ANILNEERUKONDAINSTITUTEOF TECHNOLOGY
AND SCIENCES (AUTONOMOUS)

Affiliated to Andhra University

Academic Regulations Curriculum &
Syllabi (First Year [I&IIsem], Second year [I&IIsem])

ACCREDITED BY NBA & NAAC WITH 'A' GRADE
VISION

ANITS envisions to emerge as a world-class technical institution whose products represent a good blend of technological excellence and the best of human values.

MISSION

To train young men and women into competent and confident engineers with excellent communicational skills, to face the challenges of future technology changes, by imparting holistic technical education using the best of infrastructure, outstanding technical and teaching expertise and an exemplary work culture, besides moulding them into good citizens.

QUALITY POLICY

ANITS is engaged in imparting quality technical education. It constantly strives towards achieving high standards of teaching, training and development of human resources by encouraging its faculty and staff to work as a team and to update their knowledge and skills continually to match the needs of industry.
Foreword

ANILNEERUKONDAINSTITUTEOFTECHNOLOGY and
SCIENCES(ANITS) was founded by Anil Neerukonda Educational Society (ANIT) in the fond memory of Anil Neerukonda, son of Dr. B.R Prasad Neerukonda.

Its humble journey started in 2001 with an intake of 220 students into four undergraduate B.Tech programmes. Within 14 years of its establishment, the institute registered phenomenal growth and is accredited by NAAC with ‘A’ and by NBA for the second time. It is presently affiliated to Andhra University and has achieved autonomous status in 2015. Further, the institute has been currently ranked as 4th among the private engineering colleges in Andhra Pradesh by APSCHE. It has been recognised as “Centre for Excellence” by Infosys and is accorded by Andhra University as “Centre for Research”.

Today, the institute offers seven B.Tech. programmes and four M.Tech. programmes with an annual total intake of about 1,100 students. The institute offers amenities like separate hostels for boys and girls, indoor and outdoor games, transport covering all the major locations of Visakhapatnam and medical aid provided by Anil Neerukonda hospital and NRI Institute of Medical Sciences, another educational institution of ANES.

Apart from the State-of-the-Art laboratories, well-established teaching methodology and implementation of the best practices, the wonderful co-ordination of the Management, Faculty and Parent’s has of far played a crucial role in shaping the future of the ANITIANsand has been the talisman of the Institute’s phenomenal growth.

The success stories of four champions at several qualifying exams for the higher studies like GRE, TOEFL, CAT and GATE, the impressive track record of placements with highest known packages in MNCs like Google, Oracle, Infosys, TCS and so on are the sweetest fruits of our efforts.

PRAGNANAMBRAHMA, the motto of ANITS, is truly practiced by all the members of ANITS family, directing efforts to serve the society, nation and mankind as well.

Hearty welcome to ANITS family.

Prof. T. V. HANUMANTHA RAO
PRINCIPAL
Achievements & Highlights

- Autonomous since May 2015
- NAAC with 'A' Grade
- Accredited and reaccredited by NBA, New Delhi
- UGC recognition under 2(f) and 12(B)
- Permanent affiliation to Andhra University, Visakhapatnam
- Among top 3 most preferred colleges in A.P.
- "AAA" rating accorded by "Careers Digest 360"
- Recognized as a Research Center by Andhra University
- Selected as Skill Development Center (SDC) by Govt. of A.P.
- First institution to be accorded "Center for Excellence" by Infosys
- Ranked 5th among the Promising Private Engineering Colleges for excellence as per Competition Success Review (CSR) magazine in 2011
- Recognized as "Silver Partner" of Keane India (Chennai) for the year 2007-2008
- Collaborated with "Mission (R&D)" funded by Wipro
- "On Campus Training" by IBM for the students
- Collaboration with Unisys Global Solutions India (Bangalore) for internship
- Highest package offered around 2 crores including perks – highest offer in South India
- 8 lac to 10 lac packages – for majority ANITIANS
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Department Profile

Department was started with UG programme in 2001 with an intake of 60, and subsequently enhanced to 90 in 2003 and to 120 in 2005 and to 180 in 2014. PG programme (M.Tech) in Communication Systems with an intake of 18 has been sanctioned from the academic year 2011-2012. The Department was accredited by NBA. A team of highly qualified faculty members run the Department with specializations in Antennas, Communications, Microwave Engineering, Electronic Instrumentation, Signal processing and VLSI areas. The team comprises of 39 staff members with 4 Professors, 2 Associate Professors, 33 Asst. Professors, One Instrumentation Engineer, 1 senior technician and 4 Technicians. There are 6 Ph.D holders in the department and 10 faculty are pursuing Ph.D

The department is recognized as Research Center by Andhra University and currently there are 17 Ph.D scholars guided by the faculty of the department.

The Memorandum Of Undestanding (MOU) is executed between M/S Avantel Limited, incorporated under the laws of Indian Companies Act, 1956, having its registered office at plot no.47/P,APIIC Industrial Park, Gambheeram(V), Anandapuram (M), Visakhapatnam-531163, who is specialist in Defense Electronics, Satellite Communication technologies and Embedded Systems, and Anil Neerukonda Institute Of Technology & Sciences, Affiliated to Andhra University and Accredited by NBA, Sangivalasa-531162, Bheemunipatnam Mandal, Visakhapatnam, effective from Nov 2016 for three years.

The Memorandum Of Undestanding (MOU) is executed between M/S Effetronics Pvt Limited, Vijayawada and the department of ECE, ANITS, for 3 years, effective from 2017.

Department has an exclusive Departmental library with around 200 Volumes and consisting of E-Learning resources like NPTEL. Department is provided with internet facility with 4 Mbps speed. Periodically the department organizes guest lectures from eminent people from academic, industries and research institutes.

The Department has well equipped labs with excellent infrastructure. Various labs in the Department are DSP/VHDL Lab, Digital ICs Lab, Microprocessors and Applications Lab, Communication Lab, Electronic Devices and Circuits Lab, Microwave and Antennas lab and project lab. Project lab consisting of 24 PCs connected in LAN is dedicated for carrying out the final year projects and for enhancing research activity, Simulation Lab, and also R &D lab and M.Tech Communication Engineering lab. All the faculty members are easily accessible to the students for counseling and guidance on academic matters. The students are encouraged to take active part in cultural programmes, technical student events, seminars, workshops and sports. As a result the students are doing well in semester examinations and campus interviews. The faculty members are actively involved in research and are publishing papers in various National and International Conferences/Journals.

To encourage the extracurricular activities of the students and to make them think out of box, the department of ECE has active student cum faculty clubs like Creativity & Innovations Club, Higher Education Club, Green Club, Wall magazine Club, Yoga Club, Sports Club and Cultural Club. All the faculty members are easily accessible to the students for advice, counseling and guidance on curricular, co-curricular and extra-curricular (NSS, Sports, etc.) activities. The department organizes an annual student technical symposiums, in which students from various colleges across the country participate and exhibit their talents in events like paper presentation, poster presentation, hardware exhibition, technical quiz, and mock parliament. The department has students forum of professional national and international professional bodies like IETE, IEEE, etc.

ECE department has an excellent placement record which has been consistently above 85% and the students are placed in reputed IT and core industries. The students constantly get admissions in IITs, NITs, IIMs, reputed Indian universities and foreign universities for higher studies.
VISION

To become a centre of excellence in Education and Research and produce high-quality engineers in the field of Electronics and Communication Engineering to face the challenges of future technology changes.

MISSION

The Department aims to bring out competent young Electronics & Communication Engineers by achieving excellence in imparting technical skills, soft skills and the right attitude for continuous learning.
### PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

1. To prepare graduates for successful career in Electronics industries, R&D organizations and/or IT industries by providing technical competency in the field of Electronics & Communication Engineering.

2. To prepare graduates with good scientific and engineering proficiency to analyze and solve electronic engineering problems.

3. To inculcate in students professionalism, leadership qualities, communication skills and ethics needed for a successful professional career.

4. To provide strong fundamental knowledge in men and women students to pursue higher education and continue professional development in core engineering and other fields.

### PROGRAM OUTCOMES (POs)

<table>
<thead>
<tr>
<th></th>
<th>Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialisation for the solution of complex engineering problems.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Problem analysis: Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.</td>
</tr>
<tr>
<td>3</td>
<td>Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs.</td>
</tr>
<tr>
<td>4</td>
<td>Conduct investigations of complex problems: An ability to design and conduct scientific and engineering experiments, as well as to analyze and interpret data to provide valid conclusions</td>
</tr>
<tr>
<td>5</td>
<td>Modern tool usage: Ability to apply appropriate techniques, modern engineering and IT tools, to engineering problems</td>
</tr>
<tr>
<td>6</td>
<td>The engineer and society: An ability to apply reasoning to assess societal, safety, health and cultural issues and the consequent responsibilities relevant to the professional engineering practice</td>
</tr>
<tr>
<td>7</td>
<td>Environment and sustainability: An ability to understand the impact of professional engineering solutions in societal and environmental contexts</td>
</tr>
<tr>
<td>8</td>
<td>Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice</td>
</tr>
<tr>
<td>9</td>
<td>Individual and team work: Ability to function effectively as an individual, and as a member or leader in a team, and in multidisciplinary tasks</td>
</tr>
<tr>
<td>10</td>
<td>Communication: Ability to communicate effectively on engineering activities with the engineering community such as, being able to comprehend and write effective reports and design documentation, make effective presentations.</td>
</tr>
<tr>
<td>11</td>
<td>Project management and finance: An ability to apply knowledge, skills, tools, and techniques to project activities to meet the project requirements with the aim of managing project resources properly and achieving the project’s objectives.</td>
</tr>
<tr>
<td>12</td>
<td>Life-long learning: Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.</td>
</tr>
<tr>
<td></td>
<td><strong>Professional Skills:</strong> An ability to apply the knowledge of mathematics, science, engineering fundamentals in ECE to various areas, like Analog &amp; Digital Electronic Systems, Signal &amp; Image Processing, VLSI &amp; Embedded systems, Microwave &amp; Antennas, wired &amp; wireless communication systems etc., in the design and implementation of complex systems.</td>
</tr>
<tr>
<td>---</td>
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</tr>
<tr>
<td>2</td>
<td><strong>Problem-Solving Skills:</strong> An ability to solve complex Electronics and communication engineering problems, using latest hardware and software tools, along with significant analytical knowledge in Electronics and Communication Engineering</td>
</tr>
<tr>
<td>3</td>
<td><strong>Employability and Successful career:</strong> Acquire necessary soft skills, aptitude and technical skills to work in the software industry and/or core sector and able to participate and succeed in competitive examinations.</td>
</tr>
</tbody>
</table>
ACADEMIC REGULATIONS

ACADEMIC REGULATIONS FOR B.TECH PROGRAMME UNDER AUTONOMOUS STATUS

(W.E.F. THE ADMIITTED BATCH OF 2015-16)

I. Admissions:
Admissions into first year of B.Tech. Programme and admissions into second year (lateral entry) of B.Tech. Programme of the Institute will be as per the norms stipulated by Andhra University & Andhra Pradesh State Council for Higher Education (APSCHE), Govt. of Andhra Pradesh. The academic regulations of Autonomous status mentioned herewith will be applicable from 2016-17 in case of lateral entry admissions.

II. Programmes Offered:
The following are the B.Tech. Programmes offered by the Institute.
1. Chemical Engineering
2. Civil Engineering
3. Computer Science & Engineering
4. Electrical & Electronics Engineering
5. Electronics & Communication Engineering
6. Information Technology
7. Mechanical Engineering

III. Structure of the B.Tech. Programme:
The programme of instruction will consist of Humanities, Basic Sciences, Engineering Sciences and Technology. The complete programme is distributed over eight semesters with two semesters per academic year. Every branch of B.Tech. Programme will have a curriculum and syllabi for the courses recommended by the Board of Studies and approved by the Academic Council. The academic programmes of the Institute follow the credits system. The curriculum of B.Tech. Programme is designed to have a total of about 189 credits of which at least 180 credits must be earned during the academic year. The lateral entrants shall have a total of about 146 credits of which one should acquire a minimum of 180 credits to get the degree awarded. If a student takes all the credits, then the best 137 credits are considered to determine the final CGPA. However, the credits which a student can forego will be in accordance with the mandatory courses and electives offered by the individual departments.

IV. Duration of the Programme:
The duration of the programme is four academic years consisting of two semesters in each academic year. A student is permitted to complete the programme in a stipulated timeframe of 8 consecutive academic years from the date of initial admission. Students joining the programme in the 2nd year through lateral entry scheme shall have to complete the programme in a stipulated time frame of 6 consecutive academic years from the date of initial admission.
V. MediumofInstruction:

The medium of instruction and examination is English.

VI. MinimumInstructionDays:

Each semester normally consists of a minimum of 16 weeks of instruction.

VII. AcademicCalendar:

The dates of all important events, such as commencement of class work, examinations, vacations, etc., during the academic year will be specified in the Academic Calendar of the Institute, as approved by the Academic Council.

VIII. Examinations & Evaluation Process:

The performance of a student in each semester shall be evaluated subject-wise with a maximum of 100 marks each for theory and practical/drawings subjects.

(A) Theory Course:

For all lecture-based theory courses, the assessment shall be for 40 marks through internal evaluation and 60 marks through external semester-end examination of three hours duration except for the subjects with 100% internal assessment in which case an internal examination will be conducted for 60 marks along with the semester-end examinations.

i) Internalexamination:

The sessional marks shall be awarded through internal evaluation by the teachers concerned based on the continuous assessment which includes class tests, quiz, viva-voce, assignments, student regularity, two mid-examinations etc., according to a scheme notified by the department at the beginning of the semester.

Out of the 40 internal evaluation marks, 20 marks are assigned for 2 internal-mid exams, 10 marks for assignments, 5 marks for projects/case studies/quiz/tests and 5 marks for attendance. The average of the 2 internal mid exams is considered for the 20 marks allocated.

Under any circumstances, no re-examination shall be conducted for the internal mid examinations.

ii) Externalexamination:

The question paper shall be set externally and the answer scripts are valued through double evaluation system.

The average of the two valuations will be taken for the award of marks. In case, the difference of the marks obtained in the two valuations is more than 20%, then the third examiner shall value the script. Out of the three valuations, the average of marks obtained in third valuation and the marks obtained nearer to third valuation out of first two valuations shall be considered. No revaluation for any subject/course shall be entertained as already double valuation system is in existence. However, recounting is allowed on the request of the candidate on payment of specified fee. Challenge evaluations shall also be entertained on payment of specified fee.

(B) Laboratory Course:

Each student will perform about 10 to 12 experiments in each laboratory course. Laboratory course will be evaluated for 100 marks, out of which 50 marks are for external examination and 50 marks are for internal evaluation. The internal marks are awarded based on continuous assessment,
record work, internallab examination and student regularity. The external examination will be conducted by two examiners, one of them being laboratory class teacher as internal examiner (nominated by the Principal on recommendation of HOD) and an external examiner nominated by the Principal from the panel of experts recommended by the HOD.

A candidate shall be declared to have passed any theory subject/course if he secures not less than 40% in external theory examination and also a minimum of 40% of total marks of that course which assures a minimum of ‘E’ grade.

A candidate shall be declared to have passed any practical course if he secures not less than 50% in external laboratory examination and also a minimum of 50% of total marks of that course which assures a minimum of ‘D’ grade.

Only in the case of quantitative and verbal aptitude – I & II, if a candidate fails he is given an opportunity to improve to pass grade (E) irrespective of the score he gets over and above pass mark in the reexamination within one month on payment of special examination fee.

Any student appearing for the semester-end practical examination is eligible only if he submit the bonafide record certified by the laboratory class teacher and the HOD.

(C) Project Work:

The project work is evaluated for 300 marks out of which 100 through internal assessment in the IV Year I Semester through continuous assessment followed by final evaluation by a committee nominated by the HOD. For the 200 marks in IV year I Semester, assessment is done for 100 marks internally and for the remaining 100 marks by the committee consisting of at least one external expert nominated by the Principal. If a student fails in the fourth year first semester project he has to appear for re-assessment within one month for which he has to pay the re-examination fee.

(D) Industrial Training:

The industrial training is assessed internally for 100 marks by an interne evaluation committee constituted by the HOD.

(E) Supplementary Exam:

There will be supplementary examination for the programme such that for odd semester courses the supplementary exams will be conducted during summer vacation and for the even semester courses, the supplementary exams will be conducted during the winter vacation.

IX. Attendance Regulations:

Attendance of a student is computed by considering total number of periods conducted in all courses as the denominator and the total number of periods actually attended by the student in all courses as the numerator. It is desirable for a student to put in 100% attendance in all the subjects. However, a candidate shall be permitted to appear for the semester end examination provided he maintains a minimum of 75% overall attendance in the semester.

The shortage of attendance on medical grounds can be condoned up to a maximum of 9% provided the student puts in at least 66% attendance and provided the Principal is satisfied with the genuineness of the reasons. The Medical Certificates are to be submitted to the Head of the Department when the candidate reports to the classes immediately after the absence. Certificates submitted afterwards shall not be entertained. Condonation fee as fixed by the college for those who put in attendance between ≥66% and <75% shall be charged before the semester-end examinations.
In the case of students who participate in co-curricular, extra-curricular activities like student seminars, N.S.S., N.C.C., Inter-collegiate tournaments and any such other activities involving the representation of the Institute, with the prior approval of the Principal, the candidate may be deemed to have attended the classes during the actual period of such activity, solely for the purpose of attendance.

A student, who could not satisfy the minimum attendance requirement of 66% in any semester, shall be declared ‘Detained’. He is not eligible to appear for the semester end examinations. He will not be promoted to the next semester and shall have to repeat that semester with the next batch(es) of students. Such students who are detained and seek readmission, should submit an undertaking/a declaration that they will abide by the regulations existing at the time of readmission.

X. Minimum Academic Requirements:

The following academic requirements have to be satisfied in addition to the attendance requirement mentioned in item No. IX.

