ENGINEERING PHYSICS (Common for all branches of Engineering)	L	T	P	C
Course Code (1000231102**)**		**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 free electron 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 in thin films (Reflection Geometry) & applications - Colors in thin films- Newton's Rings- Determination of wavelength and refractive index.

Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, 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 (L3)
- **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 magnetic materials: 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 free electron 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	COMMUNICATIVE ENGLISH (Common to All Branches of Engineering)	L	T	P	C
Course Code (1000231104**)**		**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 test comprehension.

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 – II 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/ electronic engineering 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 of electricity bill for domestic consumers.

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

Text Books:

1) *Basic Electrical Engineering*, 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, Second Edition.

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 full wave bridge rectifier, capacitor filter (no analysis), working of simple zener voltage regulator. Amplifiers: Block diagram of Public Address system. Electronic Instrumentation: Block diagram of an electronic instrumentation system.

UNIT III DIGITAL ELECTRONICS

Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess- 3 code, Gray code, Hamming code. Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Truth Tables and Functionality of Logic Gates – NOT, OR, AND, NOR, NAND, XOR and XNOR. Simple combinational circuits–Half and Full Adders.

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

Course Objectives:

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

Course Outcomes: 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 using diffraction grating in normal incidence configuration.
3. Verification of Brewster's law
4. Determination of dielectric constant for a dielectric substance using dielectric constant apparatus
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 biasing conditions.
10. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's Method.
11. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.
12. Determination of temperature coefficients of a thermistor.
13. Determination of acceleration due to gravity and radius of Gyration by using a compound pendulum.
14. Determination of magnetic susceptibility by Kundt's tube method.
15. Determination of rigidity modulus of the material of the given wire using Torsional pendulum.
16. Sonometer: Verification of laws of stretched string.
17. Determination of young's modulus for the given material of wooden scale by non-uniform bending (or double cantilever) method.
18. Determination of Frequency of electrically maintained tuning fork by Melde's experiment.
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 maybe conducted in virtual mode.

References:

- A Textbook of Practical Physics - S. Balasubramanian, M.N. Srinivasan, S. Chand Publishers,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 and power factor.
CO4	Analyse various characteristics of electrical circuits, electrical machines and measuring instruments.
CO5	Design suitable circuits and methodologies for the measurement of various electrical parameters; Household and commercial wiring.

Activities:

1. Familiarization of commonly used Electrical & Electronic Workshop Tools: Bread board, Solder, cables, relays, switches, connectors, fuses, Cutter, plier, screwdriver set, wire stripper, flux, knife/blade, soldering iron, de-soldering pump etc.
   - Provide some exercises so that hardware tools and instruments are learned to be 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 of electron devices & its applications.

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

CO1: Identify & testing of various electronic components.
CO2: Understand the usage of electronic measuring instruments.
CO3: Plot and discuss the characteristics of various electron devices.
CO4: Explain the operation of a digital circuit.

List of Experiments:

1. Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.
2. Plot V – I characteristics of Zener Diode and its application as voltage Regulator.
3. Implementation of half wave and full wave rectifiers
4. Plot Input & Output characteristics of BJT in CE and CB configurations
5. 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 implementedusing both Hardware and Software

I Year – I Semester	IT WORKSHOP	L	T	P	C
Course Code: (1005231110)	(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. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

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

Task 3: Every student should individually install MS windows on the personal computer. Labinstructor 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 is no 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 internetand would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

LaTeX and WORD

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

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

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

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

EXCEL

Excel Orientation: The mentor needs to tell the importance of MS office or equivalent (FOSS)tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using 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, WordArt, 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, slideslotter, 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 model responds. Try asking questions, starting conversations, or even providing incomplete sentences to see how the model completes them.

- Ex: Prompt: "You are a knowledgeable AI. Please answer the following question: What is the capital of France?"

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

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

Task 3: Language Translation: Experiment with translation tasks by providing a sentence in one language and asking the model to translate it into another language. Compare the output 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:

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

I Year – I Semester	COMMUNICATIVE ENGLISH LAB (Common to All Branches of Engineering)	L	T	P	C
Course Code: (1000231111)		**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 fortheory 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 writingand 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. (Thisis 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	NSS/NCC/SCOUTS & GUIDES/COMMUNI 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 able to

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

UNIT I Orientation

General Orientation on NSS/NCC/ Scouts & Guides/Community Service activities,career guidance.

Activities:

i) Conducting –ice breaking sessions-expectations from the course-knowing 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) Organising Zero-waste day.
v) Digital Environmental awareness activity via various social media platforms.
vi) Virtual demonstration of different eco-friendly approaches for sustainable living.
vii) Write a summary on any book related to environmental issues.

UNIT III
Community Service Activities:

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

ii) Conducting awareness programs on Health-related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS.

iii) Conducting consumer Awareness. Explaining various legal provisions etc.

iv) Women Empowerment Programmes- Sexual Abuse, Adolescent Health and 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 viva voce on the subject.

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I Year II Semester

SYLLABUS

I Year – II Semester	ENGINEERING GRAPHICS	L	T	P	C
Course Code (1003231101**)**	(Common to All branches of Engineering)	**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 in front, top and side views.
CO3: Understand and draw projection of solids in various positions in first quadrant.
CO4: Explain principles behind development of surfaces.
CO5: Prepare isometric and perspective sections of simple solids.

UNIT I

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

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

Scales: Plain scales, diagonal scales and vernier scales.

UNIT II

Orthographic Projections: Reference plane, importance of reference lines or Plane, Projections of a point situated in any one of the four quadrants.

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

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

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 radialline 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,TataMcGraw Hill, 2017.

I Year – II Semesters	Chemistry (Common to EEE, ECE, CSE, IT & allied branches)	L	T	P	C
Course Code (1000231112)		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 nano tubes and Graphines nanoparticles.

UNIT- III

Electrochemistry and Applications

Electrochemical cell, Nernst equation, cell potential calculations and numerical problems, potentiometry-potentiometric titrations (redox titrations), concept of conductivity, 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-oxygenfuel cell– working of the cells.
Polymer Electrolyte Membrane Fuel cells (PEMFC).

UNIT- IV

Polymer Chemistry

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, with specific examples and mechanisms of polymer formation. Plastics –Thermo and Thermosetting plastics, Preparation, properties and applications of – PVC, Teflon, Bakelite, Nylon-6,6, carbon fibres. Elastomers–Buna-S, Buna-N–preparation, properties and applications. Conducting polymers – polyacetylene, polyaniline, – mechanism of conduction and applications. Bio-Degradable polymers - Poly Glycolic Acid (PGA), Polyl Lactic Acid (PLA).

UNIT- V

Instrumental Methods and Applications

Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. UV-Visible Spectroscopy, electronic transition, Instrumentation, IR spectroscopies, fundamental modes and selection rules, Instrumentation. Chromatography-Basic Principle, Classification-HPLC: Principle, Instrumentation and Applications.

Textbooks:

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

Reference Books:

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

I Year – II Semester	INTRODUCTION TO PROGRAMMING	L	T	P	C
Course Code: (1005231101)	**(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. BasicLoop Structures: while, do-while loops, for loop, nested loops, The Break and Continue Statements, goto statement.

UNIT-III Arrays:

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

UNIT-IV Functions:

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

UNIT-V

Structures, 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 and problem-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 the concept 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 – 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 enligh tenth elearners 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, deloperator, 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 the theorems.

Text books:

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

Reference Books:

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

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I Year – II Semester	NETWORK ANALYSIS (ECE & allied branches)	L	T	P	C
Course Code: 1002231202		3	0	0	3

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

Course Outcomes: At the end of this course students will demonstrate the ability to

	Course Outcome
CO1	Understand basic electrical circuits with nodal and mesh analysis.
CO2	Analyse the circuit using network simplification theorems.
CO3	Find Transient response and Steady state response of a network.
CO4	Analyse electrical networks in the Laplace domain.
CO5	Compute the parameters of a two-port network.

UNIT-I: Basic Electrical Circuits and Network Theorems (10 Hours)

Types of circuit components, Types of Sources and Source Transformations, Mesh analysis and Nodal analysis, problem solving with resistances only including dependent sources also.
Principal of duality with examples.
Network Theorems: Thevenin's, Norton's, Millman's, Reciprocity, Compensation, Substitution, Superposition, Max Power Transfer, Tellegens - problem solving using dependent sources also.

UNIT-II: Transient Analysis (10 Hours)

Transients: First order differential equations, Definition of time constants, R-L circuit, R-C circuit with DC excitation, evaluating initial conditions procedure, second order differential equations, homogeneous, non-homogenous, problem-solving using R-L-C elements with DC excitation and AC excitation, Response as related to s-plane rotation of roots.
Laplace transform: introduction, Laplace transformation, basic theorems, problem solving using Laplace transform, partial fraction expansion, problem solving using Laplace transform.

UNIT-III: Steady State Analysis of A.C. Circuits (10 Hours)

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

UNIT-IV: Resonance and Coupled Circuits (10 Hours)

Resonance: Introduction, Definition of Q, Series resonance, Bandwidth of series resonance, Parallel resonance.
Coupled Circuits: Coupled Circuits: Self-inductance, Mutual inductance, Coefficient of coupling, analysis of coupled circuits, Natural current, Dot rule of coupled circuits, conductively coupled equivalent circuits- problem solving.

UNIT-V: Two Port Networks **(10 Hours)**

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

Text Books:

1) *Engineering Circuits Analysis*, Jack Kemmerly, William Hayt and Steven Durbin, Tata Mc Graw Hill Education, 2005, sixth edition.
2) *Network Analysis*, M. E. Van Valkenburg, Pearson Education, 2019, Revised Third Edition
3) *Network lines and Fields* by John. D. Ryder 2nd Edition, PHI

Reference Books:

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

E-Resources:

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

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 to

CO1: Determine the cell constant and conductance of solutions.

CO2: Prepare advanced polymer Bakelite materials.

CO3: Measure the strength of an acid present in secondary batteries.

CO4: Analyse the IR spectra of some organic compounds.

CO5: Calculate strength of acid in Pb-Acid battery.

List of experiments:

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

Reference:

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

I Year – II 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 theC- 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 seriesof 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 alongwith the total.
v) Write a C program to implement realloc()

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

Suggested Experiments/Activities:
Tutorial 10: Bitfields, Self-Referential Structures, Linked lists
Lab10 : Bitfields, linked lists
Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the samewithout using bit- fields

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

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 problemsthat 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 andothercharacters using pointers.

WEEK14:

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

Suggested Experiments/Activities:

Tutorial 14: File handling

Lab 14: File operations

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

Textbooks:

1. Ajay Mittal, Programming in C: A practical approach, Pearson.
2. Byron Gottfried, Schaum' 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 – II Semester	ENGINEERING WORKSHOP	L	T	P	C
Course Code: (1003231110)	(Common to All branches of Engineering)	**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 woodworking and make following joints.
   a) Half – Lap joint b) Mortise and Tenon joint c) Corner Dovetail joint or Bridle joint
3. **Sheet Metal Working**: Familiarity with different types of tools used in sheet metalworking, 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 followingfitting exercises.
   a) V-fit b) Dovetail fit c) Semi-circular fit
   d) Bicycle tire punctureand change of two-wheeler tyre
5. **Electrical Wiring**: Familiaritywith different types of basic electrical circuits and makethe following connections.
   a) Parallel and series b) Two-way switch c) Godown lighting
   d) Tube light e) Three phase motor f) Soldering of wires
6. **Foundry Trade:** Demonstration and practice on Moulding tools and processes,Preparation of Green Sand Moulds for given Patterns.
7. **Welding Shop**: Demonstration and practice on Arc Welding and Gas welding.Preparation of Lap joint and Butt joint.
8. **Plumbing:** Demonstration and practice of Plumbing tools, Preparation of Pipe jointswith coupling for same diameter and with reducer for different diameters.

Textbooks:

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

Reference Books:

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

I Year – II Semester	NETWORK ANALYSIS AND SIMULATION LABORATORY (ECE & allied branches)	L	T	P	Credits
Course Code: 1002231211		0	0	3	1.5

Course Objectives:

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

Course Outcomes:

	Course Outcome
CO1	Verify Network theorems.
CO2	Measure time constants of RL & RC circuits.
CO3	Analyze behavior of RLC circuit for different cases.
CO4	Design resonant circuit for given specifications.
CO5	Characterize and model the network in terms of all network parameters.

The following experiments need to be performed using both Hardware and simulation Software.
The experiments need to be simulated using software and the same need to be verified using the hardware.

List of Experiments:

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

Hardware Requirements:

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

Software requirements:

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

Reference Books:

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

I Year – II Semester	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 andrunning.

Reference Books:

1. Gordon Edlin, Eric Golanty. Health and Wellness, 14th Edn. Jones & Bartlett Learning,2022
2. T.K.V.Desikachar. The Heart of Yoga: Developing a Personal Practice
3. Archie J.Bahm. Yoga Sutras of Patanjali, Jain Publishing Company, 1993
4. Wiseman, John Lofty, SAS Survival Handbook: The Ultimate Guide to 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 vivavoce on the subject.

Department of Electronics and Communication Engineering

COURSE STRUCTURE

(Applicable from the academic year 2023-24 onwards)

B.Tech.– II Year I Semester

II Year I Semester							
S.No	**Course Code**	**Category**	**Course Name**	**L**	**T**	**P**	**Credits**
1	1000232103	BS	Random Variables and Stochastic process	3	0	0	3
2	1099232101	HSMC	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
3	1004232101	ES	Signals and Systems	3	0	0	3
4	1004232102	PCC	Electronic Devices and Circuits	3	0	0	3
5	1004232103	PCC	Digital Circuits Design	3	0	0	3
6	1004232110	PCC	Electronic Devices and Circuits Lab	0	0	3	1.5
7	1004232111	PCC	Digital Design & Signal Simulation lab	0	0	3	1.5
8	1004232180	SEC	Python Programming	0	1	2	2
9	1003232104	ES	Design Thinking & Innovation	1	0	2	2
Total Credits							**20**

Course Code	Random Variables and Stochastic process	L	T	P	C
1000232103		0	0	3	1.5

Course Overview:

The course covers key concepts related to random variables, including discrete, continuous, and mixed random variables. It also covers expectations, transformations of random variables, multiple random variables, and operations involving multiple random variables.

Course Objective:

To give students an introduction to elementary probability theory, in preparation to learn the concepts of statistical analysis, random variables and stochastic processes. To mathematically model the random phenomena with the help of probability theory concepts. To introduce the important concepts of random variables and stochastic processes. To analyze the LTI systems with stationary and om process as input. To introduce the types of noise and modelling noise sources.

Course Outcomes:

After completion of the course students able to

	Course outcome	Bloom's taxonomy	Bloom's Taxonomy Level	PO
CO1	Understand the axiomatic formulation of modern Probability Theory and think of random variables as an intrinsic need for the analysis of random phenomena.	Understanding Applying	L2 L3	PO-1 PO-2 PO-4
CO2	Identify different types of random variables and compute statistical averages of these random variables	Understanding Applying	L1 L3	PO-1 PO-2
CO3	Characterize the random processes in the time and frequency domains	Understanding Applying	L2 L3	PO-1 PO-2
CO4	Analyze the LTI systems with random inputs.	Understanding Evaluating	L2 L4	PO-1 PO-2

UNIT- I **9-Hours**

Introduction, Review of Probability Theory, Definition of a Random Variable, Conditions for a Function to be a Random Variable, Discrete, Continuous and Mixed Random Variables, Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh, Conditional Distribution, Conditional Density, Properties.

Unit-II: **8-Hours**

Introduction, Expected Value of a Random Variable, function of a Random Variable, Moments about the Origin, Central Moments, Variance and Skew, Chebyshev's Inequality, Characteristic Function, Moment Generating Function, Transformations of a Random Variable: Monotonic Transformations for a Continuous Random Variable, Non-monotonic Transformations of Continuous Random Variable

Unit-III: **11-Hours**

Vector Random Variables, Joint Distribution Function, Properties of Joint Distribution, Marginal Distribution Functions, Conditional Distribution and Density, Statistical Independence, Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem: Unequal Distribution, Equal Distributions. Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variables case, properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

Unit-IV: **9-Hours**

The Random Process Concept, Classification of Processes, Deterministic and Non-deterministic Processes, Distribution and Density Functions, Concept of Stationarity and Statistical Independence. First-Order Stationary Processes, Second-order and Wide-Sense Stationarity, Nth-order and Strict-Sense Stationarity, Time Averages and Ergodicity, Autocorrelation Function and its Properties, Cross-Correlation Function and its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process.

Unit-V: **10-Hours**

The Power Density Spectrum: Properties, Relationship between Power Density Spectrum and Auto correlation Function, The Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Density Spectrum and Cross-Correlation Function.

Random Signal Response of Linear Systems: System Response–Convolution, Mean and Mean-squared Value of System Response, Auto correlation Function of Response, Cross-Correlation Functions of Input and Output, Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectra of Input and Output.