A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory subject if only he secures not less than 40% marks in the semester-end examination and a minimum of 40% marks in the internal evaluation and semester-end examination taken together. In the labs/ projects, the student should secure a minimum of 50% marks in the external examination and a minimum of 50% marks in the sum of internal evaluation and external examination evaluation taken together.

A student will be promoted to the next semester, if only he satisfies the minimum attendance requirement. A student shall be promoted from II Year to III Year only if he fulfills the academic requirement of 50% of all credits from regular and supplementary examinations of Year and II Year – I Semester (i.e., total 3 semesters) examinations, irrespective of whether the candidate takes the examination in all the subjects or not.

A student shall be promoted from III Year to IV Year only if he fulfills the academic requirements of total 50% of credits from regular and supplementary examinations of Year, II Year, and III Year, I Semester (i.e., total 5 semesters), irrespective of whether the candidate takes the examinations in all the subjects or not.

For lateral entry students, there is no credit-based restriction for promotion from II Year to III Year. But a lateral entry student shall be promoted from III Year to IV Year only if he fulfills the academic requirement of total 50% of credits from regular and supplementary examinations of II Year and III Year, I Semester (i.e., total 3 semesters) irrespective of whether the candidate takes the examinations in all the subjects or not.

Students, who fail to complete their B. Tech. Program, with nine months academic year from their admission or fail to acquire the credits stipulated for the program, shall forfeit their seat in B. Tech. Programme and their admissions shall stand cancelled. For lateral entry students, they have to complete the programme in six years from their year of admission.
XI. Award of Grades:
The absolute grading system is adopted as follows:

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Range of Marks (%)</th>
<th>Grade</th>
<th>Description</th>
<th>Grade Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>90-100</td>
<td>O</td>
<td>Outstanding</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>80-89</td>
<td>A</td>
<td>Excellent</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>70-79</td>
<td>B</td>
<td>Very Good</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>60-69</td>
<td>C</td>
<td>Good</td>
<td>7</td>
</tr>
<tr>
<td>5</td>
<td>50-59</td>
<td>D</td>
<td>Fair</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>40-49</td>
<td>E</td>
<td>Satisfactory</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>39 and below.</td>
<td>F</td>
<td>Fail</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>I</td>
<td>Absent</td>
<td>0</td>
</tr>
</tbody>
</table>

Note: Minimum grade to pass in laboratory courses is ‘D’.
The performance of a student at the end of each semester is indicated in terms of Semester Grade Point Average (SGPA). The SGPA is calculated as below:

\[
SGPA = \frac{\sum (Credit \times Course CGPA) - d \times Absent CGPA}{\sum (Credit \times Course Points)}
\]

where \(d\) represents absent (subsequently changed into pass or higher grades.)

SGPA is calculated for the candidates who have passed in all the courses in that semester.
Cumulative Grade Point Average (CGPA) will be calculated from II semester onwards up to the final semester and its calculation is similar to that of SGPA, considering all the courses offered from the first semester onwards.

CGPA is calculated for those who clear all the courses in all the previous semesters.

XII. Award of Class:
For award of class, a total of best 180 credits are considered in case of four year programme and best 137 credits in case of lateral entry admitted students. A candidate, who becomes eligible for the award of B.Tech. Degree shall be placed in one of the following classes.

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Class</th>
<th>CGPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>First Class with Distinction</td>
<td>7.5 or more*</td>
</tr>
<tr>
<td>2</td>
<td>First Class</td>
<td>6.5 or more but less than 7.5</td>
</tr>
<tr>
<td>3</td>
<td>Second Class/Pass</td>
<td>5.0 or more but less than 6.5</td>
</tr>
</tbody>
</table>

*First Class with Distinction will be awarded only to those students who clear all the subjects of the program in first attempt of regular examinations.

The CGPA can be converted to aggregate percentage by multiplying CGPA with 10, in case of requirement by any other university or for any other purpose.
XIII. Eligibility for Award of B.Tech. Degree:
A student shall be eligible for the award of the B.Tech degree if he fulfills all the following conditions:

1) Registered and successfully completed all the components prescribed for eligibility in the Programme of study to which he/she is admitted within the stipulated period,

2) Obtained CGPA greater than or equal to 5.0 (Minimum requirement for Pass),

3) No disciplinary action is pending against him/her and

4) Has no dues to the Institute including hostels.

XIV. Malpractices:
The Controller of Examinations/Dean of Examinations shall refer the cases of suspected malpractices in mid-examinations and semester-end examinationsto Malpractice Enquiry Committee constituted by the Institute. The Principal shall follow the approved scales of punishment. The Principal shall take necessary action against the erring students based on recommendations of the committee.

XV. Amendments to Regulations:
The Institute may, from time to time, revise, amend, or change the Regulations, Schemes of Examinations, and/or Syllabi and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the Institute.

XVI. General:
(i) Where the words 'he', 'him', 'his', occur in the regulations, they include 'she', 'her', 'hers'.
(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 Principal is final.
CURRICULUM
### First Year I–Semester

<table>
<thead>
<tr>
<th>Code</th>
<th>Subjectname</th>
<th>Lecture</th>
<th>Tutorial</th>
<th>Practical</th>
<th>Total</th>
<th>Sessional</th>
<th>Endmarks</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE111</td>
<td>English</td>
<td>3</td>
<td>1</td>
<td>-</td>
<td>4</td>
<td>40</td>
<td>60</td>
<td>3</td>
</tr>
<tr>
<td>ECE112</td>
<td>Engineering Mathematics I</td>
<td>3</td>
<td>1</td>
<td>-</td>
<td>4</td>
<td>40</td>
<td>60</td>
<td>3</td>
</tr>
<tr>
<td>ECE113</td>
<td>Engineering Chemistry</td>
<td>3</td>
<td>1</td>
<td>-</td>
<td>4</td>
<td>40</td>
<td>60</td>
<td>3</td>
</tr>
<tr>
<td>ECE114</td>
<td>Professional Ethics &amp; Human Values</td>
<td>2</td>
<td>1</td>
<td>-</td>
<td>3</td>
<td>100</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>ECE115</td>
<td>Engineering Physics</td>
<td>3</td>
<td>1</td>
<td>-</td>
<td>4</td>
<td>40</td>
<td>60</td>
<td>3</td>
</tr>
<tr>
<td>ECE116</td>
<td>Engineering Chemistry Lab</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>2</td>
</tr>
<tr>
<td>ECE117</td>
<td>Programming with C Lab</td>
<td>-</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>50</td>
<td>50</td>
<td>3</td>
</tr>
<tr>
<td>ECEAC1</td>
<td>NCC/NSS/Sports</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td>14</td>
<td>6</td>
<td>9</td>
<td>29</td>
<td>360</td>
<td>340</td>
<td>19</td>
</tr>
</tbody>
</table>

### First Year II–Semester

<table>
<thead>
<tr>
<th>Code</th>
<th>Subjectname</th>
<th>Lecture</th>
<th>Tutorial</th>
<th>Practical</th>
<th>Total</th>
<th>Sessional</th>
<th>Endmarks</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE121</td>
<td>Engineering Mathematics II</td>
<td>3</td>
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## Second Year I – Semester

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## Second Year II – Semester

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### Third Year I – Semester

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Open Elective - I: (for ECE, offered to other departments)

### Third Year II – Semester

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Professional Elective - II Open Elective - II (for ECE, offered to other departments)

1. Advanced Digital Signal Processing
2. Radar Signal Processing
3. Satellite Communications & GPS
4. Cellular and Mobile Communications
5. Project management
6. Industrial Safety and Hazards
7. IT infrastructure and management
8. Multimedia concepts
9. E-Governance
10. Robotics
11. Power Electronics
## Fourth Year II – Semester

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### Professional Elective-III

1. Phased array systems
2. Bio-medical Signal processing
3. VLSI Signal processing
4. Modern Television Engineering

### Professional Elective-IV

1. Signal processing algorithms and architecture
2. Design of testability
3. Wireless sensor networks
4. Introduction to Software Defined Radio
FIRST YEARSYLLABI

I-Semester
&
II-Semester
ENGLISH
(Commonforallbranches)

ECE111
Instruction:3Periodsand1Tut/Week
EndExam:3Hours

Credits:3
SessionalMarks:40
EndExamMarks:60

CourseObjectives:
Toimprovethe languageproficiencyofthestudentsinEnglishwithemphasis
onReadingandWritingskills.
Toenablethestudentstostudyengineeringsubjectswithgreatercomprehension&cognizance.
Tostrengthenthevocabularyofthestudents.
Toenablethestudentstowritegrammaticallycorrectstructureswithlogical
flow.
Toequipthestudentswiththe knowledgeof differentformats ofbusinesscommunication.

CourseOutcomes:

Bytheendofthecourse,thestudentwillbeableto:

<p>| | |</p>
<table>
<thead>
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<tr>
<td>1.</td>
<td>Analyzethestructureof thephrases, clauses and sentences</td>
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<tr>
<td>2.</td>
<td>Applyhisenrichedvocabularytogivebettershape tohis communication skills</td>
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<tr>
<td>3.</td>
<td>Effectivelyusedifferentformats of business correspondence</td>
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<tr>
<td>4.</td>
<td>Useidiomaticexpressions and foreign phrases in his communication</td>
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<tr>
<td>5.</td>
<td>Use correct structures to write sentences</td>
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</table>

SYLLABUS

UNITI 10Periods

Vocabulary: One Word Substitutes  Grammar: Noun: Noun Phrase, Gerunds

WritingSkills:

1) Formal Letter writing—format, style of letterwriting and types of letters—
complaint, enquiry, requesting quotations, invitation, regret and acceptance.
2) Story Building—Developing a story from the keywords, giving a title and
 describing learning outcomes.

UNITII 10Periods

Vocabulary: Foreign phrases or expressions
Grammar: Adjectives: Quantifiers, qualifiers, determiners, nouns as adjectives, verbs as
adjectives, adjective phrases

WritingSkills:

1. Technical Report writing—Formal reports and types: Informational reports, Analytical reports and
Recommendation reports—Status, feasibility, progress, incident and project.
2. Essay writing.

UNITIII 10Periods

Vocabulary: Idiomatic expressions—meaning and usage.
Grammar: Articles (concept and function; definite, indefinite and omission of articles)

WritingSkills:

1. Preparation of C.V. and Resume—format, style, purpose and objective.
2. Précis-writing technique with suitable title.
UNITIV

Vocabulary: Phrasal Verbs derived from the following dynamic verbs: Go, Get, Run, Take, Look, Put, Hold, Stand etc.

Grammar: Prepositions or prepositional phrases

Writing Skills:
1. Reading comprehension—questions based on facts, interpretation, logical deduction, vocabulary.
2. E-mail etiquette—format, style and language

UNITIV

Vocabulary: Synonyms and Antonyms (From the prescribed text only)

Grammar: Pronouns: Kind of pronouns, relative pronouns—who and whom, whose, which

Verbs—Aspects, moods, tenses, direct and indirect speech (active and passive voice), concord, Infinites and verb participles, verb phrase, Conditionals—probable, improbable, impossible, If-clause, Correction of sentences

TEXTBOOK: *Life through language* Pearson Publication, Delhi

REFERENCE BOOKS:
1. G.J.K. Gangal *A Practical Course for Developing Writing Skills in English* PHI
2. Mark Lester and Larry Beason *Handbook of English Grammar & Usage*
3. Tata McGraw Hill
4. S.M. Gupta *Current English Grammar And Usage* PHI
5. Dr. P. Prasad, Rajendra K. Sharma *The Functional Aspect of Communication*
7. Abul Hashem *Common errors in English* Ramesh Publishing House
9. Edgar Thorpe & Showick Thorpe *Objective English* Pearson
ENGINEERING MATHEMATICS-I
(Commonforallbranches)

**ECE112**
Instruction: 3Periods&1Tut/Week
EndExam: 3Hours

**Credits:** 3  
**SessionalMarks:** 40  
**EndExamMarks:** 60

**CourseObjectives:**
- To impart knowledge in basic concepts of functions of several variables and their applications like maxima & minima.
- To enable the students to study the concepts of Fourier series.
- To enable the students to study the concepts of three-dimensional figures like sphere, cone, cylinder and conicoids.
- To equip the students with the knowledge of multiple integrals and their applications.
- To introduce the concepts of improper integrals like beta, gamma & error functions.

**CourseOutcomes:**

<table>
<thead>
<tr>
<th>By the end of the course, student will be able to:</th>
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<tbody>
<tr>
<td>1. Familiarize with functions of several variables</td>
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<tr>
<td>2. Apply Fourier series in solving boundary value problems</td>
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<tr>
<td>3. Apply the concept of three-dimensional analytical geometry</td>
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<tr>
<td>4. Use mathematical tools needed in evaluating multiple integral and their applications</td>
</tr>
<tr>
<td>5. Use the concepts of improper integrals, Gamma, Beta and Error functions which are needed in Engineering applications</td>
</tr>
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</table>

**SYLLABUS**

**UNIT I**

12 Periods

**Partial Differentiation:** Functions of two or more variables—Partial Derivatives— which variable is to be treated as constant—Homogeneous functions—Euler’s theorem—Total Derivative—Change of Variables—Jacobians—Taylor’s theorem for functions of two variables—Maxima and Minima functions of two variables.

**UNIT II**

12 Periods

**Fourier Series:** Introduction—Euler’s formula—conditions for a Fourier expansion—Functions having points of Discontinuity—Change of interval—Even and Odd functions—Half ranges series—Parseval’s formula.

**UNIT III**

12 Periods


**UNIT IV**

14 Periods


**UNIT V**

10 Periods

**Beta & Gamma Functions:** Beta function—Gamma function relation between Beta and Gamma functions—results and problems, error function.
TEXTBOOK:

REFERENCE BOOKS:
1. N. P. Bali, Dr. Ashok Saxena, Dr. N. Ch. S. Narayana, *ATextbook on Engineering Mathematics* Laxmi pub. (p)Ltd. New Delhi
Course Objectives:

- To provide knowledge on problems associated with impure water and various water treatment technologies
- To enable the student to know the importance of semiconducting materials and preparation techniques
- To provide basic knowledge on conventional energy resources, developments in batteries and fuel cells
- To understand the corrosion of metals, various methods to prevent and control of corrosion
- To create awareness on advanced concepts like nanomaterials, green chemistry and eco-friendly technologies for future development

Course Outcomes:

<table>
<thead>
<tr>
<th>By end of the course, student will be able to:</th>
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<tbody>
<tr>
<td>1. Adopt suitable technologies for domestic and industrial water</td>
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<tr>
<td>2. Identify and generalize the properties of semiconducting materials used in various engineering fields</td>
</tr>
<tr>
<td>3. Design suitable batteries for different applications</td>
</tr>
<tr>
<td>4. Select and design of suitable material to prevent corrosion and protecting metals from corrosion</td>
</tr>
<tr>
<td>5. Develop green technologies for industrial processes</td>
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<tr>
<td>6. Solve scientific problems related to various engineering works</td>
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</table>

SYLLABUS

UNIT I

Water Chemistry: Impurities in water, Hardness of water, units and calcium carbonate equivalents, estimation of hardness (EDTA method), disadvantages of hard water, boiler troubles - Scale & Sludge formation - prevention - Internal treatment (Phosphate, Carbonate and Calgon conditioning) - Caustic embrittlement

Water treatment techniques: Softening of water - lime-soda process - numerical problem on LS process - Zeolite - ion exchange methods, Desalination of water - Reverse osmosis and Electro dialysis, Municipal water treatment - Screening, sedimentation, coagulation, Sterilization - Chlorination - Break Point chlorination

UNIT II


Ceramic Materials: Cement - Manufacture of Portland cement - Setting and hardening of cement - Cement concrete - RCC, Refractories - Classification properties, Ceramics and its Engineering applications

UNIT III

Thermal Energy: Fuel - types of fuels - Calorific value and its determination (Bomb calorimeter method) - Coal - Ranking of coal - analysis (proximate and ultimate) - COKE - Manufacture (Otto Hoffmann’s process) - Petroleum - refining of crude oil - Synthetic petrol - Fisher-Tropsch and Bergius methods - Knocking in petrol - Octane number - Diesel engine - Cetanumber - LPG and CN

ECE113

Instruction: 3 Periods & 1 Tut/Week

End Exam: 3 Hours

Sessional Marks: 40

End Exam Marks: 60

Credits: 3
**Chemical Energy:** Electrode potential, electro chemical series – Reference electrodes – SHE, Calomel electrode – Galvanic cells – primary cells (Dry cell) secondary cells (Lead acid, Ni-Cd, Lithium batteries) – H-Ofuelcells.

**Solar Energy:** Construction and Working of Photovoltaic cell

**UNIT IV**

**Corrosion Chemistry:** Origin and theories of corrosion – Types of corrosion – Galvanic corrosion, concentration cell corrosion, pitting corrosion, stress corrosion, intergranular corrosion – Factors affecting corrosion – Corrosion

**Prevention & Control of Corrosion:** Cathodic protection; Corrosion inhibitors; Protective coatings – Galvanization & Tinning – Anodized coatings – paints & special paints

**UNIT V**

**Nanochemistry:** Introduction, growth of nanoparticles (Sol-gel process), Fullerenes and Carbon nanotubes

**Green Chemistry:** Principles of Green chemistry, Alternative Solvents used in green synthesis.

**Lubricants:** Concept of Tribology – Mechanism of lubrication – Blended oils – properties of lubricating oils – Viscosity Index – Fire & Flash Point – Cloud & Pour Point – Aniline point.

**High Polymers & Composites:** Basic concepts of Polymers, Effect of polymer structure on properties, Plastics – Thermoplastic and Thermosetting resins, Composites – types – Fiber Reinforced Plastics – Particulate composites – Layer composites, Engineering applications of composites.