Text Books:

1. Probability, Random Variables & Random Signal Principles, Peyton Z. Peebles, TMH,4thEdition,2001.
2. Probability, Random Variables and Stochastic Processes, Athanasios Papoulis and S.Unnikrisha, PHI,4thEdition,2002.
3. Probability and Random Processes with Applications to Signal Processing, Henry Stark and JohnW.Woods, Pearson Education, 3rdEdition, 2001.

Reference Books:

1. Schaum's Outline of Probability, Random Variables, and Random Processes,1997.
2. An Introduction to Random Signals and Communication Theory, B.P.Lathi, International Textbook, 1968.
3. Probability Theory and Random Processes, P.Ramesh Babu, McGrawHill, 2015.

Course Code		L	T	P	C
1099232101	UNIVERSAL HUMAN VALUES – UNDERSTANDING HARMONY AND ETHICAL HUMAN CONDUCT	2	1	0	3

Course Objectives:

- To help the students appreciate the essential complementary between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
- To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.

Course Outcomes:

- Define the terms like Natural Acceptance, Happiness and Prosperity
- Identify one's self, and one's surroundings (family, society nature)
- Apply what they have learnt to their own self in different day-to-day settings in real life
- Relate human values with human relationship and human society.
- Justify the need for universal human values and harmonious existence
- Develop as socially and ecologically responsible engineers

Course Topics

The course has 28 lectures and 14 tutorials in 5 modules. The lectures and tutorials are of 1- hour duration. Tutorial sessions are to be used to explore and practice what has been proposed during the lecture sessions. The Teacher's Manual provides the outline for lectures as well as practice sessions. The teacher is expected to present the issues to be discussed as propositions and encourage the students to have a dialogue.

UNIT I

Introduction to Value Education (6 lectures and 3 tutorials for practice session)

Lecture 1: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)

Lecture 2: Understanding Value Education

Tutorial 1: Practice Session PS1 Sharing about Oneself Lecture 3: self-exploration as the Process for Value Education

Lecture4: Continuous Happiness and Prosperity – the Basic Human Aspirations Tutorial 2: Practice Session PS2 Exploring Human Consciousness

Lecture 5: Happiness and Prosperity – Current Scenario Lecture 6: Method to Fulfill the Basic Human Aspirations Tutorial 3: Practice Session PS3 Exploring Natural Acceptance

UNIT II

Harmony in the Human Being (6 lectures and 3 tutorials for practice session) Lecture 7: Understanding Human being as the Co-existence of the self and the body. Lecture 8: Distinguishing between the Needs of the self and the body

Tutorial 4: Practice Session PS4 Exploring the difference of Needs of self and body. Lecture 9: The body as an Instrument of the self

Lecture 10: Understanding Harmony in the self

Tutorial 5: Practice Session PS5 Exploring Sources of Imagination in the self-Lecture 11: Harmony of the self with the body

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 and 3 tutorials for practice session)

Lecture 23: Natural Acceptance of Human Values Lecture 24: Definitiveness of (Ethical) Human Conduct

Tutorial 12: Practice Session PS12 Exploring Ethical Human Conduct

Lecture 25: A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order

Lecture 26: Competence in Professional Ethics

Tutorial 13: Practice Session PS13 Exploring 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 body PS5 Exploring Sources of Imagination in the self
PS6 Exploring Harmony of self with the body
Practice Sessions for

UNIT III – Harmony in the Family and Society
PS7 Exploring the Feeling of Trust PS8 Exploring the Feeling of Respect
PS9 Exploring Systems to fulfil Human Goal
Practice Sessions for

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

UNIT V – Implications of the Holistic Understanding – a Look at Professional Ethics
PS12 Exploring Ethical Human Conduct
PS13 Exploring Humanistic 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. JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, 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 – PanditSunderlal
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. Depending on the nature of topics, worksheets, home assignment and/or activity are included. The practice sessions (tutorials) would also provide support to a student in performing actions commensurate to his/her beliefs. It is intended that this would lead to development of commitment, namely behaving and working based on basic human values. It is recommended that this content be placed before the student as it is, in the form of a basic foundation course, without including anything else or excluding any part of this content. Additional content may be offered in separate, higher courses. This course is to be taught by faculty from every teaching department, not exclusively by any one department.
Teacher preparation with a minimum exposure to at least one 8-day Faculty Development Program on Universal Human Values is deemed essential.

Online Resources:

1. https://fdp-si.aicte-india.org/UHV II%20Class%20Notes%20&%20Handouts/UHV%20Handout%201-Introduction%20to%20Value%20Education.pdf
2. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%202-Harmony%20in%20the%20Human%20Being.pdf
3. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%203-Harmony%20in%20the%20Family.pdf
4. https://fdp-si.aicte-india.org/UHV%201%20Teaching%20Material/D3-S2%20Respect%20July%2023.pdf
5. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%205-Harmony%20in%20the%20Nature%20and%20Existence.pdf
6. https://fdp-si.aicte-india.org/download/FDPTeachingMaterial/3-days%20FDP-SI%20UHV%20Teaching%20Material/Day%203%20Handouts/UHV%203D%20D3-S2A%20Und%20Nature-Existence.pdf
7. https://fdp-si.aicte-india.org/UHV%20II%20Teaching%20Material/UHV%20II%20Lecture%2023-25%20Ethics%20v1.pdf
8. https://www.studocu.com/in/document/kiet-group-of-institutions/universal-human-values/chapter-5-holistic-understanding-of-harmony-on-professional-ethics/62490385
9. https://onlinecourses.swayam2.ac.in/aic22_ge23/preview

Course Code	SIGNALS AND SYSTEMS	L	T	P	C
1004232101		0	0	3	1.5

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:

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

Reference Books:

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

Course Code	ELECTRONIC DEVICES AND CIRCUITS	L	T	P	C
1004232102		0	0	3	1.5

Course Overview:

This course provides an in-depth study of electronic devices and circuits, focusing on the principles, operations, and applications of semiconductor devices. The course covers the theoretical foundations and practical aspects of electronic circuits, including diodes, transistors, and operational amplifiers. Through lectures, lab sessions, and problem-solving exercises, students will gain a comprehensive understanding of electronic components and their integration into circuits.

Course Objective:

- 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.

Course Outcomes:

COs	At the end of the course, the student will have the ability to:	Bloom's taxonomy	Bloom's Taxonomy Level	POs
CO1	Demonstrate different kind of semiconductor devices based on the principle of operations.	Understanding	L2	1, 2,3
CO2	Illustrate transistor configurations in different modes of operation	Understanding	L2	3,9,10
CO3	Construct FET with different configurations and understand the various biasing techniques of FET.	Applying	L3	2,3,9,10
CO4	Analyze h-parameter models of an amplifier circuit in different configurations	Analyzing	L4	1,2,3,9,10

UNIT- I **10-Hours**

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, Diode Resistance and Diode Capacitance, Current components in a p-n Diode, Diode current equation, Quantitative analysis of Half-wave and Full-wave Rectifiers with and without filters, Breakdown mechanisms, Zener diode, Zener diode as a voltage Regulator

Unit-II: **9-Hours**

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, UJT Characteristics.

Unit-III: **10-Hours**

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: **9-Hours**

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, stability factors, (S, S', S''), bias compensation, thermal runaway, thermal stability, Biasing of FETs. 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).

Unit-V: **8-Hours**

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, analysis of CG, CS and CD amplifiers, comparison of FET amplifiers.

High Frequency BJT & FET Amplifier Circuits: Transistor at high frequencies, Hybrid- π model, Hybrid-π conductance's, Hybrid-π capacitances, Hybrid-π parameters in terms of h- parameters, CE short circuit current gain, current gain with resistive load.

Text Books:

4. Integrated Electronics – Jacob Millman, C. Halkias, C.D.Parikh , Tata Mc-Graw Hill Education (India) Private Limited, Second Edition, 2011.
5. Electronic Devices and Circuits- J. Millman, C. Halkias, Mc-Graw Hill Education (India) Private Limited, Fourth Edition, 2015.

Reference Books:

5. Electronic Devices and Circuits- S Salivahanan, N Suresh Kumar, Tata Mc-Graw Hill, Third Edition, 2012.
6. Electronic Devices and Circuit Theory-R.L. Boylestad and Louis Nashelsky, Pearson Publications, Tenth Edition.

Course Code	DIGITAL CIRCUITS DESIGN	L	T	P	C
1004232103		0	0	3	1.5

Course Overview:

This course covers Boolean algebra, logic gates, and combinational/sequential circuits. It includes flip-flops, counters, and finite state machines. The course explores hardware description languages and FPGAs.

Course Objective:

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

Course Outcomes:

After completion of the course students able to

	Course outcome	Bloom's taxonomy	Bloom's Taxonomy Level	PO
CO1	Understand the properties of Boolean algebra, logic operations, and minimization of the Boolean functions	Understanding	L2	PO-1, PO-2, PO-3, PO-12
CO2	Develop combinational circuits and sequential logic circuits.	Applying	L3	PO-1, PO-2, PO-3,
CO3	Analyze the concepts of finite state machines and Compare various Programmable logic devices.	Analyzing	L4	PO-1, PO-2, PO-3, PO-4
CO4	Design and Model combinational and sequential circuits using HDLs.	Analyzing	L4	PO-1, PO-2, PO-3, PO-5

UNIT- I **10-Hours**

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: **10-Hours**

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: **10-Hours**

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: **10-Hours**

Finite State Machines and Programmable Logic Devices: Types of FSM, capabilities and limitations of FSM, state assignment, realization of FSM using flip-flops, Mealy to Moore conversion and vice-versa, reduction of state tables using partition technique, 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: **10-Hours**

Hardware Description Language: Introduction to Verilog as HDL-gate level, behavioral level and structural level modeling of logic circuits, Module, Test bench, Keywords, Identifiers, White Space, Characters, Comments, Numbers, Strings, Logic Values, Data Types, Scalars and Vectors, Continuous Assignment Structure, Delays and Continuous Assignments, Assignment to Vector. 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.

Text Books:

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

Reference Books:

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

Course Code	ELECTRONIC DEVICES AND CIRCUITS LAB	L	T	P	C
1004232110		0	0	3	1.5

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 (Colour 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.

Course Code	DIGITAL DESIGN & SIGNAL SIMULATION LAB	L	T	P	C
1004232111		0	0	3	1.5

COURSE OBJECTIVES:

- Verify the truth tables of various logic circuits.
- Design sequential/combinational circuit using Hardware Description Language and verify their functionality.
- Simulate various Signals and Systems through MATLAB
- Analyze the output of a system when it is excited by different types of deterministic and random signals.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Design and verify the functionality of various combinational logic circuits using HDL.
CO2	Design and verify the functionality of various sequential logic circuits using HDL.
CO3	Understand how to simulate different types of signals and system response.
CO4	Analyze the response of different systems when they are excited by different signals and plot power spectral density of signals.

PART-A

S.No.	Name of the experiment	Skill
1	Write HDL code to realize all the logic gates	Implement simple logical operations using Truth tables
2	Verify the of functionality of 3 to 8-line Decoder	Design the decoder using VERILOG
3	4 variable logic function verification using 8 to1 multiplexer.	Design and implement the 8 to 1 multiplexer.
4	Design and verify the functionality of full adder circuit, full subtractor.	Implement the full adder and full subtractor circuit
5	Verify the functionality of single bit and 4-bit comparator	Verify the truth table of comparators.
6	Design and verify the functionality of different flipflops	Verify the truth table of various flip flops.
7	Design and verify the operation of 4-bit Universal Shift Register for different Modes of operation.	Verify the left, right shift operations and parallel load operations.
8	Design up counter and down counters	Design various counters.

9	Design MOD–8 synchronous counter /asynchronous counters.	Design synchronous/a synchronous mod-8 counter

PART-B

S. No.	Name of the Experiment	Skill
1	Generate various Signals and Sequences: Periodic and Aperiodic, Unit Impulse, Unit Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc function	Observe the generation of various signals.
2	Operations on Signals and Sequences: Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.	Analyze the Operations on Signals.
3	Write a program to find the trigonometric & exponential Fourier series coefficients of a rectangular periodic signal. Reconstruct the signal by combining the Fourier series coefficients with appropriate weightings- Plot the discrete spectrum of the signal.	Find the trigonometric & exponential Fourier series coefficients of a periodic signals.
4	Write a program to find Fourier transform of a given signal. Plot its amplitude and phase spectrum.	Analyze frequency spectrum of a given signal.
5	Write a program to convolve two discrete time sequences. Plot all the sequences.	Verify the Circular Convolution for discrete time signals.
6	Write a program to find autocorrelation and cross correlation of given sequences.	Obtain the autocorrelation and cross correlation of given sequences.
7	Write a program to verify Linearity and Time Invariance properties of a given Continuous System.	Verify the linearity and time invariance properties of a given systems.
8	Write a program to generate discrete time sequence by sampling a continuous time signal. Show that with sampling rates less than Nyquist rate, aliasing occurs while reconstructing the signal.	Verify the sampling theorem of a given signal.
9	Write a program to generate Complex Gaussian noise and find its mean, variance, Probability Density Function (PDF) and Power Spectral Density (PSD).	Analyze Probability Density Function (PDF) and Power Spectral Density (PSD) of a given signal.

Course Code	Python Programming (Skill Enhancement Course)	L	T	P	C
1004232180		**0**	1	2	2

Course Overview:

This course typically covers fundamental programming concepts, including data types, control structures, functions, and object-oriented programming. They also emphasize practical applications and hands-on coding exercises to build proficiency in writing and debugging Python code.

Course Objective:

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 able to

	Course outcome	Bloom's taxonomy	Bloom's Taxonomy Level	PO
CO1	Show case adept command of Python syntax, deftly utilizing variables, data types, control structures, functions, modules, and exception handling to engineer robust and efficient code solutions.	Understanding Applying	L2 L3	PO-1 PO-2, PO-5
CO2	apply Python programming concepts to solve a variety of computational problems	Understanding Applying	L2 L3	PO-1 PO-2 PO-5
CO3	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	Understanding Applying	L2 L3	PO-1, PO-2 PO-5
CO4	exhibit competence in implementing and manipulating fundamental data structures such as lists, tuples, sets, dictionaries (L3)	Understanding Evaluating	L2 L4	PO-1 PO-2, PO-4 PO-5 PO-11

UNIT-I **9-Hours**

History of Python Programming Language, Thrust Areas of Python, Installing Anaconda Python Distribution, Installing and Using Jupyter Notebook. Parts of Python Programming Language: Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, the type () Function and Is Operator, Dynamic and Strongly Typed Language.

Control Flow Statements: if statement, if-else statement, if...elif…else, Nested if statement, while Loop, for Loop, continue and break Statements, Catching Exceptions Using try and except Statement.

Sample Experiments:

1. Write a program to find the largest element among three Numbers.
2. Write a Program to display all prime numbers 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: **8-Hours**

Functions: Built-In Functions, Commonly Used Modules, Function Definition and Calling the function, return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments. **Strings:** Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings. Lists: Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, del Statement.

Sample Experiments:

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 create, display, append, insert and reverse the order of the items in the list.

Unit-III: **10-Hours**

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:

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

13. Write a program to count the number of vowels in a string (No control flow allowed).
14. Write a program to check if a given key exists in a dictionary or not.
15. Write a program to add a new key-value pair to an existing dictionary.
16. Write a program to sum all the items in a given dictionary.

Unit-IV: **8-Hours**

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.

Sample Experiments:

17. Write a program to sort words in a file and put them in another file. The output files should have only lower-case words, so any upper-case words from source must be lowered.
18. Python program to print each line of a file in reverse order.
19. Python program to compute the number of characters, words and lines in a file.

Unit-V: **6-Hours**

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:

20. Write a program to add, transpose and multiply two matrices.
21. 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.
22. Write a program to compute student grade using classes and object.
23. Write a class person with attribute write a class Person with attributes name, age, weight (kgs), height (ft) and takes them through the constructor and exposes a method get_bmi_result() which returns one of "under weight", "healthy", "obese".

Text 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.

Reference Books:

1. Mark Lutz & David Ascher, "Learning Python", Oreilly Publications, 5th edition

Online Learning Resources/Virtual Labs:

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

Course Code	DESIGN THINKING & INNOVATION	L	T	P	C
1003232104		0	1	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.
- Explain the fundamentals of Design Thinking and innovation.
- Apply the design thinking techniques for solving problems in various sectors.
- Analyse to work in a multidisciplinary environment.
- Evaluate the value of creativity.
- Formulate specific problem statements of real time issues.

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 prototypes.