**TEXTBOOK:**

**REFERENCE BOOKS:**
5. V.K. Ahluvalia *Greensolventsfororganicsynthesis* Narosa Publications.
PROFESSIONALETHICSANDHUMANVALUES
(CommonforAllBranches)

ECE114 Credits:2
Instruction:2Periods&1Tut/Week SessionalMarks:100

CourseObjectives:
Tounderstandmoralvaluesandtheirsignificance.
Todrawinspirationforimbibingmoralvalues
Tounderstandprofessionalethicsandobligations
ToknowthecodeofethicsofrelevantProfessionalsocieties

CourseOutcomes:

<table>
<thead>
<tr>
<th>Byendofthecourse,studentwillbeableto:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Understandtherightcodeofconduction.</td>
</tr>
<tr>
<td>2. Assesshis/herrolesasaproactivememberofthesociety</td>
</tr>
<tr>
<td>3. Solvevomoral dilemmas and issues</td>
</tr>
<tr>
<td>4. ImplementCodeofethicsofrelevantProfessionalsocieties</td>
</tr>
</tbody>
</table>

SYLLABUS

UNIT-1

Introduction: Philosophical basis for human values- Human values as enshrined intheGita,Bibleandkhoran;Religion- Valuespropoundedinvariousreligions-NeedforReligiousharmony

UNITII

Human Values: Inspiration:Inspirationforhumanvalues-MahatmaGandhi, Dr.SarvepalliRadha Krishnan, SwamiVivekananda, RabindranathTagore, Mother Theresa- Benefits of Human values-Harmony between Self-interest and human values

UNITIII

BasicsofProfessionalEthics:EthicalHumanConduct–basedonacceptanceof basic human values; Humanistic Constitution and Endersal human order – skills, sincerity and fidelity; Scope and characteristics of people-frily and eco-frily production system,Technologiesandmanagementsystems.

UNITIV

ProfessionalEthicsinpractice:ProfessionandProfessionalism–Professional Accountability,Rolesofaprofessional,Ethicsandimageofprofession;Engineering professionandEthics-Technologyandsociety,EthicalobligationsofEngineering professionals, Roles of Engineers in industry, society, nation and the world; Professional Responsibilities – Collegiality, Loyalty, Confidentiality, Conflict of Interest,WhistleBlowing

UNITV


Multinational corporations - Environmental ethics - computer ethics - weapons development - engineers as managers-consulting engineers-engineers as expert witnessesandadvisors-moralleadership.
TEXTBOOKS:

REFERENCE BOOKS:
1. R. Subramanian *Professional Ethics* Oxford Endersity Press.
ENGINERINGPHYSICS  
(Commonforallbranches)

ECE115
Instruction:3Periods&1Tut/Week
EndExam:3Hours
Credits:3
SessionalMarks:40
EndExamMarks:60

CourseObjectives:
To impart knowledge in basic concepts of physics relevant to engineering applications
To introduce advances in technology for engineering applications

CourseOutcomes:
By the end of the course, student will be able to:

| 1. | Design and conduct simple experiments as well as analyse and interpret data in engineering applications |
| 2. | Understand advanced topics in engineering |
| 3. | Identify formulae and solve engineering problems |
| 4. | Apply quantum physics to electrical phenomena |

SYLLABUS

UNIT I

10Periods

Thermodynamics: Heat and work, first law of thermodynamics and its applications, reversible and irreversible processes, heat engine, Carnot cycle and its efficiency, Carnot’s theorem, second law of thermodynamics, entropy – entropy change in reversible and irreversible processes, entropy and second law, entropy and disorder, entropy and probability, third law of thermodynamics

UNIT II

10Periods

Electromagnetism: Faraday’s law of induction, Lenz’s law, Integral and differential forms of Faraday’s law, self-inductance, energy stored in electric and magnetic fields, Poynting vector, displacement current, Maxwell’s equations in integral form (no derivation), wave equation, propagation of electromagnetic waves in free space

Ultrasonics: Properties of ultrasonic waves, production of ultrasonic waves by magnetostriction and piezoelectric methods, applications of ultrasonics

UNIT III

10 Periods

Optics

Interference: Introduction, principle of superposition, coherence, Young’s double slit experiment, conditions for interference, interference in thin films by reflection, wedgeshaped film and Newton’s rings

Diffraction: Introduction, Fresnel and Fraunhofer diffraction, diffraction at a single slit

Polarisation: Introduction, types of polarized light, double refraction in uniaxial crystals, Nicol’s prism, quarter and half-wave plate, production and detection of plane, circular and elliptically polarized light

UNIT IV

10 Periods

Lasers: Introduction, characteristics of a laser beam, spontaneous and stimulated emission of radiation, population inversion, Ruby laser, He-Ne laser, semiconductor laser, applications of lasers

Fibre optics: Introduction to optical fibers, principle of propagation of light in optical fibers, acceptance angle and acceptance cone, numerical aperture, types of optical fibers, modes
of propagation and refractive index profiles, attenuation in optical fibers, advantages of optical fibers in communications, fiber optics communicationsystem, applications of optical fibers, fiber optics sensors

UNIT 10

Quantum Mechanics:
Planck’s hypothesis, wave-particle duality, introduction to quantum theory, de-Broglie concept of matter waves, Heisenberg’s uncertainty principle, Schrödinger’s time independent and time dependent wave equations, physical significance and properties of the wave function ψ, applications of Schrödinger wave equation for a particle in one dimensional well – eigen wave functions and energy eigen values of the particle

Elements of Statistical Mechanics: Elementary concepts of Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics (no derivation)

TEXTBOOKS:
2. M.N. Avadhanulu & P.G. Kshirasagar, Textbook of engineering physics, S. Chand publication
3. Resnick & Halliday, Physics - Volume II

REFERENCE BOOKS:
1) V. Rajendran, Engineering physics, McGraw Hill Education Private Ltd
2) S. O. Pilai, Sivakami, Engineering Physics, New Age International Publishers
3) Young & Freedman, University Physics, Pearson Education
4) A. Marikani, Engineering Physics, PHI Learning Private Limited
ENGINEERINGCHEMISTRYLAB
(Commonforallbranches)

ECE116
Practical/week:3
EndExam:3Hrs

Credits:2
SessionalMarks:50
EndExamMarks:50

CourseObjectives:
Toprovideclearideaoverquantitativechemicalanalysis.
Toimproveskillsinanalyzingsamplesthroughtitrationprocedures.
TofamiliarizewithInstrumentalmethodsofanalysesformoreaccuracy.
Tointroducevariousmethodsofanalyzingtheoresamples.

CourseOutcomes:

Byendofthecourse,studentwillbeableto:

1. Identifythesuitablemethodforanalyzingsamples.
2. Analyzedifferenttypesofwatersamplestotestqualityparameters.
3. Usedifferenttypesofinstrumentsinestimatingthecomposition
   ofmaterialsinsamplesrelatedtosoil,water.

ListofExperiments(any10experimentsaretobecompleted):

1. Preparationofstandardsolution
2. Estimationofsodiumcarbonatepresentinsodaash.
3. Estimationofamountofcalciumpresentintheparticulatecontent
   bytitrimetrically.
4. EstimationofamountofCopperpresentinthecopperorebyiodometrically.
5. DeterminationoftotalHardnesspresentinthegivenwatersample.
6. EstimationofamountofZincbytitratingwithEDTA.
7. DeterminethestrengthofacidbytitratingwithstrongbaseusingpHmeter.
8. Estimatethelocalisedstrengthofacidspresentintheacidmixtureby
   titratingwithstrongbaseusingconductivitymeter.
9. EstimatetheamountofMoh’ssaltpresentinthegivensolutionbytitrating
   withpotassiumdichromateusingpotentiometer.
10. DeterminationofviscosityoftheveryfluidbyOstwaldviscometer.
11. Determinationofrateconstantofacidcatalyzedhydrolysisofester.
12. Determinationofpartitioncoefficientofiodinedistributedbetweenwaterandcarbondioxide.

Demonstration


TEXTBOOKS:

1. S.K.BhasinandSudhaRaniLaboratorymanualonEngineeringchemistry,

REFERENCEBOOKS:

1. S.S.DaraExperimentsandcalculationsinEngineeringchemistry9theditionS.Chand&CompanyLtd.
PROGRAMMING WITH CLAB
(Common for all branches)

ECE117
Practicals/week: 3
Periods & 1 Tut/Week
EndExam: 3 Hrs
Credits: 3
Sessional Marks: 50
EndExamMarks: 50

Course Objectives: To enable students to
Understand the program development steps using compilers.
Strengthen the problem solving skills using programming techniques.
Design programs using various control structures.
Develop programs using structures, unions and files.

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

1. Gain a working knowledge on programming.
2. Learn and use the fundamentals of a programming language (such as language-defined data types (int, float, char, double), control constructs (sequence, selection, repetition), program modules (including functions, modules, methods)).
3. Exhibit the ability to formulate a program that correctly implements the algorithm.
4. Demonstrate the effective use of the programming environment used in the course.

SYLLABUS

1. Overview
2. Introduction to Unix
3. Data Types, Constants
4. Operators, Expressions
5. Control Structures
6. Arrays & Strings
7. Pointers
8. Functions.
9. Structures & Unions
10. Files

REFERENCE BOOKS:
5. B. W. Kernighan, Dennis M. Ritchie The C Programming Language PHI

LIST OF SAMPLE PROGRAMS
1. Write a program for any three of the following
   i) To accept the distance between two cities and convert the distance in meters, feet, inches and centimeters. (Note: Input distance in Kilometers).
   ii) To accept marks obtained by a student in five different subjects, calculate the total marks and percentage obtained by the student (The maximum marks for each subject is 100).
   iii) To accept a 3-digit number and calculate the sum of its digits.
iv) To accept quantity, product code, unit price of five products and calculate the total price for each product and the SUBTOTAL, TAX, TOTAL, and print the details in the following format:

<table>
<thead>
<tr>
<th>Qty</th>
<th>Productcode</th>
<th>Unitprice</th>
<th>Totalprice</th>
</tr>
</thead>
<tbody>
<tr>
<td>xx</td>
<td>1</td>
<td>400.00</td>
<td>xxxxx.xx</td>
</tr>
<tr>
<td>xx</td>
<td>2</td>
<td>20.00</td>
<td>xxxxx.xx</td>
</tr>
<tr>
<td>xx</td>
<td>3</td>
<td>200.00</td>
<td>xxxxx.xx</td>
</tr>
<tr>
<td>xx</td>
<td>4</td>
<td>100.00</td>
<td>xxxxx.xx</td>
</tr>
<tr>
<td>xx</td>
<td>5</td>
<td>200.00</td>
<td>xxxxx.xx</td>
</tr>
</tbody>
</table>

SUBTOTAL xxxxx.xx
TAX xxxxx.xx
TOTAL xxxxx.xx

v) To evaluate the following expression
   a) \((ax+by)/(ax-by)\)
   b) \(a^2+b^2+\text{square root}(2ab)\)

2. Write a program for any three of the following
   i. To find the maximum and minimum of three numbers.
   ii. For the above experiment in 1-ii) find and display the grade of the student as prescribed below:

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;90</td>
<td>A</td>
</tr>
<tr>
<td>&gt;80 and &lt;=90</td>
<td>B</td>
</tr>
<tr>
<td>&gt;70 and &lt;=80</td>
<td>C</td>
</tr>
<tr>
<td>&gt;60 and &lt;=70</td>
<td>D</td>
</tr>
<tr>
<td>&gt;=50 and &lt;=60</td>
<td>E</td>
</tr>
<tr>
<td>&lt;50</td>
<td>F</td>
</tr>
</tbody>
</table>

iii) To find the root of a quadratic equation.
iv) To find the area of a triangle when
   a) Sides are given
   b) Base and height are given
   c) Co-ordinates are given

v) To accept an alphabet and convert into its opposite case. (Do not use library functions)

3. Write a program for any four of the following
   i) To print prime numbers between the specified range (e.g., 100 to 200)
   ii) To generate Pascal triangle format
   iii) To compute cosine series: \(\cos(x)=1-x^2/2!+x^4/4!-x^6/6!+\ldots\)
   iv) To check whether number is palindromic or not.
   v) To print set of Armstrong numbers in a specified range (e.g., 100 to 200)
   vi) To convert the numbers from the following
       a) Binary to decimal
       b) Decimal to binary

4. Write a program to perform the following operations in a given array of n numbers
   i) Sum of all the numbers
   ii) Minimum and maximum in the array
   iii) Searching an element
   iv) To generate random real numbers in the range of 10 to 20 and sort them.
5. Write a C program to perform the following on the matrices
   i) Transpose of a matrix and check the symmetry
   ii) Trace and norm of a matrix
   iii) Addition of matrices
   iv) Multiplication of two matrices

6. Write a C program to perform any two of the following operations on strings
   i. To check whether the given string is a palindrome or not.
   ii. To find the length of the string
   iii. To concatenate two strings.
   iv. To check whether the given substring exists in a text and display the frequency

7. Write a C program to create a structure for a student with the details name, roll no, total of five subject marks, percentage and sort the records according to the percentage.
   ii. Write a C program to add two complex numbers using structures.
   iii. Write a C program to illustrate the difference between union and structure.

8. i. Write a program to calculate the sum of an array using pointers.
   ii. Write a program to search a name in a given list of names using pointers.

9. Write a C program using functions
   i) To illustrate call by value and call by reference
   ii) To accept a string and character and pass them as parameters to a function, the function shall replace the character in the string with any other specific character and return the modified string.
   iii) To pass the employee record as a structure to the function. The function shall compute the gross salary (include DA and HRA Calculation), take the savings as input and compute the tax payable as per the prescribed table.

<table>
<thead>
<tr>
<th>Gross Salary</th>
<th>Tax(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 2 Lakhs</td>
<td>NIL</td>
</tr>
<tr>
<td>2 Lakhs to 5 Lakhs</td>
<td>10</td>
</tr>
<tr>
<td>5 Lakhs to 10 Lakhs</td>
<td>20</td>
</tr>
<tr>
<td>10 Lakhs to 50 Lakhs</td>
<td>30</td>
</tr>
<tr>
<td>Above 50 Lakhs</td>
<td>50</td>
</tr>
</tbody>
</table>

   Note: The employee record shall contain employee name, employee id, hire date, basic salary, DA, HRA.

10. Write a C program for any one program for the following to illustrate recursion
    i. Factorial of a number
    ii. GCD and LCM of two numbers
    iii. Fibonacci series

11. Write a C program to perform any three of the following on files
    i. To count the number of alphabets, numbers, words, lines in a given file.
    ii. To merge two files into a third auxiliary file and display the content.
    iii. To print every even position character in a given file.
    iv. To separate alphabets and integers into two files from the given source file.
12. Write a program to update the record of a person in a file by accepting personID. 
   **Hint:** 
   1. Create the file with few records. 
   2. The fields in a record 
      a. Name of the person 
      b. Identity (ID) of the person 
      c. Age 
      d. Gender 
      e. Occupation 
      f. Salary
ENGINEERINGMATHEMATICS-II
(Commonforallbranches)

ECE121
Instruction:3Periods&1Tut/Week
EndExam:3Hours

Credits:3
SessionalMarks:40
EndExamMarks:60

CourseObjectives:
To impart knowledge in basic concepts of solving linear system of equations.
To enable the students to study the eigenvalues and eigenvectors of matrices.
To introduce the concepts of ordinary differential equations and their applications to engineers.
To enable the students to solve any higher order differential equations and to solve differential equations related to simple electric circuits, Newton's law of cooling.
To introduce the students to Laplace Transforms and their applications.

CourseOutcomes:
By the end of the course, student will be able to:

1. Solve linear system equations using matrix algebra techniques
2. Determine the Eigenvalues and eigenvectors of a matrix
3. Apply different techniques in solving differential equations that model engineering problems
4. Use the application of Differential equations like simple electric circuits, Newton's law of cooling and to solve any higher order linear ordinary differential equation with constant coefficients

SYLLABUS

UNITI

UNITII

UNITIII

UNITIV
Higher order Linear Differential Equations: Definitions – Rules for finding the complementary function, rules for finding the particular integral, method of variation of parameters, equations reducible to linear equations with constant coefficient – Cauchy’s homogeneous linear equation, Legendre’s linear equation.
UNITV

Laplace Transforms: Introduction– definitions-Transforms of elementary functions-
Properties of Laplace transforms-Transforms of Periodic functions–Transforms of Derivatives–
Transforms of Integrals-Multiplication by $t^n$ -division by $t$-Evaluation of integrals by Laplace transforms.

Inverse Laplace transforms – Other methods of finding inverse transforms (Excluding Residue method) Convolution theorem– Application to Differential Equations – Unit Step function– Unit Impulsive functions.

TEXTBOOK:

REFERENCE BOOKS:
APPLIED PHYSICS
(for ECE, EEE & Mech)

ECE122
Instruction: 3 Periods & 1 Tut/Week
End Exam: 3 Hours

Credits: 3
Sessional Marks: 40
End Exam Marks: 60

Course Objectives:
To enhance student’s knowledge of theoretical and modern technological aspects in physics and to introduce fundamentals of physics relevant to engineering applications
To introduce advances in technology for engineering applications

Course Outcomes:

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

1. Correlate the theoretical principles with experimental observations
2. Identify engineering materials for specific engineering applications
3. Apply the knowledge of advanced materials for engineering applications

SYLLABUS

UNIT I 12 Periods

Magnetic materials: Definition of magnetic permeability, magnetization and magnetic susceptibility, origin of magnetic moment, classification of magnetic materials, properties of diamagnetic and paramagnetic materials, ferromagnetic materials – hysteresis curve, domain theory of ferromagnetism, soft and hard ferromagnetic materials, anti-ferromagnetic and ferrimagnetic materials, ferrites and its applications

Superconductivity: Introduction, properties of superconductors, effect of temperature and magnetic field, Meissner effect, flux quantization, type – I and type – II superconductors, high temperature superconductors, applications of superconductors, BCS theory (qualitative)

UNIT II 10 Periods

Dielectric materials: Definition of electric dipole moment, dielectric polarization and dielectric constant, types of polarization – electronic, ionic and orientational polarization, expression for polarisability, internal fields in solids, Clausius – Mossotti equation, frequency dependence of electronic polarization, properties of ferroelectric materials and their applications

UNIT III 10 Periods


UNIT IV 10 Periods

Crystal structure: Introduction, fundamental terms of crystallography – space lattice, crystal lattice, unit cell, planes, seven crystal systems – Bravais lattices, cubic lattices, crystal directions and planes, Miller indices, interplanar spacing and interatomic distance, some simple crystal structures, body-centered cubic crystals, face-centered cubic crystals
Semiconductor Physics: Intrinsic and extrinsic semiconductors, Fermi level, carrier concentration in intrinsic semiconductor, continuity equation, direct and indirect bandgap semiconductors, Lorentz force, Hall effect and its applications.