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.
   Chesbrough. H, The Era of Open Innovation – 2013

Department of Electronics and Communication Engineering

COURSE STRUCTURE

(Applicable from the academic year 2023-24 onwards)

B.Tech.– II Year II Semester

II Year II Semester							
S.No.	**Course Code**	**Category**	**Course Name**	**L**	**T**	**P**	**Credits**
1.	1099232201	HSMC	Managerial Economics and Financial Analysis	3	1	0	2
2.	1004232201	ES	Linear Control Systems	3	1	0	3
3.	1004232202	PCC	EM Waves and Transmission Lines	3	1	0	3
4.	1004232203	PCC	Analog Circuits Design	3	1	0	3
5.	1004232204	PCC	Analog and Digital Communications	3	1	0	3
6.	1004232210	PCC	Analog Circuits Design Lab	0	0	3	1.5
7.	1004232211	PCC	Analog and Digital Communications Lab	0	0	3	1.5
8.	1000232280	SEC	Soft Skills	0	1	2	2
9.	1001232125	Audit Course	Environmental Science	2	0	0	-
Total Credits							19

Course Code	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	L	T	P	C
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-output relationship for optimizing production and cost
- To Know the Various types of market structure and pricing methods and strategy
- To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
- To provide fundamental skills on accounting and to explain the process of preparing financial statements.

Course Outcomes:

	At the end of the course, the student will have the ability to:	Bloom's taxonomy	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 **08- Hours**

Managerial Economics: Introduction – Nature, meaning, significance, functions, and advantages. Demand-Concept, Function, Law of Demand - Demand Elasticity- Types – Measurement. Demand Forecasting- Factors governing Forecasting, Methods. Managerial Economics and Financial Accounting and Management.

UNIT – II **10-Hours**

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

UNIT – III	**08-Hours**
Business Organizations and Markets: Introduction – Forms of Business Organizations- Sole Proprietary - Partnership - Joint Stock Companies - Public Sector Enterprises. Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition Monopoly-Monopolistic Competition–Oligopoly-Price- Output Determination - Pricing Methods and Strategies.	
UNIT – IV	**08-Hours**
Capital Budgeting: Introduction – Nature, meaning, significance. Types of Working Capital, Components, Sources of Short-term and Long-term Capital, Estimating Working capital requirements. Capital Budgeting– Features, Proposals, Methods and Evaluation. Projects – Pay Back Method, Accounting Rate of Return (ARR) Net Present Value (NPV) Internal Rate Return (IRR) Method (sample problems).	
UNIT – V	**10-Hours**
Financial Accounting and Analysis: Introduction – Concepts and Conventions- Double-Entry Bookkeeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). Introduction to Financial Analysis - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.	

Textbooks:

1. Varshney & Maheswari: Managerial Economics, Sultan Chand.
2. Aryasri: Business Economics and Financial Analysis, 4/e, MGH.

Reference Books:

1. Ahuja Hl Managerial economics Schand.
2. S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age 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.

Course Code	LINEAR CONTROL SYSTEMS	L	T	P	C
1004232201		3	0	0	3

Course Overview:

This course provides a comprehensive foundation in linear control systems, equipping students with the knowledge and tools to analyze and design control systems effectively.

Course Objective:

To introduce the basic principles and applications of control systems, learn the time response analysis of the systems, understand different aspects of stability analysis of systems in time and frequency domain, concept of state space, controllability and observability.

Course Outcomes:

	At the end of the course, the student will have the ability to:	Bloom's taxonomy	Bloom's Taxonomy Level	PO
CO1	Classify different types of control systems and obtain their mathematical models	Understanding	L2	PO-1 PO-2 PO-12
CO2	Apply standard test signals to first and second order systems to determine their responses	Applying	L3	PO-1 PO-2 PO-3
CO3	Examine the stability of the systems by using time and frequency domain approaches	Analyzing	L4	PO-1 PO-2 PO-3 PO-4
CO4	Analyse system responses through state space models	Analyzing	L4	PO-1 PO-2 PO-3

UNIT- I **08-Hours**

Control Systems Concepts: Open loop and closed loop control systems and their differences- Examples of control systems- Classification of control systems, Feedback characteristics, Effects of positive and negative feedback, Transfer functions, Impulse Response, Block diagram reduction methods – Signal flow graphs - Reduction using Mason's gain formula. Controller components.

Unit-II: **10-Hours**

Time Response Analysis: Step Response - Impulse Response - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants, Study of effects and Design of P, PI, PD and PID Controllers on second order system.

Unit-III: **08-Hours**

Stability Analysis in Time Domain: The concept of stability – Routh's stability criterion – Stability and conditional stability - limitations of Routh's stability. The Root locus concept - construction of root loci-effects of adding poles and zeros to G(s) H(s) on the root loci.

Unit-IV: **12-Hours**

Frequency Response Analysis: Introduction, Frequency domain specifications-Bode Diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram - Stability Analysis from Bode Plots. Polar Plots- Nyquist Plots- Phase margin and Gain Margin-Stability Analysis.

Compensation techniques – Study of Effects and Design of Lag, Lead, Lag-Lead Compensator design in frequency Domain on a second order system.

Unit-V: **10-Hours**

State Space Analysis of Continuous Systems: Concepts of state, state variables and state model - differential equations & Transfer function models - Block diagrams. Diagonalization, Transfer function from state model, solving the Time invariant state Equations- State Transition Matrix and its Properties. System response through State Space models. The concepts of controllability and observability, Duality between controllability and observability.

Text Books:

1. Modern Control Engineering by Katsuhiko Ogata, Prentice Hall of India Pvt. Ltd., 5th edition, 2010.
2. Control Systems Engineering by I. J. Nagrath and M. Gopal, New Age International (P) Limited Publishers, 5th edition, 2007.

Reference Books:

1. Control Systems Principles & Design by M.Gopal, 4th Edition, McGraw Hill Education, 2012.
2. Automatic Control Systems by B. C. Kuo and Farid Golnaraghi, John wiley and sons, 8th edition, 2003.
3. Feedback and Control Systems, Joseph J Distefano III, Allen R Stubberud& Ivan J Williams, 2nd Edition, Schaum's outlines, McGraw Hill Education,2013.
4. Control System Design by Graham C. Goodwin, Stefan F. Graebe and Mario E. Salgado, Pearson, 2000.
5. Feedback Control of Dynamic Systems by Gene F. Franklin, J.D. Powell and Abbas Emami-Naeini, 6th Edition, Pearson, 2010.

Course Code		L	T	P	C
1004232202	**EM WAVES AND TRANSMISSION LINES**	3	0	0	3

COURSE OBJECTIVES:

- To understand the fundamentals of steady electric and magnetic fields using various laws
- To apply the concept of static and time varying EM fields
- To analyze the wave concept with help of Maxwell equations
- To demonstrate the concepts of wave theory and propagation of waves through various mediums.
- To develop skills in solving various problems related to transmission lines.

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	Apply the laws & theorems of electrostatic fields to solve the related problems.		
CO2	Apply the laws & theorems of magnetostatic fields to solve the related problems.		
CO3	Analyze the electromagnetic wave propagation in different mediums.		
CO4	Determine the parameters of transmission lines and also apply various impedance matching techniques to solve problems in transmission lines.		

UNIT- I **[10 Hours]**

ELECTROSTATICS: Coulomb's Law, Electric Field Intensity, Electric Field due to infinite charge, finite Charge, infinite sheet of Charge, Electric Flux Density, Gauss Law and Applications, electric flux density due to infinite line charge, infinite sheet charge, Electric Potential, Potential due to infinite charge, Finite Charge, Maxwell's Two Equations for Electrostatic Fields. Convection and Conduction Currents, Continuity Equation, Dielectric Constant, Poisson's and Laplace's Equations, Illustrative Problems.

UNIT-II **[10 Hours]**

MAGNETOSTATICS, MAXWELL'S EQUATIONS:

Magnetostatics: Biot-Savart Law, Magnetic field intensity due to infinitely long conductor, Finite length conductor, Square, Circular loop, Ampere's Circuital Law and applications, Magnetic field intensity due to a solid conductor, Magnetic Flux Density, Maxwell's Two Equations for Magneto static Fields.

Maxwell's Equations: Faraday's Law, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements. Boundary Conditions Dielectric-Dielectric and Dielectric-Conductor Interfaces, Illustrative Problems

UNIT-III **[8 Hours]**

ELECTROMAGNETIC WAVE PROPAGATION:

Waves equations for conducting and perfect dielectric media, Uniform Plane waves, Wave Propagation in Lossy Dielectrics, Plane Waves in Lossless Dielectrics, Plane Waves in Good Conductors, skin depth, polarization, Illustrative Problems.

Reflection and Refraction of Plane Waves – Normal and Oblique Incidences for Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Poynting Vector and Poynting Theorem, Illustrative Problems.

UNIT-IV **[8 Hours]**

TRANSMISSION LINES – I

Types, Parameters, T&π Equivalent Circuits, Transmission Line Equations, Primary & Secondary Constants, Expressions for Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line, Lossless lines, distortion less lines, Line distortion, Loading - Types of Loading. Illustrative Problems.

UNIT-V **[8 Hours]**

TRANSMISSION LINES – II:

Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR, Impedance Transformations λ/4, λ /2, λ/8 Lines, Low loss radio frequency and UHF Transmission lines, UHF Lines as Circuit Elements, Stub Matching-single & double, Smith Chart – Construction and Applications, Single stub matching using smith charts, Illustrative Problems.

Text Books:

1. Matthew N.O. Sadiku, "Principles of electromagnetics" 4th edition, Oxford university Press, 2014.

2. Electromagnetic Field Theory and Transmission Lines, G. S. N. Raju, 2nd Edition, Pearson Education, 2013.

3. Electromagnetic Waves and Radiating Systems, E.C. Jordan and K.G. Balmain, 2nd Edition, PHI, 2000.

Reference Books:

1. Hayt Jr, William H., John A. Buck, and M. Jaleel Akhtar, "Engineering Electro magnetics| (SIE)", McGraw-Hill Education, 2020.

2. Y. Mallikarjuna Reddy, "Electromagnetic Waves and Transmission lines" Universities Press, 2015

3. GottapuSasibhushana Rao, "Electromagnetic Field Theory and Transmission Lines"Wiley India 2013.

NPTEL/MOOC: (Specify Links)

1. https://nptel.ac.in/courses/117/101/117101057/
2. http://courseware.cutm.ac.in/courses/electromagnetic-field-theory-transmission-lines/

Course Code	ANALOG CIRCUITS DESIGN	L	T	P	C
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.

Course Code		L	T	P	C
1004232204	**ANALOG AND DIGITAL COMMUNICATIONS**	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, 2nd Edition.
2. B. P. Lathi, Zhi Ding "Modern Digital and Analog Communication Systems", Oxfordpress, 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,JohnWiley& 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.

Course Code	ANALOG CIRCUITS DESIGN LAB	L	T	P	C
1004232210		3	0	0	3

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.

Course Code	ANALOG AND DIGITAL COMMUNICATIONS LAB	L	T	P	C
1004232211		3	0	0	3

Course Objectives:

- Understand the basics of analog and digital modulation techniques.
- Integrate theory with experiments so that the students appreciate the knowledge gained from the theory course.
- Design and implement different modulation and demodulation techniques and their applications.
- Develop cognitive and behavioral skills for performance analysis of various modulation techniques.

- **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	Know about the usage of equipment/components/software tools used to conduct experiments in analog and digital modulation techniques.		
CO2	Conduct the experiment based on the knowledge acquired in the theory about modulation and demodulation schemes to find the important metrics of the communication system experimentally.		
CO3	Analyze the performance of a given modulation scheme to find the important metrics of the system theoretically.		
CO4	Compare the experimental results with that of theoretical ones and infer the conclusions.		

List of Experiments:

Design the circuits and verify the following experiments taking minimum of six from each section shown below.

Section-A

1. AM Modulation and Demodulation
2. DSB-SC Modulation and Demodulation
3. FM Modulation and Demodulation
4. Radio receiver measurements
5. PAM Modulation and Demodulation
6. PWM Modulation and Demodulation
7. PPM Modulation and Demodulation

Section-B

1. Sampling Theorem.
2. Time Division Multiplexing
3. Frequency Division Multiplexing
4. Delta Modulation and Demodulation
5. PCM Modulation and Demodulation
6. BPSK Modulation and Demodulation
7. BFSK Modulation and Demodulation
8. QPSK Modulation and Demodulation
9. DPSK Modulation and Demodulation

Note: Faculty members (who are handling the laboratory) are requested to instruct the students not to use readymade kits for conducting the experiments. They are advised to make the students work in the laboratory by constructing the circuits and analyzing them during the lab sessions.

Course Code	SOFT SKILLS	L	T	P	C
1004232280		0	1	2	2

Course Objectives:

- To encourage all round development of the students by focusing on soft skills
- To make the students aware of critical thinking and problem-solving skills
- To enhance healthy relationship and understanding within and outside an organization
- To function effectively with heterogeneous teams

Course Outcomes

- List out various elements of soft skills
- Describe methods for building professional image
- Apply critical thinking skills in problem solving
- Analyse the needs of an individual and team for well-being
- Assess the situation and take necessary decisions
- Create a productive workplace atmosphere using social and work-life skills ensuring personal and emotional well-being

UNIT I

Soft Skills & Communication Skills

Soft Skills - Introduction, Need - Mastering Techniques of Soft Skills – Communication Skills - Significance, process, types - Barriers of communication - Improving techniques.

Activities:

Intrapersonal Skills- Narration about self- strengths and weaknesses- clarity of thought – self-expression – articulating with felicity.

(The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes and literary sources)

Interpersonal Skills- Group Discussion – Debate – Team Tasks - Book and film Reviews by groups - Group leader presenting views (non- controversial and secular) on contemporary issues or on a given topic.

Verbal Communication- Oral Presentations- Extempore- brief addresses and speeches- convincing- negotiating- agreeing and disagreeing with professional grace.

Non-verbal communication – Public speaking – Mock interviews – presentations with an objective to identify non- verbal clues and remedy the lapses on observation.

UNIT II

Critical Thinking

Active Listening – Observation – Curiosity – Introspection – Analytical Thinking – Open-mindedness – Creative Thinking - Positive thinking - Reflection

Activities:

Gathering information and statistics on a topic - sequencing – assorting – reasoning – critiquing issues –placing the problem – finding the root cause - seeking viable solution – judging with rationale – evaluating the views of others - Case Study, Story Analysis.

UNIT III

Problem Solving & Decision Making

Meaning & features of Problem Solving – Managing Conflict – Conflict resolution – Team building - Effective decision making in teams – Methods & Styles

Activities:

Placing a problem which involves conflict of interests, choice and views – formulating the problem – exploring solutions by proper reasoning – Discussion on important professional, career and organizational decisions and initiate debate on the appropriateness of the decision. Case Study & Group Discussion.

UNIT IV

Emotional Intelligence & Stress Management

Managing Emotions – Thinking before Reacting – Empathy for Others – Self-awareness – Self-Regulation – Stress factors – Controlling Stress – Tips

Activities:

Providing situations for the participants to express emotions such as happiness, enthusiasm, gratitude, sympathy, and confidence, compassion in the form of written or oral presentations. Providing opportunities for the participants to narrate certain crisis and stress –ridden situations caused by failure, anger, jealousy, resentment and frustration in the form of written and oral presentation, Organizing Debates.

UNIT V

Corporate Etiquette

Etiquette- Introduction, concept, significance - Corporate etiquette - meaning, modern etiquette, benefits - Global and local culture sensitivity - Gender Sensitivity - Etiquette in interaction- Cell phone etiquette - Dining etiquette - Netiquette - Job interview etiquette - Corporate grooming tips -Overcoming challenges.

Activities: Providing situations to take part in the Role Plays where the students will learn about bad and good manners and etiquette - Group Activities to showcase gender sensitivity, dining etiquette etc. - Conducting mock job interviews - Case Study - Business Etiquette Games

NOTE-:

1. The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes, epics, scriptures, autobiographies and literary sources which bear true relevance to the prescribed skill.
2. Case studies may be given wherever feasible for example for Decision Making- The decision of King Lear.

Prescribed Books:

1. Mitra Barun K, Personality Development and Soft Skills, Oxford University Press, Pap/Cdr edition 2012
2. Dr Shikha Kapoor, Personality Development and Soft Skills: Preparing for Tomorrow, I K International Publishing House, 2018

Reference Books:

1. Sharma, Prashant, Soft Skills: Personality Development for Life Success, BPB Publications 2018.
2. Alex K, Soft Skills S.Chand & Co, 2012 (Revised edition)
3. Gajendra Singh Chauhan & Sangeetha Sharma, Soft Skills: An Integrated Approach to Maximise Personality Published by Wiley, 2013
4. Pillai, Sabina & Fernandez Agna, Soft Skills and Employability Skills, Cambridge University Press, 2018
5. Soft Skills for a Big Impact (English, Paperback, Renu Shorey) Publisher: Notion Press
6. Dr. Rajiv Kumar Jain, Dr. Usha Jain, Life Skills (Paperback English) Publisher: Vayu Education of India, 2014

Course Code	ENVIRONMENTAL SCIENCE	L	T	P	C
1001232125		2	0	0	-

Course Objectives:

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

UNIT I

Multidisciplinary Nature of Environmental Studies: – Definition, Scope and Importance – Need for Public Awareness.