Physics of semiconductor devices: Open circuit, p-n junction diode, energy diagram of p-n diode, working of a diode, voltage-current characteristics of p-n junction, diode as a rectifier, light emitting diode (LED), liquid crystal display (LCD), photodiode

TEXTBOOKS:
2. M.N. Avadhanulu & P.G. Kshirasagar Textbook of Engineering Physics, S. Chand publication

REFERENCE BOOKS:
1. V. Rajendran Engineering Physics, Tata McGraw Hill Education Private Limited
2. Dattu Ramanlal Joshi Engineering Physics, Tata McGraw Hill Education Private Limited
3. A. Marikani Engineering Physics, PHI Learning Private Limited
ENVIRONMENTAL SCIENCES  
(Common for all branches)

ECE123  
Instruction: 3 Periods & 1 Tut/Week  
End Exam: 3 Hours  

Credits: 3  
Sessional Marks: 40  
End Exam Marks: 60

Course Objectives:  
To gain knowledge on the importance of environment and ecosystems.  
To acquire knowledge with respect to biodiversity, its threats and its conservation and appreciate the concept of interdependence.  
To acquire knowledge about environmental pollution—sources, effects and control measures of environmental pollution.  
To understand the treatment of wastewater and solid waste management.  
To be aware of the national and international concern for protecting the environment.

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

1. Understand the natural environment and its relationships with human activities.  
2. Characterize and analyze human impacts on the environment.  
3. Integrate facts, concepts, and methods from multiple disciplines and apply to environmental problems.  
4. Design and evaluate strategies, technologies, and methods for sustainable management of environmental systems and for the remediation or restoration of degraded environments.

SYLLABUS

UNIT I  
10 Periods

Introduction to Environment and Natural Resources:  
Introduction: Definition, Multidisciplinary nature, Scope and Importance of Environmental Sciences—R&D in environment, green advocacy, green marketing, green media and environment consultancy, Need for public awareness.

Natural Resources: Forest resources—use and overexploitation, deforestation, Big Dam effects on forests and tribal people. Water resources—sources, use and overutilization of surface and groundwater, conflict over water, dams—benefits and problems. Food resources—environmental impact of modern agriculture—fertilizer and pesticides. Land resources—land degradation—landslides, soil erosion and desertification. Energy resources—renewable and non-renewable energy resources and use of alternate-energy sources.

UNIT II  
10 Periods

Ecosystem and Bio Diversity

Ecosystem: Concept of an ecosystem—structure and function of an ecosystem, Food chains, food webs and ecological pyramids, Energy flow in an ecosystem, Ecosystem regulation, Ecological succession. Types, characteristic features, structure and function of forest, grassland, desert and aquatic ecosystems.

Biodiversity: Definition, types, India as Mega diversity Nation, Values of biodiversity, Hotspots of biodiversity, Threats to biodiversity—habitat loss, poaching, human-wildlife conflicts, Endangered and endemic species, Conservation of biodiversity.
UNIT III

Environmental Pollution And Waste Management: Sources, effects and control measures of Air pollution, Noise Pollution, Soil Pollution, Marine pollution, Thermal pollution, Radio Active Pollution, Water Pollution (Sources, Effects, Control measures, DO, BOD, COD, sewage treatment), Green house effect, Ozone depletion, Acid rain – causes and adverse effects.


UNIT IV


Urbanization, Industrialization, Transportation, Human population and the environment-population growth, role of information technology in environment and human health.

UNIT V


Case Studies: Chipko Movement, Kolleru Lake, Fluorosis, Silent valley project, Narmada Bacho Andolan, Ralegoen Siddhi, Tehri dam, Madhura refinery and Taj Mahal

TEXTBOOK:

REFERENCE BOOKS:
2. G.S. Sodhi Fundamental Concepts of Environmental Chemistry, Narosa Publishing House, New Delhi
ENGINERINGDRAWING
(Commonforallbranches)

ECE124        Credits:3
Instruction:1Theory&3 PracticalPeriods/week SessionalMarks:40
EndExam:3Hours EndExamMarks:60

CourseObjectives:
To increaseabilitytocommunicatewithpeopleandlearnontosketchandtakefielddimensions.
Tomakethestudentfamiliarwithdrawingpracticesandconvention.
Tofamiliarizethestudentaboutvariousengineeringcurvesusedinindustry.
To enablethestudenttodraftsimpleengineeringcomponentsandanalyze
differentviewsandcomponents.
TointroducebasicAutoCADskills.

CourseOutcomes:
By the end of the course, student will be able to:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Draw various engineering curves and understand the basic geometrical constructions.</td>
</tr>
<tr>
<td>2.</td>
<td>Prepare orthographic projections of points and lines</td>
</tr>
<tr>
<td>3.</td>
<td>Produce orthographic projections of planes and surfaces</td>
</tr>
<tr>
<td>4.</td>
<td>Draw orthographic projections of solids in various orientations.</td>
</tr>
<tr>
<td>5.</td>
<td>Prepare isometric projections and understand basics of Computer Aided Drafting.</td>
</tr>
</tbody>
</table>

SYLLABUS

UNITI
Introduction to Engineering Drawing & basics of geometrical construction. Construction of conic sections. Construction of cycloidal curves (cycloid, epicycloid, and hypocycloid), involutes (over circles and polygon) & Archimedian spiral.

UNITII
Orthographic projections – projection of points – projection of straight lines (lines parallel to both HP & VP, lines parallel to one and inclined to the other, lines inclined to both the planes)

UNITIII
Projection of planes – perpendicular planes – oblique planes

UNITIV
Projection of solids – Prisms – Cylinder – Pyramids & Cones

UNITV
Isometric projections – Planes of solids, Combination of solids. Demonstration & Practice: Computer aided drafting of lines, plane solids & Dimensioning.

TEXTBOOK:

REFERENCE BOOKS:
1. K.L.Narayana & P.Kanniah *EngineeringDrawing*
2. R.B.Choudary *EngineeringGraphics* with AutoCAD
3. Trymbaka Murty *ComputerAidedEngineeringDrawing*
Course Objectives:
1. To familiarize the students about different discrete electronic components and CRO. 
2. To familiarize the students with the analysis and design of Rectifier Circuits. 
3. To train the students with the operational principle, analysis, design and applications of different types of Diodes.
4. To train the students with the operational principle, analysis, design and application of different field effect transistors (FET) and circuits using FETs and bipolar junction transistor (BJT).
5. To familiarize the students about Analog ICs.

Course Outcomes:
At the end, the student will be able to
1. Analyze different types of diodes, operation, and its characteristics.
2. Design different types of voltage rectifiers.
3. Design and analyze the DC bias circuitry of BJT and FET and set up required bias point.
4. Design simple electronic circuits to accomplish a specific function, e.g. DC power supplies, Electronic switches etc.

SYLLABUS
UNIT I: Electronic Components 8 periods
Capacitors: Capacitance, Charging and Discharging, Typical capacitors, Capacitor Coding, Parallel capacitances, Series capacitances, Energy stored in Electrostatic field of Capacitance, Measuring and Testing of Capacitors.
Inductors: Self and Mutual Inductance
Semiconductors: Mass Action Law, Mobility, Conductivity, Drift current and Diffusion current, Hall-Effect
UNIT II: Electronic Instruments 8 periods
Types of wire conductors, Connectors, Printed wiring, Switches, Fuses, Wire resistance, Introduction to batteries, Introduction to CRO, CRT, Soldering Materials, Soldering Tools.
UNIT III: Diodes and Applications 8 periods
Semiconductor Materials, The PN Junction Diode, Volt-Amp characteristic curve, Diode approximations, Diode ratings, Rectifier Circuits, Special Diodes.
UNIT IV: Transistors 10 periods
Transistor Construction, Transistor Operating region, Transistor Ratings, Transistor Biasing Techniques, Small Signal Amplifier operation, CB, CC, CE configurations, JFET and their characteristics, Biasing techniques for JFET, MOSFET and their characteristics, MOSFET Biasing techniques.
UNIT V: Integrated Circuits

14 periods


TEXTBOOKS:


REFERENCE BOOKS:

Course Objective

To enable the student to acquire skills, techniques, and utilization of the instruments

Course Outcomes:

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Design and conduct experiments as well as analyze and interpret data.</td>
</tr>
<tr>
<td>2.</td>
<td>Identify, solve, and apply fundamental physics principles to solve engineering problems.</td>
</tr>
</tbody>
</table>

List of Experiments (any eight to ten experiments are to be completed)

1. Determination of coefficient of thermal conductivity of a bad conductor - Lee’s method.
2. Determination of radius of curvature of a convex lens - Newton’s rings.
4. Determination of Cauchy’s constant of the material of the prism using spectrometer.
5. Determination of thickness of a thin paper by forming parallel interference fringes - Wedge method.
6. Study of variation of magnetic field along the axis of a current-carrying circular coil - Stewart and Gee’s apparatus.
7. Calibration of a low-range voltmeter using potentiometer.
8. Verification of laws of resistance and determination of specific resistance of a wire by using Carey-Foster’s bridge.
9. Determination of refractive indices of ray and ray in quartz crystal (double refraction).
10. Determination of the frequency of a frequency maintained tuning fork - Melde’s experiment.
11. Determination of Rydberg constant using hydrogen discharge tube.
12. Characteristics of a photocell and determination of Planck’s constant - Photoelectric effect.

Textbook:

1. Physics Laboratory Manual prepared by Department of Physics ANITS

Reference Books:

1. D. P. Siva Ramaiyah and V. Krishna Murthy Practical Physics Marutibook Depot
Course Objectives:
- To expose the student to a variety of self-instructional, learner-friendly modes of language learning.
- To facilitate computer-aided multi-media instruction enabling individualized and independent language learning.
- To improve the fluency in spoken English and neutralize mother tongue influence.
- To bring about a consistent accent and intelligibility in their pronunciation of English by providing an opportunity for practice in speaking.
- To initiate them into greater use of the computer in resume preparation, report writing, format-making etc.
- To help the students cultivate the habit of reading passages from the computer monitor, thus providing them with the required facility to face computer-based competitive exams such as GRE, TOEFL, GMAT etc.

Course Outcomes:
By the end of the course, student will be able to:
1. Handle CBT (Computer Based Tests) of the qualifying examinations.
2. Receive, interpret, remember and evaluate information by practicing effective listening skills.
3. Speak English with neutralized accent.
4. Narrate, describe and report incidents and situations using appropriate terminology.

SYLLABUS
I CALL (Computer Aided Language Learning)
1. Introduction to the Sounds of English - Vowels, Diphthongs & Consonants.
2. Introduction to Stress and Intonation.
3. Short and long Reading comprehension exercises (listening skills)
4. Telephoning Skills.

II CSL (Communication Skills Lab)
5. ‘Just A Minute’ Sessions (JAM).
6. Describing Objects/Situations/People.
7. Videotalks
8. Situational Dialogues/Role Play.

Suggested Software
Cambridge Advanced Learners’ English Dictionary with CD.
English Phonetics and Phonology – 2 CDs set
English Mastery – Alania ABC
Telephoning English
Cambridge Grammar of English (Ronald Carter and Michael McCarthy) CD
English Grammar in Use - Cambridge University Press
Communication Skills – Oxford UP (Sanjay Kumar and Pushpa Latha)
REFERENCE BOOKS:
Books Suggested for English Language Lab Library (to be located within the lab in addition to the CD of the textbook which are loaded on the systems)

1. *Spoken English* (CIEFL) in 3 volumes with 6 cassettes, OUP.
4. Dr A Ramakrishna Rao, Dr G Natanam & Prof S A Sankaranarayanan *English Language Communication: A ReadercumLab Manual* Anuradha Publications, Chennai
5. Krishna Mohan & N P Singh *Speaking English Effectively* (Macmillan)
8. *English Skills for Technical Students*, WBSCTE with British Council, OL
9. J. K. Gangal *A Practical Course in Effective English Speaking Skills* PHI.
OBJECTORIENTEDPROGRAMMINGWITHC++LAB
(Commonforallbranches,exceptforCivil&Chemicalbranches)

ECE128
Practicals/week:3Periods&1Tut/Week
EndExam:3Hrs
Credits:3
SessionalMarks:50
EndExamMarks:50

CourseObjectives:
TointroduceObjectOrientedProgramming(OOP)usingtheC++Language.
ToprovidethebasicconceptsandtechniqueswhichtformtheObjectOrientedProgramming paradigm.

CourseOutcomes:
Bytheendofthecourse,studentwillbeableto:
1. UnderstandhowtousetheprogrammingconstructsofCPP.
2. UseObjectOrientedProgrammingconceptstodevelopobjectoriented programs.
3. Applyvariousobjectorientedfeaturestosolverealworldcomputing problemsusingC++language.

SYLLABUS
Listoftheexperimentstobedoneonthefollowingtopics
1. Overview(TransitionfromC)
2. OOPConceptsandCharacteristics
3. Preprocessor,Commandlinearguments
4. Classes&DataAbstraction
5. Objects
6. OperatorOverloading
7. Inheritance
8. VirtualFunctions&Polymorphism
9. I/OStreams
10. Templates
11. FileProcessing
12. ExceptionHandlingConcepts

REFERENCEBOOKS:
1. MaheshBhave,SunilpatekarObjectOrientedProgramminginC++ Secondedition,Pearson
3. HerbertSchildtC++theCompleteReference IIIedition, TMH1999
LIST OF SAMPLE PROGRAMS

1. Write a C++ program that uses a recursive function for solving the Towers of Hanoi problem.

2. Write a C++ program to find both the largest and smallest numbers in a list of integers.

3. Write a C++ program that uses function templates to solve problems 1 and 2.

4. Write a C++ program to implement the matrix ADT using a class. Use operator overloading for implementation.

5. Write the definition for a class called Rectangle that has floating point data members length and width. The class has the following member functions:
   - void setLength(float) to set the length data member
   - void setWidth(float) to set the width data member
   - float perimeter() to calculate and return the perimeter of the rectangle
   - float area() to calculate and return the area of the rectangle
   - int sameArea(Rectangle) that has one parameter of type Rectangle.
   - sameArea returns 1 if the two Rectangles have the same area, and returns 0 if they don’t.
   i. Write the definitions for each of the above member functions.
   ii. Write a main function to create two rectangle objects. Set the length and width of the first rectangle to 5 and 2.5. Set the length and width of the second rectangle to 5 and 18.9. Display each rectangle and its area and perimeter.
   iii. Check whether the two Rectangles have the same area and print a message indicating the result. Set the length and width of the first rectangle to 15 and 18.9. Display each rectangle and its area and perimeter again. Again, check whether the two Rectangles have the same area and print a message indicating the result.

6. Create a class called MusicInst to contain three methods string(), wind() and perc(). Each of these methods should initialize string array to contain the following
   i. Veena, guitar, sitar, sarod and mandolin under string
   ii. Flute, clarinet, saxophone, nadaswaram and piccolo under wind
   Table: mridangam, bangos, drums and tambourine under perc
   It should also display the contents of the arrays initialized, create a sub class called TypeInst to contain method called get() and show(). The get() method must display a menu as follows
   - String instruments
   - Wind instruments
   - Percussion instruments
   The show method should display the relevant details according to user choice. The base class variable must be accessible only to its derived classes.

7. Create a base class called shape. It should contain two methods getCoord() and showCoord() to accept x and y co-ordinates and to display the same respectively. Create a sub class called Rect. It should contain method to display length and breadth of the rectangle called showCoord(). In main method, execute the showCoord() of Rect class by applying the dynamic method dispatch concept.

8. Create a class called Car. Initialize the color and body attributes to “blue” and “wagon”. There should be two constructors: one is a default that creates blue wagon the other constructor should take two arguments, color and body. Initialize write method toString() that returns the color and body.
Create a sub class funcar. In sub class there are two constructors to invoke super class constructors resp. Write a method playCD in sub class that displays the message “Beautiful music fills the passenger compartment” execute the method to show the messages

- My car is a blue wagon
- My father’s car is red convertible.

9. Create the ZooAnimal constructor function. The function has 4 parameters - a character string followed by three integer parameters. In the constructor function dynamically allocate the name field (20 characters), copy the character string parameter into the name field, and then assign the three integer parameters to cage Number, weight, Date, and weight respectively.

10. Write a C++ program to perform operations on complex numbers using operator overloading

11. Write a C++ program to write number 1 to 100 in data file NOTES.TXT

12. Write a function in C++ to count and display the number of lines not starting with alphabet ‘A’ present in text file “STORY.TXT”. Example: If the file “STORY.TXT” contains the following lines, There is a red.
    A girl is playing there. There is a playground.
    An aeroplane in the sky.
    Numbers are not allowed in the password.
    The function should display the output as 3
WORKSHOP
(Commonforallbranches)

ECE129
Practical/week: 3
EndExam: 3 Hrs
Credits: 2
SessionalMarks: 50
EndExamMarks: 50

CourseObjective:
To provide training and hands-on experience to the student on basic Engineering related skills like carpentry, fitting, house wiring and tin smithy.

CourseOutcomes:
By the end of the course, student will be able to:

1. Make simple carpentry and fitting works
2. Understand and do different types of wiring for practical requirements
3. Develop cross-sections of models for tin smithy and make them.
4. It also helps in understanding of relevant skills required by the engineer working in engineering industries and workshops.

LISTOFEXPERIMENTS
Minimum of three exercises must be conducted from each trade.

Trade:
Carpentry
1. Cross Lap Joint
2. Dovetail Joint
3. Mortise and Tennon Joint
4. Briddle Joint

Fitting
1. V Fit
2. Square Fit
3. Half Round Fit
4. Dovetail Fit

House Wiring
1. Parallel/Series Connection of three bulbs
2. Stair Case Wiring
3. Fluorescent Lamp Fitting
4. Measurement of Earth Resistance

Tin Smithy
1. Taper Tray
2. Square Box without lid
3. Elbow
4. Funnel
SECONDYEARSYLLABI

I-Semester
&
II-Semester
### Second Year I – Semester

<table>
<thead>
<tr>
<th>Code</th>
<th>Subject name</th>
<th>Category</th>
<th>Instruction periods per week</th>
<th>Max marks</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td></td>
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<td>Lecture</td>
<td>Tutorial</td>
<td>Practical</td>
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<tr>
<td>ECE 211</td>
<td>Engineering Mathematics-III</td>
<td>BS</td>
<td>3</td>
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<tr>
<td>ECE 212</td>
<td>Electrical Machines</td>
<td>ES</td>
<td>3</td>
<td>1</td>
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<td>ECE 213</td>
<td>Data structures</td>
<td>ES</td>
<td>3</td>
<td>1</td>
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<tr>
<td>ECE 214</td>
<td>Signals and Systems</td>
<td>PC</td>
<td>3</td>
<td>1</td>
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<tr>
<td>ECE 215</td>
<td>Network analysis and synthesis</td>
<td>ES</td>
<td>3</td>
<td>1</td>
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<tr>
<td>ECE 216</td>
<td>Electronic Circuits and Analysis-I</td>
<td>PC</td>
<td>4</td>
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<tr>
<td>ECE 217</td>
<td>Electronic Circuits and Analysis-I Laboratory</td>
<td>PC</td>
<td>-</td>
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<td>3</td>
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<td>ECE 218</td>
<td>Network &amp; EM Laboratory</td>
<td>ES</td>
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### Second Year II – Semester

<table>
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<tr>
<th>Code</th>
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<td>Lecture</td>
<td>Tutorial</td>
<td>Practical</td>
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<td>Electronic Circuits and Analysis-II</td>
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<td>Digital Electronics</td>
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<td>ECE 224</td>
<td>Probability Theory and Random Processes</td>
<td>PC</td>
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<td>Electromagnetic Field Theory &amp; Transmission Lines</td>
<td>PC</td>
<td>3</td>
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<td>ECE 226</td>
<td>Control Systems</td>
<td>ES</td>
<td>3</td>
<td>1</td>
<td>-</td>
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<td>ECE 227</td>
<td>Electronic Circuits and Analysis-II Laboratory</td>
<td>PC</td>
<td>-</td>
<td>-</td>
<td>3</td>
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<tr>
<td>ECE 228</td>
<td>Simulation Laboratory</td>
<td>PC</td>
<td>-</td>
<td>-</td>
<td>3</td>
</tr>
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<td></td>
<td>Massive Open Online Course (MOOC)*</td>
<td>AC</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td></td>
<td><strong>Total</strong></td>
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<td>18</td>
<td>6</td>
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</tr>
</tbody>
</table>

*MOOCs: Course any time during 2-2 to 4-2. But its grade will be accorded with the 4-2 courses of the program.
Course Objectives:
The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

Course Outcomes:
By the end of the course student should be able to:

1. To gain good knowledge in the application of Fourier Transforms.
2. Understanding the characteristics and properties of Z-transforms and apply the concepts of Z-Transform in Digital Systems.
3. Familiarize the formation of Difference Equations and method of solving difference equations.
4. Understanding the concepts of Gradient, Divergence and Curl and finding scalar potential function of irrotational vector fields.
5. Understanding the concepts of Green’s Theorem, Stokes’ Theorem and the Divergence Theorem and to evaluate line integrals, surface, integrals and flux integrals.

SYLLABUS

UNIT-I: VECTOR DIFFERENTIATION (12 Periods)
Differentiation of Vectors – Scalar and Vector point function – Del applied to Scalar point functions - Gradient geometrical interpretations – Directional Derivative - Del applied to vector point function – divergence - Curl – Physical interpretation of Divergence and Curl - Del applied twice to point functions- Del applied to product of point functions.

UNIT-II: VECTOR INTEGRATION (12 Periods)

UNIT-III: PARTIAL DIFFERENTIAL EQUATIONS (12 Periods)
UNIT –IV : APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS
Introduction – Method of separation of variables – Vibrations of a stretched string- Wave equation –
One dimensional Heat flow - Two dimensional Heat flow – Solution of Laplace’s equation.-
Laplace’s equation in Polar Co-ordinates.

UNIT-V : FOURIER TRANSFORMS
( 12 Periods )
Introduction – definition – Fourier integral theorem - Fourier sine and cosine integrals – Complex
form of Fourier integrals – Fourier integral representation of a function – Fourier Transforms –
Properties of Fourier Transforms – Convolution Theorem – Parseval’s identity for Fourier
transforms – Fourier Transforms of the Derivatives of functions – Application of Transforms to
Boundary value problems – Heat conduction – Vibrations of a string.

Text Books:
   New Dehli, 2014.

Reference books:
Course Objectives:
The main objectives of the course are:

- Analyse performance of DC Machines
- Understand basic operation of AC Machines.
- Elementary treatment of Power Generation, Transmission and Distribution

Course Outcomes:
By the end of the course student should be able to:

1. Find efficiency of DC Machine
2. Find Regulation and Efficiency of Single phase Transformer
3. Analyse the performance of Induction Motors
4. Understand working of synchronous machine
5. Understand basic concepts of Electric Power System

SYLLABUS

UNIT-1
DC Machines: [18 Periods]
Constructional Features, Function of Commutator, Induced EMF and Torque Expressions, Relationship Between Terminal Voltage and Induced EMF for Generator and Motoring Action, Different Types of Excitation and Performance Characteristics of Different Types of DC Machines, Starting and Speed Control of DC Motors, Losses and Efficiency, Efficiency by Direct Loading, Swinburne’s Test, and Applications of DC Machines.

UNIT-2
Transformers: [12 Periods]
Constructional Details, EMF Equation, Equivalent Circuit, Voltage Regulation, Losses and Efficiency, Auto – Transformers, Open/Short – Circuit Tests and Determination of Efficiency and Regulation.

UNIT-3
Induction Motors: [16 Periods]
Single-phase Induction Motors: Double Revolving Field Theory, Methods of Starting Single Phase Induction Motors, Stepper Motor.
UNIT-4 [10 Periods]

Three – Phase Synchronous Machines:
Generation of EMF, Constructional Details, Induced EMF, Synchronous Generator on No – Load and Load, Synchronous Impedance and Voltage Regulation, Starting of Synchronous Motors, Applications of Synchronous Machines.

UNIT-5 [8 Periods]

Electric Energy System (Elementary treatment only):

TEXT BOOKS:

REFERENCES:
Course objectives:
The main objectives of the course are:

- To acquire knowledge on several data structures like stacks, queues, linked list, trees and graphs.
- To have better insight into linear and nonlinear data structures.
- To learn various sorting and searching techniques.
- To exercise the applications of data structures.
- To have a good understanding of problem solving using data structure tools and techniques.

Course Outcomes:

<table>
<thead>
<tr>
<th>By the end of the course student should be able to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Demonstrate the knowledge in problem solving techniques.</td>
</tr>
<tr>
<td>2. Write programs for different data structures</td>
</tr>
<tr>
<td>3. Implement different applications using tree structures.</td>
</tr>
<tr>
<td>4. Implement various sorting techniques</td>
</tr>
<tr>
<td>5. Apply and implement learned algorithm design techniques and data structures to solve problems using Graphs.</td>
</tr>
</tbody>
</table>

SYLLABUS

UNIT I: ARRAYS AND STACKS [12-Periods]

Introduction: Basic Terminology, Elementary Data Organization, Data Structure operations, Algorithm Complexity and Time-Space trade-off.

Arrays: Array Definition, Representation and Analysis, Single and Multidimensional Arrays, address calculation, application of arrays, Character String in C, Character string operation, Array as Parameters, Sparse Matrices.

UNIT II:
QUEUES AND LINKED LIST

Queues: Array representation and implementation of queues, Operations on Queue: Insert, Delete, Full and Empty. Circular queue, De-queue, and Priority Queue, Applications of Queues.

Linked list: Representation and Implementation of Singly Linked Lists, Traversing and Searching of Linked List, Insertion and deletion to/from Linked Lists, Doubly linked list, Circular Doubly linked list, Implementing priority queue using Linked List, Polynomial Representation using Linked list & addition.

UNIT III:
TREES AND SEARCHING

Trees: Basic terminology, Binary Trees, Binary tree representation, Almost Complete Binary Tree, Complete Binary Tree, Array and Linked Representation of Binary trees, Traversing Binary trees, Threaded Binary trees.

Searching: Sequential search, binary search, Interpolation Search, comparison and analysis, Hash Table, Hash Functions.

UNIT IV:
BINARY SEARCH TREES AND BASIC SORTING TECHNIQUES [12-Periods]

Sorting: Insertion Sort, Bubble Sort, Selection sort, Merge Sort.

Binary Search Trees: Binary Search Tree (BST), Insertion and Deletion in BST, Complexity of Search Algorithm, AVL Trees.

UNIT V:
GRAPHS [10-Periods]

Graphs: Terminology & Representations- Graphs, Directed Graphs, Adjacency Matrices, Path OR Transitive Closure of a Graph, Warshall’s Algorithm, Shortest path Algorithm-Dijkstra’s Algorithm, Connected Component and Spanning Trees, Minimum Cost Spanning Trees, Graph Traversals.

TEXT BOOKS

REFERENCES:
1. E.Horowitz and Sahani, "Fundamentals of Data Structures"
Course Objectives:
- Coverage of continuous and discrete-time signals and systems, their properties.
- Knowledge of time-domain representation and analysis concepts as they relate to difference equations, impulse response and convolution, etc.
- Knowledge of frequency-domain representation and analysis concepts using Fourier Analysis tools.
- $Z$-transform Concepts of the sampling process.

Course Outcomes:
By the end of the course student should be able to:

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Characterize and analyze the properties of CT and DT signals and systems</td>
</tr>
<tr>
<td>2</td>
<td>Analyze CT and DT systems in Time domain using convolution</td>
</tr>
<tr>
<td>3</td>
<td>Represent CT and DT systems in the Frequency domain using Fourier Analysis tools like CTFS, CTFT, DTFS and DTFT.</td>
</tr>
<tr>
<td>4</td>
<td>Conceptualize the effects of sampling a CT signal</td>
</tr>
<tr>
<td>5</td>
<td>Analyze CT and DT systems using Laplace transforms and $Z$ Transforms</td>
</tr>
</tbody>
</table>

SYLLABUS

Unit-I  Introduction to Signals and Systems  10 Periods
Continuous-Time (CT) signals and Discrete-Time (DT) signals and their representation, commonly used CT and DT signals: impulse, step, pulse, ramp and exponentials, classification of CT and DT signals: periodic and aperiodic, even and odd, energy signals and power signals, operations on CT and DT signals- addition, subtraction, multiplication, differentiation and integration of CT signals, convolution and correlation of two signals (CT & DT), properties of convolution operation. Time-shifting and time-scaling of CT and DT signals, classification of CT and DT systems: static and dynamic, linear and non-linear, time-invariant and time-varying, basic concepts like causality, stability and invertability of systems.

Unit-II  Linear Time-Invariant Systems  10 Periods
CT and DT type of LTI systems, impulse response function and unit-sample response sequence, Input-Output relation through convolution summation/integral, characterization of CT and DT types of LTI systems, impulse response function/sequence and causality of LTI systems, interconnected LTI systems (CT and DT), CT type of LTI systems described by Linear constant coefficient differential equations, DT type LTI systems described by constant coefficient linear difference equations, BIBO stability of LTI systems (CT and DT types).
Unit III  Analysis of CT Signals and Systems  12 Periods
Fourier series analysis of CT Signals, CT Fourier transform (FT) and its inverse; magnitude and phase spectra, FT using impulses, FT as a particular case of Laplace Transform (LT), FT and LT in CT system analysis, magnitude and phase responses of CT type LTI systems, block diagram representation of Linear Differential Equations with constant coefficients, pole-zero locations, causality (Paley-Wiener Criterion) and stability, distortionless transmission of signals through CT type LTI systems.

Unit IV  Analysis of DT Signals and Systems  15 periods
Discrete–time Fourier transform (DTFT) & inverse DTFT; convergence of DTFT and IDTFT; DTFT properties and theorems, discrete Fourier transform (DFT) & inverse DFT; properties and theorems, circular convolution, Z-Transform (ZT) & its properties & theorems, inverse ZT, inversion methods power series, PFE and Residue methods, solution of difference equations using ZT, distortionless transmission through DT type of LTI systems, ROCs of right-sided, left sided and finite duration sequences, relationship between ZT, DTFT and DFT.
Application of ZT, DTFT and DFT in DT signal and system analysis, DT system function, transfer function, poles and zeros, stability, block diagram representation of difference equations, processing of CT signals using DFT.

Unit V  Sampling of Lowpass and Bandpass Signals  10 periods
Lowpass sampling theorem and its proof, types of sampling: impulse sampling, natural sampling and flat-top sampling, spectra of sampled versions, aliasing, Nyquist rate, anti-aliasing filter, reconstruction of band–limited lowpass signal from its samples, aperture effect due to flat-top sampling, reconstruction filters and zero–order hold (ZOH), sampling of bandpass signals and bandpass sampling theorem.

Text Books :
2. S.Haykin and B.V Veen: Signals and Systems, John Wiley

References:
5. K. Raja Rajeswari and B. Visveswara Rao: Signals and Systems, PHI.
Network analysis and synthesis

ECE 215

Credits : 3

Instruction: 3 Periods & 1 Tut/Week
End Exam: 3 Hours

Sessional Marks : 40
End Exam Marks : 60

Course Objectives:
The main objectives of the course are:
- Analysis of D.C circuits using basic network theorems.
- Analysis of transients in RLC circuits in both time and S domain.
- Analysis of A.C circuits using basic network theorems.
- Understanding the concept of resonance and coupled circuits, 3-phase circuits.
- Able to synthesize the given transfer function.

Course Outcomes:

<table>
<thead>
<tr>
<th>By the end of the course student should be able to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Apply basic network theorems and analyze both D.C and A.C. circuits.</td>
</tr>
<tr>
<td>2. Determine various parameters of two port networks.</td>
</tr>
<tr>
<td>3. Analyze circuits under resonant condition.</td>
</tr>
<tr>
<td>4. Calculate natural and forced response of RL, RC &amp; RLC circuits</td>
</tr>
<tr>
<td>5. Measure real, reactive, apparent power in three phase circuits.</td>
</tr>
</tbody>
</table>

SYLLABUS

UNIT-I:
ANALYSISOFDCCIRCuits

ActiveElement, PassiveElement, Reference Direction
ForCurrentandVoltage, Kirchoff’s Laws, Voltage and Current Division, Nodal Analysis, Mesh Analysis, Linearity and Superposition, Thevenin’s and Norton’s Theorems, Source Transformation.

UNIT-II:
DC TRANSIENTS

UNIT-III:
SINUSOIDAL STEADY-STATE ANALYSIS


UNIT-IV:
RESONANCE & COUPLED CIRCUITS

Balanced Three Phase Circuits, Resonance, Concept of Duality. Coupled Circuits: Magnetically Coupled Circuits, Dot Convention.

UNIT-V:
NETWORK SYNTHESIS


TEXTBOOKS:


REFERENCE BOOK:

Electronic Circuits and Analysis-I

ECE 216
Credits : 4
Instruction: 4 Periods & 1 Tut/Week
End Exam: 3 Hours
Sessional Marks : 40
End Exam Marks : 60

Course Objectives:
- To understand how to analyze a BJT at low and high frequencies.
- To design and analyze single stage and multistage amplifiers.
- To learn about the response of HPF and LPF for different types of inputs.
- To understand working of different clipping and clamping circuits.
- To know to design different types of multivibrators.

Course Outcomes:

<table>
<thead>
<tr>
<th>By the end of the course student should be able to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Design and analyze different clipping and clamping circuits.</td>
</tr>
<tr>
<td>2 Analyze different linear wave shaping circuits</td>
</tr>
<tr>
<td>3 Understand large signal and small signal characteristics of simple amplifier circuits.</td>
</tr>
<tr>
<td>4 Estimate frequency response of single-stage amplifiers using high-frequency transistor models and derive methods to improve high frequency response of amplifiers.</td>
</tr>
<tr>
<td>5 Design different types of multivibrators.</td>
</tr>
</tbody>
</table>

SYLLABUS

Unit-1:  
Transistor at low frequencies and high frequencies  
[12 periods]
Graphical analysis of CE configuration, Two port devices and hybrid model, Transistor hybrid model, h-parameters, conversion formulas of three transistor configurations, Analysis of transistor amplifier circuit using h-parameters, the emitter follower, Millers theorem and its dual, cascading transistor amplifiers, simplified CE hybrid model, high input resistance transistor circuits, hybrid-π CE transistor model, hybrid-π conductance, hybrid-π capacitances, validity and variation of hybrid-π parameters.