Natural Resources : Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources.

UNIT II

Ecosystems: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem.
b. 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 for University Grants Commission, Universities Press.
2. Palaniswamy, “Environmental Studies”, Pearson education
3. S.Azeem Unnisa, “Environmental Studies” Academic Publishing Company
4. K.Raghavan Nambiar, “Text book of Environmental Studies for Undergraduate Courses as 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”, BS Publication.
3. J.P.Sharma, Comprehensive Environmental studies, Laxmi publications.
4. J. Glynn Henry and Gary W. Heinke, “Environmental Sciences and Engineering”, Prentice Hall of India Private limited.
5. G.R.Chatwal, “A Text Book of Environmental Studies” Himalaya Publishing House.
6. Gilbert M. Masters and Wendell P. Ela, “Introduction to Environmental Engineering and Science, Prentice Hall of India Private limited.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

VR23-COURSE STRUCTURE

B.Tech. III-Year I Semester

S.No.	Course Code	Category	Title	L	T	P	C
1	1004233101	Professional Core	Analog & Digital IC Applications	3	0	0	3
2	1004233102	Professional Core	Microprocessors & Microcontrollers	3	0	0	3
3	1004233103	Professional Core	Antennas and Wave Propagation	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				
	1004233133		Neural Networks				
5	1005233150	Open Elective - I	Principles of Operating Systems	3	0	0	3
	1005233151		Scripting Languages	3	0	0	3
6	1004233110	Professional Core Lab-1	Analog & Digital IC Applications Lab	0	0	3	1.5
7	1004233111	Professional Core Lab-2	Microprocessors & Microcontrollers Lab	0	0	3	1.5
8	1004233180	Skill Enhancement course	Antenna Design	0	1	2	2
9	1004233181	Engineering Science	PCB Design Practice Lab	0	0	2	1
10	1004233170	Evaluation of Community Service Internship		-	-	-	2
11	1000233125	Audit Course	Constitution of India	2	0	0	0
Total Credits				17	1	10	23

III Year – I	ANALOG AND DIGITAL IC APPLICATIONS	L	T	P	C
1004233101		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 Objective:

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 outcome	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, PLL	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 and classify the memories.	Applying Analyzing	L3 L4	PO3, PO4, PO5

UNIT- I **12-Hours**

Operational Amplifier (OP-AMP): Classification of Integrated Circuits (ICs), OP-AMP: Introduction, block diagram, ideal and practical OP-AMP, features of IC 741 OP-AMP, modes of operation of OP-AMP, DC and AC Characteristics of OP-AMP, OP-AMP as AC amplifier, differentiator, integrator, comparator, zero crossing detector, regenerative comparator, and Instrumentation Amplifier.

Unit-II **14-Hours**

IC-741, IC-555 & IC-565 Applications: Introduction to active filters, analysis of first order LPF & HPF Butterworth filters, square, triangular and saw-tooth waveform generators, RC-Phase-Shift and Wien-Bridge oscillators using OP-AMP, Introduction to IC-555 Timer: functional diagram, astable

and monostable multivibrators using 555 Timer and IC-741, Introduction to PLL (IC- 565): block diagram and operation principle, PLL as frequency multiplier.

Unit-III **8-Hours**

Data Converters: Introduction, DAC Techniques: Weighted resistor DAC, R-2R ladder DAC and Inverted R-2R DAC, ADC Techniques: Parallel Comparator Type ADC, Counter Type ADC, Successive Approximation ADC and Dual Slope ADC, DAC and ADC Specifications

Unit-IV **14-Hours**

Digital Integrated Circuits-Combinational Logic ICs: Familiarity with commonly available TTL-74XX Series ICs pertaining to 4-bit parallel adder (74LS83A/74LS283),8-bit/16-bit parallel adder using two/four74LS283 ICs, 4-bit comparator (74HC85), 8-bit comparator using two 74HC85 ICs, 8X1 multiplexer (74LS151), 1-to-16 demultiplexer (74HC154), 4-line-to-16-line decoder(74HC154), BCD-to-7-Segment decoder (74LS47), 8-to-3 bit and 10-to-4 bit priority encoders (74HC147 & 74LS148), 9-bit parity generator (74LS280). (Qualitative approach of designing and modeling the logic circuits using HDL)

Unit-V **14-Hours**

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), dual D-Flip-flop (74AHC74), dual J-K Flip-flop (74HC112), 4-bit synchronous binary counter(74HC163), 4-bit synchronous decade counter (74F162) and various shift registers (74HC164/ 74HC165/ 74HC195) (Qualitative approach of designing and modeling the logic circuits using HDL)

Memories: ROM Architecture, Types of ROMS & Applications, RAM Architecture, Static & Dynamic RAMs.

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	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.

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	ANTENNAS AND WAVE PROPAGATION	L	T	P	C
1004233103		3	0	0	3

Course Overview:

This course's objective is to introduce the student to antennas, covering their principles of radiation, their basic parameters, their general types, and those commonly used in wireless systems. The student also learns the various propagation mechanisms/impairments and the basic models of propagation. Atmospheric and weather effects are also reviewed.

Course Objectives:

- Understand the concept of radiation mechanism of various antennas
- Introduce the working principles of various antennas, antenna arrays
- Discuss the major applications of antennas with an emphasis on how antennas are employed to meet electronic system requirements.
- Understand the mechanism and models for radio-wave propagation

Course Outcomes:

COs	Course Outcomes	Bloom's Taxonomy Level	POs
CO1	Illustrate the basic antenna parameters and Providing knowledge of different types of antenna.	L2	PO1,PO2,PO5
CO2	Construct the antenna arrays and obtain their radiation patterns	L3	PO1,PO2,PO3,PO4,PO5
CO3	Analyze the importance of resonant and non resonant antennas	L4	PO1,PO2,PO3,PO4,PO5
CO4	Compare different modes of wave propagation through ground wave, space wave and sky wave.	L4	PO1,PO2,PO4

Unit-I

Antenna Fundamentals & Linear Wire Antennas:

Introduction, Radiation Mechanism: single wire, two wire, dipoles, Current Distribution on a thin wire antenna. Radiation Patterns, Patterns in Principal Planes, Main Lobe and Side Lobes, Beam width, Beam Area, Radiation Intensity, Beam Efficiency, Directivity, Gain, Antenna Apertures, Effective Height, Antenna regions. Radiation from Small Electric Dipole, Quarter wave Monopole, Half wave dipole: Evaluation of Field Components, Power Radiated, and Radiation Resistance, Applications of half wave dipole.

Unit-II

Antenna Arrays

2 Element Arrays: Different cases, Principle of Pattern Multiplication,

N Element Uniform Linear Arrays: Broadside, End fire Arrays, Concept of Scanning Arrays., Binomial Arrays, Related Problems.

Arrays with Parasitic Elements: Yagi - Uda Arrays, Folded Dipoles & their characteristics

Unit-III

Non-Resonant Radiators and VHF, UHF Antennas

Traveling wave radiators – basic concepts, Long wire antennas – field strength calculations and patterns, V-antennas, Rhombic Antennas and Design Relations, **Small Loop antennas**- Small Loops

- Field Components, Comparison of far fields of small loop and short dipole

Helical Antennas: Significance, Geometry, basic properties, Design considerations for monofilar helical antennas in Axial Mode and Normal Modes (Qualitative Treatment).

Unit-IV

Microwave Antennas and Measurements

Paraboloidal Reflectors: Geometry, characteristics, types of feeds, F/D Ratio, Spill Over, Back Lobes, Aperture Blocking, Off-set Feeds and Cassegrain Feeds. Microstrip antennas,

Antenna Measurement Theory: Antenna Measurements-Patterns Required, Set Up, Distance Criterion, Directivity and Gain Measurements (Comparison, Absolute and 3Antenna Methods).

Unit-V

Wave Propagation

Concepts of Propagation – frequency ranges and types of propagations. Ground Wave Propagation– Characteristics, wave tilt, Ionosphere – formation of layers and mechanism of propagation, reflection and refraction mechanisms, Critical Frequency, MUF, skip distance, Virtual Height, Space Wave Propagation– Mechanism, LOS and Radio Horizon, Duct Propagation

Text Books:

1. Antennas for All Applications – John D. Kraus and Ronald J. Marhefka, 3rd Edition, TMH, 2003.
2. Antenna Theory - C.A. Balanis, John Wiley and Sons, 2nd Edition, 2001

Reference Books:

1. G.S.N Raju, "Antennas and Wave Propagation", 1st Edition Pearson Education, 2004.
2. Antennas and Wave Propagation – K.D. Prasad, Satya Prakashan, Tech India Publications, 3rd Edition, New Delhi, 2001.