Unit-2
Multistage Amplifiers  
[8 periods]

Unit-3:
Linear wave shaping  
[12 periods]
The high pass RC circuit- response for sine, step, pulse, square and ramp inputs, High pass RC circuit as a differentiator, Double differentiation, The low pass RC circuit- response for sine, step, pulse, square and ramp inputs, Low pass RC circuit as an integrator, attenuators, RL and RLC circuits.
Unit-4:
Clipping and Clamping Circuits [12 periods]
Diode Clippers, The transistor clipper, Clipping at two independent levels, Cathode coupled and emitter coupled clipper, Compensation for temperature changes, comparators, breakaway diode and amplifier, diode differentiator comparator, accurate time delays, applications of voltage comparator, The clamping operation, clamping circuit taking source and diode resistance into account, Clamping circuit theorem, Practical clamping circuits, effect of diode characteristics on clamping voltage, Synchronized clamping.

Unit-5:
Multivibrators [12 periods]
Stable stages of a binary, fixed bias transistor binary, self bias transistor binary, commutating capacitors, methods of improving resolution, emitter coupled binary, Schmitt trigger circuit, the monostable multivibrator, emitter coupled monostable multivibrator, astable emitter coupled multivibrator.

Text Books:


REFERENCES:
Electronic Circuits and Analysis-I Laboratory

ECE 217
Instruction: 3 Practical’s /Week
End Exam: 3 Hours

Credits : 2
Sessional Marks: 50
End Exam Marks : 50

Course Objectives:
- To study the characteristics of a PN diode and to design various application circuits like clippers, clampers, regulators and rectifiers.
- To learn the input and output junction characteristics of BJT and FET and to calculate the required parameters.
- To analyze the frequency response of single and multistage amplifiers.
- To analyze linear wave shaping circuits for various inputs.
- To design and analyze different multivibrator circuits.

Course Outcomes:
By the end of the course student should be able to:

<p>| | |</p>
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Measure the important parameters of a PN diode and to implement for various Applications.</td>
</tr>
<tr>
<td>2</td>
<td>Design and construct different rectifier and voltage regulation circuits used in regulated Power supplies.</td>
</tr>
<tr>
<td>3</td>
<td>Design amplifier circuits for specific applications, based on their input and output Characteristics of BJT and FET.</td>
</tr>
<tr>
<td>4</td>
<td>Design and verify the output of linear wave shaping circuits for different inputs.</td>
</tr>
<tr>
<td>5</td>
<td>Design and analyze different multivibrator circuits.</td>
</tr>
</tbody>
</table>

LIST OF EXPERIMENTS
1. Plot the V-I characteristics of a PN diode in forward and reverse bias and find the static, dynamic resistances and the reverse saturation current.
2. Plot the V-I characteristics and regulation characteristics of a Zener diode in reverse bias.
3. Plot the output waveforms of a fullwave rectifier using 2 diodes.
4. Plot the output waveforms of a Bridge rectifier and find the ripple factor.
5. Plot the input and output characteristics of CE configured transistor and to find the h-parameter values from the characteristics.
6. Plot the input and output characteristics of CB configured transistor and to find the h-parameter values from the characteristics.
7. Verify the working of a BJT as a switch.
8. Plot the drain and transfer characteristics of a JFET.
9. Design different types of clipping and clamping circuits using PN diodes.
10. Verify the response of HPF and LPF using passive components for different types of input signals.
11. Plot the frequency response of a single stage CE amplifier and an RC coupled multistage amplifier.
12. Obtain the output wave form of a Bistable multivibrator and observe the switching action.
13. Observe the hysteresis loop of a Schmitt trigger circuit
14. Verify the working of a CC amplifier as an emitter follower and as a buffer.
15. Design and implement a DC regulated power supply.

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Text Books:

REFERENCES:
Network & EM Laboratory

ECE 218
Credits : 2
Instruction: 3 Practical’s /Week
End Exam: 3 Hours
Sessional Marks : 50
End Exam Marks : 50

Course objectives:

The main objectives of the course are:

- Do analysis of linear circuits by using network theorem.
- Predict the performance characteristics of DC machines, single phase transformer and induction motor.
- Predict the regulation of single phase transformer & alternator.

Course outcomes:

By the end of the course student should be able to:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Conduct the experiments on basic network theorems.</td>
</tr>
<tr>
<td>2</td>
<td>Predict the characteristics on D.C machines and single phase transformers</td>
</tr>
<tr>
<td>3</td>
<td>Predict the regulation Of an alternator.</td>
</tr>
</tbody>
</table>

LIST OF EXPERIMENTS:

**CYCLE-I: Networks Lab**

1. To obtain filament lamp characteristics.
2. Verification of KCL & KVL.
3. Verification of superposition theorem.
4. Verification of Thevenin’s and Norton’s theorem.
5. Determination of two port network parameters.

**CYCLE-II: Electrical Machines Lab**

1. O.C.C & Load characteristics of D.C shunt generator.
2. Swinburne’s test on D.C. shunt machine.
5. Brake test on 3-phase induction motor.
6. Regulation of alternator by e.m.f. method.

TEXTBOOKS:

Course Objective:

➢ The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects.
➢ Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

Course Outcomes:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Understand some basic techniques for solving linear partial differential equations and how to identify a partial differential equation in order to determine which technique(s) can best be applied to solve it</td>
</tr>
<tr>
<td>2</td>
<td>Understand the methods to solve the Laplace, heat, and wave equations</td>
</tr>
<tr>
<td>3</td>
<td>Understand, interpret and use the basic concepts: analytic function, harmonic function, Taylor and Laurent series, singularity</td>
</tr>
<tr>
<td>4</td>
<td>Study the concepts of Residues, evaluating definite integrals using technique of residues and understand the concepts of conformal mappings</td>
</tr>
<tr>
<td>5</td>
<td>Analyze the Statistical data by using statistical tests (based on small sample and large sample) and to draw valid inferences based on the analysis of statistical data</td>
</tr>
</tbody>
</table>

SYLLABUS

UNIT-I : FUNCTIONS OF A COMPLEX VARIABLE (14 Periods)
Introduction –Limit of a Complex function- Derivative of \( f(z) \) – Analytic functions-Harmonic functions - Applications to Flow problems. Complex Integration- Cauchy’s Theorem- Cauchy’s Integral Formula –Series of Complex terms ( Statements of Taylor’s and Laurent’s Series without proof ) - Zeros of an Analytic function - Residues - Calculation of Residues - Evaluation of Real Definite Integrals ( Integration around the unit circle, Integration around the small semi circle , Indenting the Contours having poles on the real axis).
Geometric representation of \( f(z) \), Some standard transformation
\( \left( w = z + c, w = cz, w = \frac{1}{z}, w = \frac{az+b}{cz+d} \right) \).

UNIT-II : FINITE DIFFERENCES & INTERPOLATION (12 Periods)
Finite Differences – Forward differences – Backward differences – Central differences – Differences of a Polynomial – Factorial Notation – Other difference operators – To find one or more missing terms – Newton’s Interpolation Formulae – Central Difference Interpolation Formulae - Interpolation with Unequal Intervals – Lagrange’s interpolation formula – Inverse Interpolation.
UNIT-III: NUMERICAL DIFFERENTIATION AND INTEGRATION (10 Periods)

UNIT - IV : Z – TRANSFORMS (12 Periods)

UNIT-V : SAMPLING THEORY (12 Periods)
Introduction – Sampling Distribution – Testing a hypothesis – Level of Significance – Confidence Limits – Test of Significance of Large samples (Test of significance of single mean, difference of means) – Confidence limits for unknown – Small samples – Students t-distribution – Significance test of a sample mean – Significance test of difference between sample means – Chi-Square ($\chi^2$) Test – Goodness of fit.

Text Books:

Reference books:
Electronic Circuits and Analysis-II

ECE 222
Credits : 3
Instruction: 3 Periods & 1 Tut/Week
End Exam: 3 Hours
Sessional Marks : 40
End Exam Marks : 60

Course Objectives:
- To understand and analyze different types of negative feedback amplifiers and sinusoidal oscillators.
- To learn to design different types of Tuned voltage amplifiers and Power amplifiers.
- To understand and design simple differential amplifier circuits.
- To know various applications of operational amplifiers.
- To obtain detailed knowledge of the basic MOSFET amplifiers.

Course Outcomes:
By the end of the course student should be able to:

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<tbody>
<tr>
<td>1</td>
<td>Understand the relevance of negative feedback and positive feedback in electronic circuits, analyze and design different negative feedback circuits and sinusoidal oscillators.</td>
</tr>
<tr>
<td>2</td>
<td>Understand the concept Tuned voltage amplifiers and design Tuned voltage amplifiers for required resonance frequency.</td>
</tr>
<tr>
<td>3</td>
<td>Design a power amplifier circuit and calculate the distortion.</td>
</tr>
<tr>
<td>4</td>
<td>Analyze and design simple differential amplifier circuits using BJTs.</td>
</tr>
<tr>
<td>5</td>
<td>Design different circuits for various applications using op-amp</td>
</tr>
<tr>
<td>6</td>
<td>Understand the basic MOSFET amplifiers and their responses with different loads</td>
</tr>
</tbody>
</table>

SYLLABUS

Unit-I:
Feedback Amplifiers [14 Periods]
Classification of amplifiers, the feedback concept, general characteristics of negative feedback, effect of negative feedback on input and output impedance, Method of analysis of feedback amplifiers,
Oscillators
Sinusoidal oscillators, Phase shift oscillators, Resonant circuit oscillators, General form of oscillator circuit, The wien bridge oscillator, crystal oscillators, Frequency stability.

Unit-II:
Tuned voltage amplifiers [10 Periods]
Introduction, need for tuned voltage amplifiers, operation of single tuned, double tuned and stagger tuned amplifiers.
Power Amplifiers
Class A Large Signal amplifiers, Second Harmonic Distortion, Higher order Harmonic Distortion, The Transformer coupled audio power amplifier, Efficiency, Push-Pull amplifiers, Class B Amplifiers, Class AB operation, Class C amplifier.
Unit-III:
Differential amplifiers  [10 Periods]
The Differential amplifier, Basic BJT differential pair, DC transfer characteristic, small signal equivalent circuit analysis, differential and common mode gain, differential and common mode impedances, Bipolar transistor current sources, two transistor current sources, improved current source circuits, Widlar current source, multi transistor current mirrors.

Unit-IV:
Applications of Operational Amplifiers:  [10 Periods]
Review of basics of Op-Amp, Basic op-amp applications, Differential DC amplifier, Stable AC coupled amplifier, Analog Integration and differentiation, comparators, sample and hold circuits, Precision AC/DC converters, Logarithmic amplifiers, waveform generators, regenerative comparators, Instrumentation amplifier.

Unit-V:
FET Amplifiers  [12 Periods]
MOSFET DC circuit analysis, The MOSFET amplifier - small signal equivalent circuit, Common source amplifier, source follower amplifier, Common Gate amplifier. NMOS amplifiers with enhancement load, depletion load and PMOS load, CMOS source follower and common gate amplifiers.

Text Books:

REFERENCES:
Digital Electronics

ECE 223
Credits : 3
Instruction: 3 Periods & 1 Tut/Week
End Exam: 3 Hours
Sessional Marks : 40
End Exam Marks : 60

Course Objectives:
- To understand the simplification methods (Boolean algebra & postulates, k-map method and tabular method) to simplify the given Boolean function.
- To understand the fundamentals of digital logic and design various combinational and sequential circuits.
- To understand the concepts of programmable logic devices
- To understand formal procedure for the analysis and design of synchronous and asynchronous sequential logic

Course Outcomes:
By the end of the course student should be able to:

<p>| | |</p>
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Apply the simplification methods to simplify the given Boolean function (Boolean algebra, k-map and Tabular method).</td>
</tr>
<tr>
<td>2</td>
<td>Implement given Boolean function using logic gates, MSI circuits and/ or PLD’s</td>
</tr>
<tr>
<td>3</td>
<td>Design and analyze various combinational circuits like decoders, encoders, multiplexers, and de-multiplexers, arithmetic circuits (half adder, full adder, multiplier etc).</td>
</tr>
<tr>
<td>4</td>
<td>Design and analyze various sequential circuits like flip-flops, registers, counters etc</td>
</tr>
<tr>
<td>5</td>
<td>Analyze and Design synchronous and asynchronous sequential circuits.</td>
</tr>
</tbody>
</table>

SYLLABUS

UNIT-1 [10 periods]
NUMBER SYSTEMS: Number representation, Conversion of bases, Binary Arithmetic, Representation of Negative numbers, Binary codes: weighted and non-weighted, Error detecting and correcting codes -- Hamming codes.
BOOLEAN ALGEBRA: Basic definitions, Axiomatic Definitions, Theorems and properties, Boolean Functions, Canonical and standard forms.

UNIT-2 [10 periods]
LOGIC FAMILIES
Binary Logic, AND, OR, NOT, NAND, NOR, EX-OR and Equivalence gates. Introduction, Specifications of digital circuits, RTL and DTL circuits, Transistor-Transistor Logic (TTL), Emitter Coupled Logic (ECL), MOS, CMOS circuits, Performance comparison of logic families.

UNIT-3 [14 periods]
GATE-LEVEL MINIMIZATION
The Map Method: Two variable map, Three variable map, four variable map, Prime Implicants, Don't care conditions, NAND and NOR implementation, Exclusive-OR Function, Parity Generation and Checking, Variable Entered Mapping (VEM): Plotting Theory, Reading Theory, Quine-Mccluskey (QM) Technique.
COMBINATIONAL LOGIC
Combinational circuits, Analysis Procedure, Design procedure, Binary Adder-Subtractor, Decimal adder, carry look ahead adder, Binary Multiplier, Magnitude comparator, Decoders, Encoders, Multiplexers, ROM, PLA, PAL.

UNIT-4
SYNCHRONOUS SEQUENTIAL LOGIC
[14 periods]

REGISTERS AND COUNTERS
Registers, Shift registers, universal shift register Ripple counters, Synchronous counters, counter with unused states, Ring counters, Johnson counter.

UNIT-5
ASYNCHRONOUS SEQUENTIAL LOGIC
[12 periods]
Analysis Procedure, Circuits with latches, Design procedure, Reduction of state and flow tables, cycles, Race-Free state Assignment, Hazards, Design example.

Text Books:

Reference Books:
Probability Theory and Random Processes

ECE 224

Instruction: 3 Periods & 1 Tut/Week
End Exam: 3 Hours

Credits : 3
Sessional Marks : 40
End Exam Marks : 60

Course Objective:

- To understand the fundamentals of Probability Theory.
- To understand the concept of random variables and probability density and distribution functions.
- To know some important operations that can be performed on a random variable or multiple random variables.
- Understand the mathematical concepts related to random processes
- Analysis of random process and its basic applications to the signal processing in the communication system.

Course Outcomes:

<table>
<thead>
<tr>
<th>By the end of the course student should be able to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Use set–theoretic notation to describe events and compute probabilities and conditional probability</td>
</tr>
<tr>
<td>2 Identify the types of random variables involved in a given problem and calculate relevant probabilities,</td>
</tr>
<tr>
<td>3 Know the main tools to describe a random variable, such as the probability density function, the cumulative distribution function and the moment generating function.</td>
</tr>
<tr>
<td>4 Understand the concept of various operation applied on random variables be able to apply it in decision making</td>
</tr>
<tr>
<td>5 Know about well-known distributions and how they are used in practice.</td>
</tr>
<tr>
<td>6 Recognize the importance of the central limit theorem.</td>
</tr>
<tr>
<td>7 Discuss the concept of random processes and determine covariance and spectral density of stationary random processes</td>
</tr>
<tr>
<td>8 Demonstrate the specific applications to Poisson and Gaussian processes</td>
</tr>
<tr>
<td>9 Formulate and solve the engineering problems involving random processes</td>
</tr>
<tr>
<td>10 Demonstrate the theoretical concept related to sampling and Modulation for a band pass process</td>
</tr>
</tbody>
</table>

SYLLABUS

UNIT-I: Probability and Random Variable [12 Periods]


Random Variable: Definition of a Random Variable, Conditions for a Function to be a Random Variable, Discrete, Continuous and Mixed Random Variables.
UNIT -II: Distribution & Density Functions and Operation on One Random Variable [12 Periods]

**Distribution & Density Functions:** Distribution and Density functions and their Properties - Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh and Conditional Distribution, Methods of defining Conditional Event, Conditional Density, and Properties.


UNIT-III: Multiple Random Variables and Operations [12 Periods]


UNIT-IV Random Process - Temporal Characteristics


UNIT-V Spectral Analysis


**Text Book:**

Reference Book:
Electromagnetic Field Theory & Transmission Lines

ECE 225
Credits : 3
Instruction: 3 Periods & 1 Tut/Week
End Exam: 3 Hours

Course objectives:

➢ To provide the basic skills required to understand, develop, and design various engineering applications involving electromagnetic fields.
➢ To lay the foundations of electromagnetism and its practice in modern communications such as wireless, guided wave principles such as fiber optics and electronic electromagnetic structures.

Course Outcomes:

By the end of the course student should be able to:

1. Apply vector calculus to static electric fields in different engineering situations
2. Solve the problems related to magnetostatic fields with proper knowledge of law’s and equations and theorems
3. Analyze Maxwell’s equation in different forms (differential and integral) and apply them to diverse engineering problems.
4. Examine the phenomena of wave propagation in different media and its interfaces and in applications of microwave engineering. Analyze the nature of electromagnetic wave propagation in guided medium which are used in microwave applications
5. Able to make use of the transmission line concepts and use smith chart to find various parameters useful to design a circuit at radio frequency

SYLLABUS

UNIT I: Electrostatics (14 HRS)
Introduction to vector analysis, Fundamental of electrostatic fields, Different types of charge distributions, Coulomb’s law and Electric field intensity, Potential function, Equi-potential surface, Electric field due to dipole; Electric flux density, Gauss’s law and applications, Poisson’s and Laplace’s equations and its applications; Uniqueness theorem; Boundary conditions; Conductors & Dielectric materials in electric field; Current and current density, Relaxation time, Relation between current density and volume charge density; Dipole moment, Polarization, Capacitance, Energy density in an electric field.