III Year – I	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	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.

III Year – I	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:

- To impart basic concepts of computer architecture and organization
- To explain key skills of constructing cost-effective computer systems.
- To familiarize the basic CPU organization.
- To help students in understanding various memory devices.
- 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 Sem	Professional Core Elective-I Neural Networks	L	T	P	C
1004233133		3	0	0	3

Course Overview:
This course introduces the architecture, learning methods, and real-world applications of neural networks, enabling students to design, implement, and analyze various models including CNNs and RNNs for tasks such as classification, prediction, and anomaly detection.

Course Objective:

1. Understand the architecture and functioning of biological and artificial neural networks.
2. Analyze and implement feedback on neural networks and their learning algorithms.
3. Apply various supervised, unsupervised, and reinforcement learning methods.
4. Understand and implement convolutional and recurrent neural network architectures.
5. Explore real-world applications of neural networks including classification, prediction, and anomaly detection.

Course Outcomes:
After completion of the course students able to

CO's	Course outcome	Bloom's taxonomy	Bloom's Taxonomy Level	PO
CO1	Explain the structure and functioning of biological and artificial neural networks.	Understanding	L2	PO1, PO5
CO2	Implement and analyze various neural network learning algorithms including supervised, unsupervised, and reinforcement learning.	Applying Analyze	L4 L3	PO1, PO2, PO4, PO5
CO3	Design and train deep neural networks such as Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs) for real-world problems.	Create	L6	PO1, PO2, PO3, PO5
CO4	Evaluate the performance of neural network models for tasks such as classification, prediction, and anomaly detection.	Evaluating	L5	PO1, PO2, PO3, PO4

UNIT- I **9-Hours**

Introduction to Neural Networks: Introduction, structure and working of Biological Neural Network Artificial Neuron Models, Trends in Computing Comparison of BNN and ANN Characteristics of ANN, McCulloch -Pitts Model, Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, Classification Taxonomy of ANN- Connectivity, Neural Dynamics: Activation and Synaptic, Learning Strategy: Supervised, Unsupervised, Reinforcement, Learning Process: Error Correction Learning, Memory Based Learning, Hebbian Learning, Competitive, Boltzmann Learning.Applications of Memory Based Learning.

Unit-II: **8-Hours**

Single & Multilayer Feed Forward Neural networks: Perception Models: Discrete, Continuous and Multi - Category, Training Algorithms: Discrete and Continuous Perception Networks, Perception Convergence theorem, Limitations of the Perception Model, Credit Assignment Problem, Generalized Delta Rule, Gradient Descent, Back propagation neural network, Back Propagation Algorithm XOR Problem, Heuristics, Output Representation and Decision Rule, Feature Detection. Applications of BPNN

Unit-III: **11-Hours**

Leaning Algorithms: Supervised learning: Linear Regression, Logistic Regression, K Nearest Neighbors (KNN), Random Forest, Support Vector Machines (SVM), Un supervised learning: k- means, c-means, Apriorism, Reinforcement learning: Q-Learning, Case Study. Risk Evaluation, Anomaly Detection

Unit-IV: **9-Hours**

Convolutional Neural Networks and Recurrent Neural Networks: Introduction to CNNs, Convolution, Correlation, Filtering, Kernel filter, Principles behind CNNs, Multiple Filters, CNN architectures, Detection and Segmentation, Visualizing and Understanding, Advanced CNNs for computer vision, Introduction to RNNs, Unfolded RNNs. *RNN applications, CNN Applications*

Unit-V: **10-Hours**

Recurrent Neural Networks (RNNs) and Applications: Introduction to RNNs: structure, unfolding through time, Types of RNNs: Vanilla RNN, LSTM, GRU, Training RNNs: backpropagation through time, Applications of RNNs in NLP and time-series prediction, Comparison: RNNs vs CNNs, Real-world use cases and integration of neural networks in AI systems

Text Books:

1. James A Freeman and Davis Skapura, Neural Networks, Pearson Education, 2002.
2. Simon Haykin, Neural Networks-Acomprehensive foundation, Pearson Education, 2001
3. Bengio, Yoshua, Ian J. Goodfellow, and Aaron Courville. "Deep learning." An MIT Press book in preparation. (2015).

Reference Books:

1. S. N. Sivanandam, S. Sumathi, S. N. Deepa, Neural Networks using MATLAB 6.0, TMH, 2006
2. B Yegnanarayana, Artificial neural networks, Prentice Hall of India, 1stEdition, 2005.

III Year – I	Open Elective-I	L	T	P	C
1005233150	PRINCIPLES OF OPERATING SYSTEMS	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.

III Year – I	Open Elective-I	L	T	P	C
1005233151	SCRIPTING LANGUAGES	0	0	3	1.5

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	ANALOG AND DIGITAL IC APPLICATIONS LAB	L	T	P	C
1004233110		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 & IC565 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: ANALOG 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. OP-AMP as an Astable and Monostable Multivibrators using IC 741
5. Astable and Monostable Multivibrators using 555 Timer
6. Schmitt trigger using IC 741 OP-AMP & IC 555 Timer
7. PLL Characteristics using IC 565
8. R-2R ladder type DAC using OP-AMP. (IC 741)

PART-B: DIGITAL INTEGRATED CIRCUITS APPLICATIONS (HARDWARE & 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. 8-to-3-bit Priority Encoder using IC 74LS148
6. 9-bit Parity Generator using IC 74LS280
7. The S-R Latch using IC 74LS279
8. Dual JK Flip-Flop using IC 74HC112 and D Flip-Flop using IC 74LS74
9. 4-bit Synchronous Decade Counter using IC 74F162 or Decade Counter using IC 74LS90 or 4-bit Counter using IC 74LS93
10. Shift Register using IC 74HC164/IC 74HC165/IC 74HC195/IC 74LS95
11. RAM (16 X 4) using IC 74LS189 (Read and Write Operations)
12. ALU

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	Microprocessors and Microcontrollers Lab	L	T	P	C
1004233111		0	0	3	1.5

Course Objective:

- 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	Antenna Design	L	T	P	C
1004233180		1	0	2	2

COURSE OBJECTIVES:

The student will

- ❖ Understand the high frequency antenna design using 3D electromagnetic software.
- ❖ Learn different electromagnetic software
- ❖ Gain knowledge in practical oriented applications

COURSE OUTCOMES:

CO's	Course outcome	Bloom's Taxonomy Level	PO
CO1	Analyze the different types of antenna design	L2	PO1, PO2
CO2	Examine different parameters like gain, bandwidth etc.	L3	PO2, PO3, PO5
CO3	Analyze the electromagnetic field in high frequency.	L3	PO3, PO4
CO4	To formulate and analyze the antenna related problems.	L4	PO3, PO4

List of Experiments to be performed

1. Study of antenna mechanism and its performance evaluation parameters.
2. Study of basics about HFSS/CST software
3. Design of a monopole antenna to resonate at a frequency of 2.4 GHz
4. Design of dipole antenna to resonate at a frequency of 5GHz
5. Design of a Microstrip patch antenna using Inset feed technique.
6. Design of a Microstrip patch antenna using coaxial feeding technique.
7. Introduction to MIMO antenna parameters and 5G frequency bands.
8. Design of two element MIMO antenna and obtain S-parameters, ECC, and DG.

Text Books

1. Microstrip Antenna Design Handbook (Antennas & Propagation Library) by R.Garg (P. Bhartia, Inder ahl, A. Ittipiboon .
2. AntennaTheory: Analysis and Design by Constantine A. Balanis

Reference Books/Journals:

1. T. S. Rappaport, R. Mayzus, Y. Azar, K. Wang, G. N. Wong, J. K. Schulz, Samimi and F. Gutierrez, "Millimeter Wave Mobile Communications for 5GCellular: It Will Work!," in IEEE Access, vol. 1, pp. 335–349, 2013.
2. K.Huang and D.Edwards, Millimetre Wave Antennas for Gigabit wireless Communication, John Wiley and Sons Inc., 2008.

III Year – I	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 Softwarere
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	CONSTITUTION OF INDIA	L	T	P	C
1000233125		3	0	0	3

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's	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