UNIT II: Steady Magnetic Fields (12 HRS)

UNIT III: Maxwell’s Equations (10 HRS)
Introduction, Faraday’s law, displacement current, Equation of continuity for the varying fields, inconsistency of Amperes circuit law, Maxwell’s equations in integral form, Maxwell’s
equations in point form, retarded potentials Meaning of Maxwell’s equations, conditions at a Boundary surfaces, Retarded potentials.

UNIT IV: Electromagnetic Waves (10 HRS)
Introduction, Applications of EM waves, solutions for free space condition, Uniform plane wave propagations uniform plane waves, wave equations conducting medium, sinusoidal time variations, conductors & dielectrics, Depth of penetration, Direct cosines, Polarization of a wave, reflection by a perfect conductor – Normal incidence, Oblique incidence, reflection by a perfect dielectric-Normal incidence, reflection by a perfect insulator – oblique, Surface impedance, Poynting vector and flow of power, Complex poynting vector.

UNIT V: Transmission Lines (10 HRS)
Types of transmission lines, Applications of transmission lines, Equivalent circuit of pair of transmission lines, Primary constants, Transmission line equations, Secondary constants, lossless transmission lines, Distortionless line, Phase and group velocities, Loading of lines, Input impedance of transmission lines, RF lines, Relation between reflection coefficient, Load and characteristic impedance, Relation between reflection coefficient and voltage standing wave ratio (VSWR), Lines of different lengths - $\frac{\lambda}{8}, \frac{\lambda}{4}, \frac{\lambda}{2}$ lines, Losses in transmission lines, Smith chart and applications, Stubs, Double stubs.

Text Books:

Reference Books:
Control Systems

ECE 226
Instruction: 3 Periods & 1 Tut/Week
End Exam: 3 Hours

Course Objectives:
- Generate the transfer functions of mechanical and electrical systems.
- Can adjust the relative stability by using damping factor and undamped natural frequency of the system.
- Can find the stability by using root locus technique, polar plot, nyquist plot, bode plot or M&N circles.

Course Outcomes:

<table>
<thead>
<tr>
<th>By the end of the course student should be able to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The block reduction techniques and signal flow graphs</td>
</tr>
<tr>
<td>2. The mathematical modelling of mechanical and electrical systems</td>
</tr>
<tr>
<td>3. The analysis of systems in time domain</td>
</tr>
<tr>
<td>4. The relative and steady state stability of the systems</td>
</tr>
<tr>
<td>5. The analysis of systems in frequency domain</td>
</tr>
</tbody>
</table>

SYLLABUS

UNIT-I: Introduction to Control Systems [12 Periods]

Transfer Function of Linear Systems-Impulse Response of Linear Systems-Block Diagrams of Control Systems-Signal Flow Graphs (Simple Problems)-Reduction Techniques for Complex Block Diagrams and Signal Flow Graphs (Simple Examples).

UNIT-II: Modeling of Control Systems [10 periods]


UNIT-III: Time domain analysis [16 periods]


UNIT-IV: Concept of stability in time domain [12 periods]

Concept of Stability and Necessary Conditions for Stability-Routh-Hurwitz Criterion, Relative Stability Analysis, The Concept and Construction of Root Loci,
Analysis of Control Systems With Root Locus (Simple Problems to Understand Theory)

UNIT-V: Frequency domain analysis [14 periods]


Textbooks:

2. Benjamin C. Kuo, Automatic Control Systems, Prentice Hall of India

References:

Ogata, Modern Control Engineering, Prentice Hall of India.
Electronic Circuits and Analysis-II Laboratory

ECE 227  
Instruction: 3 Practical’s /Week  
End Exam: 3 Hours

Credits : 2  
Sessional Marks : 50  
End Exam Marks : 50

Course Objectives:

➢ To Analyze and verify the characteristics and frequency response of feedback amplifiers and sinusoidal oscillators.
➢ To understand and analyze different power amplifier circuits
➢ To design tuned voltage amplifiers for different applications.
➢ To verify different applications of op-amp.
➢ To verify the operation of a MOSFET.

Course outcomes:

<table>
<thead>
<tr>
<th>By the end of the course student should be able to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Design and identify the applications of feedback amplifiers and sinusoidal oscillators in different electronic circuits.</td>
</tr>
<tr>
<td>2. Design and implement different power amplifiers and tuned voltage amplifiers.</td>
</tr>
<tr>
<td>3. Calculate the parameters of BJT differential amplifier.</td>
</tr>
<tr>
<td>4. Apply op-amps fundamentals in design and analysis of op-amps applications.</td>
</tr>
<tr>
<td>5. Apply the MOSFET inverter in different electronic circuits.</td>
</tr>
</tbody>
</table>

LIST OF EXPERIMENTS

1. Obtain the input and output impedance of a trans-conductance amplifier with and without feedback.
2. Obtain the frequency response of a voltage shunt negative feedback amplifier with and without feedback.
3. Generate a sinusoidal signal using Colpitts oscillator at a desired frequency.
4. Generate a sinusoidal signal using Wein bridge circuit.
5. Generate a sinusoidal signal using RC phase shift oscillator and observe the lissajous patterns at different phase shifts.
6. Plot the frequency response of a tuned voltage amplifier and find the resonant frequency.
7. Obtain the output waveforms of a class-B pushpull power amplifier and calculate the efficiency and distortion.
8. Obtain the output waveforms of a class-A transformer coupled power amplifier and calculate the power conversion efficiency.
9. Determine the gain and CMRR for the BJT differential amplifier.
10. Obtain the signals at the output junctions of multistage BJT differential pair.
11. Verify different applications of an Operational amplifier.
12. Verify different parameters of an operational amplifier.
13. Observe the working of an operational amplifier in inverting, non inverting and differential modes.
14. Plot the V-I characteristics of an n-channel enhancement MOSFET and verify its operation as an inverter.
15. Verify the working of a CMOS source follower amplifier.
TEXT BOOKS:

REFERENCES:
Simulation Laboratory

ECE 228
Instruction: 3 Practical’s /Week
End Exam: 3 Hours
Credits : 2
Sessional Marks : 50
End Exam Marks : 50

Course Objective:
1. To understand the operation of various filters, amplifiers and oscillator circuit
2. To understand the frequency response of different amplifiers.
3. To provides an overview of signal transmission through linear systems, convolution and correlation of signals and sampling.
4. To understand the concept of Fourier and Z-Transform

Course outcomes:

| Course outcomes |  
|-----------------|--------------------------------------------------|
| By the end of the course student should be able to: | 
| 1 Design Low pass and High pass filtering circuit | 
| 2 Analyze any complex circuit consisting of amplifiers, rectifiers, oscillators etc | 
| 3 Understand the Use Multivibrator circuit for designing mini project | 
| 4 Calculate the convolution and correlation between signals | 
| 5 Find the Fourier transform of a given signal and plotting its magnitude and phase spectrum | 
| 6 Discuss the importance of Z-Transform | 
| 7 Generate random sequences for a given distribution. | 

Students have to perform at least five experiments from each cycle

Cycle-I  (Electronics circuit & simulation)

<table>
<thead>
<tr>
<th>Experiment Number</th>
<th>Experiment Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Simulation of Low pass and High pass Filter</td>
</tr>
<tr>
<td>2</td>
<td>Simulation of Half-Wave and Full-Wave Rectifier</td>
</tr>
<tr>
<td>3</td>
<td>Simulation of Clippers and Clampers circuit</td>
</tr>
<tr>
<td>4</td>
<td>Frequency Response of CE and CC Amplifier</td>
</tr>
<tr>
<td>5</td>
<td>Frequency Response of CC Amplifier</td>
</tr>
<tr>
<td>6</td>
<td>Simulation of Current Series Feedback Amplifier</td>
</tr>
<tr>
<td>7</td>
<td>Simulation of Voltage Shunt Feedback Amplifier</td>
</tr>
<tr>
<td>8</td>
<td>Simulation of RC phase shift Oscillator</td>
</tr>
<tr>
<td>9</td>
<td>Simulation of Wein Bridge Oscillator</td>
</tr>
<tr>
<td>10</td>
<td>Simulation of Hartley Oscillator</td>
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<tr>
<td>11</td>
<td>Simulation of Colpitts Oscillator</td>
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<tr>
<td>12</td>
<td>Simulation of Class-C Tuned Amplifier</td>
</tr>
<tr>
<td>13</td>
<td>Simulation of Differential Amplifier.</td>
</tr>
<tr>
<td>14</td>
<td>Simulation of Astable Multivibrator</td>
</tr>
<tr>
<td>15</td>
<td>Simulation of Monostable Multivibrator</td>
</tr>
<tr>
<td>16</td>
<td>Simulation of Bistable Multivibrator</td>
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<td>17</td>
<td>Simulation of Digital to Analog Converter</td>
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<td>18</td>
<td>Simulation of Analog Multiplier.</td>
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<td>19</td>
<td>Simulation of CMOS NOT/NAND/NOR gates</td>
</tr>
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<td>20</td>
<td>Simulation of Differential amplifier</td>
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<tr>
<td>21</td>
<td>Simulation of Voltage Regulator</td>
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<tr>
<td>22</td>
<td>Simulation of Class-A Power Amplifier</td>
</tr>
</tbody>
</table>

**Cycle-II (Signal & System)**

<table>
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<tr>
<th></th>
<th>Basic Operations on Matrices.</th>
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<tbody>
<tr>
<td>2</td>
<td>Write a program for Generation of Various Signals and Sequences (Periodic and Aperiodic), such as Unit impulse, unit step, square, saw tooth, triangular, sinusoidal, ramp, sinc.</td>
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<td>3</td>
<td>Write a program to perform operations like addition, multiplication, scaling, shifting, and folding on signals and sequences and computation of energy and average power.</td>
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<td>Write a program for finding the even and odd parts of signal/sequence and real and imaginary parts of signal.</td>
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<td>5</td>
<td>Write a program to perform convolution between signals and sequences.</td>
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<tr>
<td>6</td>
<td>Write a program to perform autocorrelation and cross correlation between signals and sequences.</td>
</tr>
<tr>
<td>7</td>
<td>Write a program for verification of linearity and time invariance properties of a given continuous/discrete system.</td>
</tr>
<tr>
<td>8</td>
<td>Write a program for computation of unit samples, unit step and sinusoidal response of the given LTI system and verifying its physical realizability and stability properties.</td>
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<tr>
<td>9</td>
<td>Write a program to find the Fourier transform of a given signal and plotting its magnitude and Phase spectrum.</td>
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<td>10</td>
<td>Write a program for locating the zeros and poles and plotting the pole-zero maps in S-plane and Z-plane for the given transfer function.</td>
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<td>11</td>
<td>Write a program for Sampling theorem verification.</td>
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<td>12</td>
<td>Write a program for Removal of noise by autocorrelation/cross correlation.</td>
</tr>
<tr>
<td>13</td>
<td>Generation of random sequence</td>
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<tr>
<td>14</td>
<td>Write a program to generate random sequence with Gaussian distribution and plot its pdf and CDF.</td>
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<tr>
<td>15</td>
<td>Write a program for verification of winer-khinchine relations.</td>
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</table>

**Cycle-III (Probability Theory and Random Process)**

<table>
<thead>
<tr>
<th></th>
<th>Let Z be the number of times a 6 appeared in five independent throws of a die. Write a program to describe the probability distribution of Z by:</th>
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<tbody>
<tr>
<td></td>
<td>Plotting the probability density function</td>
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<td>Plotting the cumulative distribution function</td>
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<tr>
<td>2.</td>
<td>Plot the probability mass function and the cumulative distribution function of a geometric distribution for a few different values of the parameter p. How does the shape change as a function of p?</td>
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<td>3.</td>
<td>Write a program to generate 10,000 samples of an exponentially distributed random variable using the simulation method. The exponential random variable is a standard</td>
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</table>
one, with mean 10. Plot also the distribution function of the exponentially distributed random variable using its mathematical equation.

4. Write a program to determine the average value and variance of $Y=\exp(X)$, where $X$ is a uniform random variable defined in the range $[0, 1]$. Plot the PDF of $Y$.

5. Consider the random process defined as $X[n] = 2U[n] - 4U[n - 1]$, where $U[n]$ is a white noise with zero mean and variance $\sigma^2 = 1$. Generate a realization of 1000 samples of $X[n]$ by using MATLAB. Based on this realization, estimate the power spectral density and plot the estimate.
THIRD YEARSYLLABI

I-Semester
&
II-Semester
### Third Year I–Semester

<table>
<thead>
<tr>
<th>CODE</th>
<th>SUBJECT NAME</th>
<th>Category</th>
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<td>Quantitative Aptitude &amp; Verbal Aptitude-I</td>
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Open Elective-I: (for ECE offered by other departments) Refer Annexure-I

### Third Year II–Semester

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<td>Professional Elective-I</td>
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Professional Elective-I
1. Analog IC Design
2. EMI/EMC
3. Electronic Measurements and Instrumentation
4. Telecommunications and Switching Networks

Industrial Training during summer vacation after Third Year II –Semester. But its grade will be accorded with the 4-1 courses of the program
INTRODUCTION TO EMBEDDED SYSTEMS

ECE 311(a) Credits: 3
Instruction: 3 Periods & 1 Tut/week Sessional Marks: 40
End Exam: 3 Hours End Exam Marks: 60
Prerequisites: Nil

Course Objectives:
➢ To introduce the student to the basics of embedded systems
➢ To learn about the components of embedded systems
➢ To familiarize the student with embedded systems by providing examples from various fields

Course Outcomes:
By the end of the course, the student will be able to:
1. learn about the general principles of computer architecture
2. learn about the working of a simple embedded system and embedded system applications
3. learn the hardware aspects of embedded systems
4. understand the sensors, ADCs and actuators used in embedded systems
5. understand the real world examples of embedded systems

Mapping of Course Outcomes with Program Outcomes:

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SYLLABUS

UNIT I 8 Periods
Basics of computer architecture and the binary number system
Basics of computer architecture, computer languages, RISC and CISC architectures, number systems, number format conversions, computer arithmetic, units of memory capacity

UNIT II 8 Periods
Introduction to embedded systems
Application domain of embedded systems, desirable features and general characteristics of embedded systems, model of an embedded system, microprocessor Vs microcontroller, example of a simple embedded system, figure of merit for an embedded system, classification of MCUs: 4/8/16/32 bits, history of embedded systems, current trends
UNIT III
Embedded systems-The hardware point of view
Microcontroller unit(MCU), a popular 8-bit MCU, memory for embedded systems, low power design, pull up and pull down resistors

UNIT IV
Sensors, ADCs and Actuators
Sensors: Temperature Sensor, Light Sensor, Proximity/range Sensor; Analog to digital converters: ADC Interfacing; Actuators Displays, Motors, Opto couplers/ Opto isolators, relays.

UNIT V
Examples of embedded systems
Mobile phone, automotive electronics, radio frequency identification (RFID), wireless sensor networks(WISENET), robotics, biomedical applications, brain machine interface

Text Books:

Reference Books:
ELECTROMAGNETIC INTERFERENCE AND COMPATABILITY

ECE 311(b)  
Credits : 3

Instruction : 3 periods & 1 Tutorial/Week  
Sectional Marks : 40

End Exam : 3 Hours  
End Exam Marks: 60

Prerequisites: Nil

Course Objectives:
- To introduce the concepts of electromagnetic interference and electromagnetic compatibility
- It presents different kinds of electromagnetic interference coupling principles.
- To study the electromagnetic interference control techniques
- To discuss electromagnetic interference measurements and standards

Course Outcomes:

<table>
<thead>
<tr>
<th>By the end of the course the student will be able to:</th>
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<tbody>
<tr>
<td>1. Gain enough knowledge to understand the concept of EMI / EMC related to product design &amp; development.</td>
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<tr>
<td>2. Analyze the different EM coupling principles and its impact on performance of electronic system.</td>
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<td>3. Know how to bring down the electromagnetic interference highlighting the concepts of both susceptibility and immunity</td>
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<tr>
<td>4. Acquire broad knowledge of various EM radiation measurement techniques</td>
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<tr>
<td>5. Gain enough knowledge to understand the present leading edge industry standards in different countries</td>
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Mapping of Course Outcomes with Program Outcomes:

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</table>

SYLLABUS

Unit I  EMI / EMC Concepts  12periods
EMI-EMC definitions and Units of parameters; Sources and victim of EMI; Conducted and Radiated EMI Emission and Susceptibility; Transient EMI, ESD; Radiation Hazards.

Unit II  EMI Coupling Principles  12periods
Conducted, radiated and transient coupling; Common ground impedance coupling; Common mode and ground loop coupling; Differential mode coupling; Near field cable to cable coupling, cross talk ; Field to cable coupling ; Power mains and Power supply coupling.
Unit III  EMI Control Techniques  12periods
Shielding- Shielding Material-Shielding integrity at discontinuities, Filtering- Characteristics of Filters-Impedance and Lumped element filters-Telephone line filter, Power line filter design, Filter installation and Evaluation, Grounding- Measurement of Ground resistance-system grounding for EMI/EMC-Cable shielded grounding, Bonding, Isolation transformer, Transient suppressors, Cable routing, Signal control. EMI gaskets

Unit IV EMI /EMC Measurements  12periods
Open area test site; TEM cell; Anechoic chamber; Tx /Rx Antennas, Sensors, Injectors /Couplers, and coupling factors; EMI Rx and spectrum analyzer.

Unit V EMI /EMC and Standards  12periods

References:
COMMUNICATION SYSTEMS ENGINEERING

ECE 312
Credits: 4
Instruction: 4 Periods & 1 Tutorial/Week
End Exam : 3 Hours
Sessional Marks: 40
End Exam Marks: 60

Prerequisites:

Course Objectives:
- To understand basic concepts of modulation, demodulation and design of major building blocks of Communication system and to understand how Fourier analysis can be used in communication Systems.
- Modulation techniques will be analyzed both in time and frequency domains.
- To understand the design of practical AM & FM transmitters and Receivers.
- To understand effect of noise on different modulation techniques and different noise reduction techniques.
- To provide knowledge about the overview of satellite systems in relation to other terrestrial systems & its contribution to overall technical growth.

Course Outcomes:
By the end of the Course, the students will be able to:
1. Analyze about various blocks in a Communication System.
2. Analyze and design the analog modulator and demodulator circuits.
3. Apply the concepts to explain about various blocks in Transmitters and Receivers.
4. Analyze and design the pulse analog modulation techniques and evaluate the performance of analogue communication systems in the presence of noise.
5. Gain knowledge of satellite orbits, its launching methods, Link design, earth segment and space segment components.

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

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SYLLABUS

UNIT I
15 periods

Introduction to Communication Systems:
Basic Block Diagram of Communication Systems; Principles of Analog and Digital Communication; Linear Modulation Systems: Need for Modulation, Frequency Translation, Method of Frequency Translation, Amplitude Modulation, Modulation Index, Spectrum of AM Signal, Square law modulator and diode detector, DSB-SC Signal and its Spectrum, Balanced...
Modulator, Synchronous Detectors, Costas loop, Hilbert transform, properties & applications, SSB Signal, SSB Generation Methods, Power Calculations in AM Systems, VSB, Applications of AM Systems.

UNIT II
Non Linear Modulation Systems:

UNIT-III
Radio Transmitters & Receivers:
Transmitters: AM and FM Transmitters, SSB Transmitters; Radio receiver: Tuned radio frequency receiver, Superheterodyne receiver, AM Receivers – RF Section, Frequency Changing and Tracking, Intermediate Frequency and IF Amplifiers, Automatic Gain Control (AGC); FM Receivers – Amplitude Limiting.

UNIT-IV
Noise & Noise performance of AM & FM systems:
Thermal noise, shot noise, Flicker Noise and Transition Noise, Signal to Noise ratio, Noise equivalent bandwidth, Noise equivalent temperature, Noise figure, Figure of merit, Noise in AM Systems: DSB-SC, SSB-SC, AM with carrier (Envelope Detector); Noise in FM, pre-emphasis & De-emphasis, threshold effect, problems. Analog Pulse Modulation Techniques: Pulse modulation and its types, PAM, PWM, PPM, concepts of Time Division Multiplexing, Frequency Division Multiplexing.

UNIT-V
Satellite Communications:
Introduction, History of Satellites, Kepler’s laws, Satellite orbits, Geosynchronous Satellites, Launch vehicle, Antenna look angle, Satellite system link models- Uplink, Transponder, Downlink model, Cross-Links, satellite system parameters, satellite system Link equations, satellite system Link Budget.

Text Books

Reference Books
MICROPROCESSORS AND APPLICATIONS

ECE 313
Credits: 3
Instruction: 3 Periods & 1 Tut/week
End Exam: 3 Hours

Prerequisites: Digital Electronics.

Course Objectives:
➢ To understand the internal architecture of 8085 microprocessor
➢ To understand the internal architecture of 8085 microprocessor
➢ To program the 8086 microprocessor to meet the requirements of the user
➢ To interface memory and peripherals through various interfacing IC’s to 8086 microprocessor

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

1. Acquire knowledge of the architecture of 8-bit Microprocessors, its interrupt structure and Instruction set
2. Acquire knowledge of the architecture of 8086 Microprocessor, its interrupt structure, Stack operation, modes and timing.
3. Understand instruction set of 8086 & apply them to write assembly language programs.
4. Interface 8086 microprocessor to semiconductor memory devices and different peripheral devices

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

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SYLLABUS

UNIT I
Overview of 8085 (Architecture & Instruction Set):
Introduction to Microprocessors and Microcomputers, Internal Architecture and Functional Description of INTEL 8085 Microprocessor, Interrupt Structure of 8085, Instruction Set of 8085 µP and Sample programs.

UNIT II
8086 Architecture:
Architecture of 8086, Register organization, Memory segmentation. Physical memory organization, signal description of 8086, Minimum mode 8086 system and timings, Maximum mode 8086 system and timings.
UNIT III 15 Periods
Instruction Set and Assembly Language Programming of 8086:
Addressing modes, instruction set, assembler directives(Significant), macros and operators. Simple programs involving arithmetic, logical, branch and string manipulation instructions.

UNIT IV 09 Periods
Interfacing – I:
Memory interfacing to 8086 (Static RAM & EPROM).
Methods of parallel data transfer, 8255A Internal block diagram and system connections, 8255A operational modes and initialization, constructing and sending 8255A control words, interfacing to 8086. Interfacing Stepper motor, D/A and A/D converters

UNIT V 08 Periods
Interfacing – II:
8086 Interrupts and response, Interrupt vector table, Types of Interrupts, 8259 PIC Architecture and interfacing, cascading of interrupt controller to 8086, 8253/8254, modes of 8253 & Interfacing.
Serial data transfer schemes: Asynchronous and Synchronous data transfer schemes. 8251 USART architecture and interfacing to 8086. RS-232.

Text Books:
2. D. V. Hall, Microprocessors and Interfacing, Revised 2nd edition 2006, TMH.,

Reference Books:
2. N. Senthil Kumar, M. Saravanan, and S. Jeevananthan, Microprocessors and Microcontrollers, OUP India
COMPUTER ARCHITECTURE AND ORGANIZATION

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<th>ECE314</th>
<th>Credits:3</th>
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<td>Instruction: 3 Periods &amp; 1 Tut/week</td>
<td>Sessional Marks:40</td>
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<td>End Exam: 3 Hours</td>
<td>End Exam Marks:60</td>
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Prerequisites: Digital Electronics.

Course Objectives:

➢ To learn how computers work, how to analyze their performance, how computers are designed.

Course Outcomes:

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

1. Understand the typical assembly language instructions of a computer
2. Understand the hardware involved in the CPU of a computer
3. Design CPU & control unit of a basic computer
4. Use computing resources such as memory and I/O in an effective manner to improve the performance of a computer
5. Understand the concept of pipelining and multiprocessors

SYLLABUS

UNIT I 
Register Transfer and Microoperations:
Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Microoperations, Logic Microoperations, Shift Microoperations, Arithmetic Logic Shift Unit

UNIT II
Basic Computer Organization:
Instruction Codes, Computer Registers, Computer Instructions, hardwired control unit, Instruction Cycle, Memory Reference Instructions
Microprogrammed Control:
Control Memory, Address Sequencing, Microinstruction Formats, Micro program Example, Design of Control Unit
UNIT III
CPU Organization
Introduction, General Register Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Stack Organization. Reduced Instruction Set Computer(RISC) and CISC architectures

UNIT IV
Memory Organization
Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory

UNIT V
Input - Output Organization
Peripheral Devices, Input - Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access (DMA), Introduction to pipelining, multiprocessors

Text Book

Reference Books
5. Sajjan G. Shiva, Computer design and architecture, 3rd Ed., Marcel Dekker, 2000
INTEGRATED CIRCUITS AND APPLICATIONS

ECE315
Credits: 3
Instruction: 3 periods & 1 Tut/week
End Exam: 3 Hours

Prerequisites:
Network Theory and Synthesis, Electronic Circuits and Analysis-II

Course Objectives:
➢ To provide the students strong fundamentals in the field that is relevant for engineers to design Linear circuits using Op-amps.
➢ To teach active filter using operational amplifiers and their comparison
➢ To introduce the theory and applications of PLL and Analog multiplier
➢ To familiarize the students conversion of data from Analog to Digital and Digital to Analog
➢ To introduce concepts of sine wave generation and some special function ICs

Course Outcomes:
By the end of the course, the student will be able to:
1. Understand the DC and AC characteristics of operational amplifiers and its effect on output and their compensation techniques.
2. Design and analyze active filters of an op-amp
3. Understand concept of PLL and analog multiplier ICs and demonstrate different applications based on them.
4. Differentiate D/A and A/D convertor, understand their types and analyze their applications
5. Demonstrate the applications of sine wave generators, timers and Voltage regulators

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

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SYLLABUS

UNIT I
12 Periods
Digital Circuits:
CMOS logic, electrical behavior of CMOS circuits-Static and Dynamic, Low -Voltage CMOS logic and interfacing, CMOS/TTL interfacing

UNIT II
12 Periods
Voltage regulators & Active Filters:
IC Voltage regulators - Three terminal fixed and adjustable voltage regulators - IC 723 general purpose regulator - Monolithic switching regulator
Filter Fundamentals: Filter types, Realizing Practical Filters: Sallen-Key LPF and HPF Realizations-BPF Realization-Notch Filter (Band Reject) Realization - All Pass Filters, Switched Capacitor filter

UNIT III
Timer, Phase Locked Loop and Analog Multiplier: 12 Periods
IC 555 Timer: Functional block diagram and description, Monostable, Astable operation and their applications, 556 Voltage Controlled Oscillator - Phase Locked Loop-Operation of 565 PLL-Closed loop analysis of PLL-PLL Applications: Frequency Synthesis - Frequency Translation - AM and FM detection, analog multiplier ICs.

UNIT IV
Analog to Digital and Digital to Analog Converters : 12 Periods
Digital to Analog converters - Binary weighed and R-2R Ladder types - Analog to digital converters - Continuous - Counter ramp, successive approximation, single, dual slope and parallel types

UNIT V
Combinational Logic ICs - Specifications and Applications of TTL-74XX & CMOS 40XX Series ICs, Code Converters, Decoders, Demultiplexers, LED & LCD Decoders with Drivers, Encoders, Priority Encoders, Multiplexers, Demultiplexers
Sequential Logic ICs: Familiarity with commonly available 74XX & CMOS 40XX Series ICs - All Types of Flip-flops, Synchronous Counters, Decade Counters, Shift Registers.

Text Books:

Reference Books:
ANTENNAS AND WAVE PROPAGATION

ECE 316

Credits : 3

Instruction : 3 periods & 1 Tutorial/Week

End Exam : 3 Hours

Sessional Marks : 40

End Exam Marks: 60

Prerequisites: EMFT

Course Objective:

➢ Students will be introduced to antennas – their basic radiation mechanism, their principle of operations, design, analysis and their applications. It provides a platform to introduce concepts of wave propagation over ground, through troposphere and ionosphere, propagation effects in radio frequencies.

Course Outcome:

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

1. Understand the basic concepts of radiation and reception mechanism & analyze the basic antenna parameters.

2. Analyze, synthesize and Design antenna arrays.

3. Develop the basic skills necessary to design and analyze a wide variety of practical antennas which operate at various frequencies.

4. Perform measurements of various antenna parameters.

5. Identify characteristics of radio wave propagation.

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

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SYLLABUS

UNIT I  12 Periods

Radiation Mechanism and Antennas Basics

Antenna definition, Functions of antennas, Network theorems, Properties of antennas, Antenna parameters. Radiation mechanism, Radiation fields of alternating current element, Radiated power and radiation resistance; Radiation, induction and electrostatic fields. Different current distributions in linear antennas, Radiation from half-wave dipole, quarter wave mono pole and their characteristics. Radiation patterns of alternating current element, dipoles and monopoles.

UNIT II  12 Periods

Types of Antennas & Applications

Introduction, Isotropic radiators, Directional antennas, omni directional antennas, Resonant antennas, Non-resonant antennas, LF, HF, VHF and UHF antennas. Folded dipole, V-Antennas, Inverted V-antennas, Rhombic antenna, Yagi-Uda antenna, Log-periodic antennas, Loop antenna, Helical antennas. Microwave Antennas: Rod reflector, Plane reflector, Corner reflector,
Parabolic reflector, Types of parabolic reflectors, Feed systems for parabolic reflectors, Shaped beam antennas, Horn antennas, Corrugated horns, Slot antennas, Slots in the walls of rectangular waveguides, Babinet’s principle, Lens antennas, Microstrip antenna and feeding techniques.

UNIT III
Analysis & Synthesis of Linear Arrays

UNIT IV
Antenna Measurements

UNIT V
Wave Propagations
Propagation characteristics of EM Waves, Factors involved in the propagation of radio waves, Ground wave propagation, Ground wave field strength by Maxwell’s equations, Reflection of radio waves by the surface of the earth, Roughness of earth, Reflection factors of earth, Wave tilt of the ground wave, Tropospheric wave propagation, Atmospheric effects in space wave propagation, Duct propagation, Radio horizon, Troposscatter, Fading of EM waves in Troposphere, Line of sight (LOS), Ionospheric propagation, Characteristics of ionosphere, Refractive index of ionosphere, Phase and group velocities, Mechanism of Ionospheric propagation, reflection and refraction, Characteristic parameters of Ionospheric propagation, Sky wave field strength, Fading and diversity techniques, Faraday’s rotation, Effect of earth’s magnetic field.

Text Book

Reference Books:
MICROPROCESSORS & APPLICATIONS LABORATORY

ECE 317

Instruction: 3 Lab periods
End Exam: 3 Hours

Credits: 2
Sessional Marks: 50
End Exam Marks: 50

Prerequisites:
Microprocessors and Applications

Course Objectives:
➢ To program both 8085 and 8086 to meet the requirements of the user.
➢ To interface various peripherals
➢ To handle interrupts
➢ To design a microcomputer to meet the requirement of the user

Course Outcomes:
By the end of the course, the student will be able to:
1. Program 8085 & 8086 microprocessor to meet the requirements of the user.
2. Interface peripherals like switches, LEDs, stepper motor, Traffic lights controller, etc.,
3. Handle interrupts
4. Design a microcomputer to meet the requirement of the user

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

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List of Experiments
Experiments using 8085 Microprocessor trainer:
1) Write a program, which loads Registers, A, B, C, and D with the same constant. Try to optimize the program in such a way that the smallest numbers of program bytes are used. Test the program in single step mode. After each step, test the register of interest.

Assume that 4 bytes of data are stored at consecutive locations of the data-memory starting at (x). Write a program, which loads Registers E with (x), D with (x+1), C with (1+2) and A with (x+3).

a. Assume that 1 byte of data is stored at data memory location (x). Write a program which tests bit 5 of (X). Write ‘FF’ in (x+1), if bit 5=0 and write ‘00’ at the same location if bit 5=1.

b. Write a program which tests the zero-condition of a data byte specified at data memory location (x). If it is zero ‘00’ should be stored at (x+1) location, if non-zero ‘FF’ should be stored at the same location.
c. A binary number is stored at data-memory location (x) Compute the number of its logical 1’s and store the result at y.

d. Comment on the instructions used in the above three programs and write about the effect of flags with the instructions used.

2) Two unsigned binary numbers are stored at data-memory locations (x) and (x+1).
   a. Compute the sum of the two numbers and store the result at y, ignoring the possible overflow.
   b. Write a program to compute (x+1) - (x). The magnitude of the result should be stored at (y) and the sign (00 if positive, 01 if negative) at (y+1). Understand the 2’s compliment Arithmetic.

3) N binary numbers stored at consecutive data memory locations starting at (x) where N is defined at data memory location ‘NUMBER’.
   a. Find the largest number and display it in the data field and arrange them in ascending order.
   b. Find the smallest number and display it in the data field and arrange them in descending order.

4) Two 8-bit binary numbers are stored at data memory locations (x) and (x+1) compute product of the two numbers using, a). Successive addition method. b). Shifting and adding method store the result in (y) and (y+1).

Experiments using 8086 Microprocessor trainer/TASM/MASTM:
5) Addition of a) 16-bit numbers b) 32-bit numbers
6) Factorial of a number, Fibonacci series
7) Hexadecimal and decimal counters
8) Sorting of numbers

Interfacing experiments with 8086 Microprocessor trainer:
9) Interfacing of D/A converter
10) Interfacing of A/D converter
11) 8255 Study Card – Interfacing I/O Devices
12) Interfacing of stepper motor
13) Interfacing of 7-segment display/Traffic light controller

Note: A student has to perform a minimum of 10 experiments.

Text Books:
2. D. V. Hall, Microprocessors and Interfacing, Revised 2nd edition 2006, TMH.,
INTEGRATED CIRCUITS LABORATORY

ECE318 | Credits: 2
---|---
Instruction: 3 Lab periods | Sessional Marks: 50
End Exam: 3 Hours | End Exam Marks: 50

**Prerequisites:**
Digital Electronics, Integrated Circuits and Applications

**Course Objectives:**
- To understand the linear and non-linear applications of operational amplifiers (741)
- To familiarize with theory and applications of 555 timers.
- To design and construct waveform generation circuits using Op-Amp
- To design multivibrator circuits using IC555
- To design and analyze combinational and sequential logic circuits

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

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

**List of Experiments:**

1) Application of Operational Amplifiers
2) Design and testing of Active LPF & HPF using op-amp
3) Design of Schmitt Trigger using op-amp
4) Design of Astable multivibrator using a) op amp b) IC 555
5) Line and load regulation of three terminal IC Voltage Regulator.
6) Operation of R-2R ladder DAC and flash type ADC
7) Simulation of any 4 Experiments 1, 2, 3, 4, 5 and 6 using Multisim software
8) Minimization and Realization of a given Function using Basic Gates (AND, OR, NOR, NAND, EXOR).
9) Design and implementation of code converters using logic gates (i) BCD to excess-3 code
   (ii) Gray to binary
10) Design of binary adder and subtractor
11) Design and implementation of Multiplexer and De-multiplexer using logic gates.
12) Implementation and Testing of RS Latch and Flip-flops – D, JK and T.
13) Design of synchronous counters
14) Design of asynchronous counters

Note: A student has to perform a minimum of 12 experiments.

Text Books:
**QUANTITATIVE APTITUDE - I**

<table>
<thead>
<tr>
<th>ECE 319</th>
<th>Credits: 2</th>
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<tbody>
<tr>
<td>Instructions: 4 Periods/week</td>
<td>Sessional Marks: 100</td>
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**Prerequisites:** Nil

**Course Objectives:**

Quantitative Aptitude - I

- To prepare the students on various principles related to numerical computations.
- To explain concepts related to numerical estimation.
- To illustrate and explain the fundamentals related to geometry and mensuration.

Verbal Aptitude-I:

- To categorize and explain principles of grammar in order to minimize errors in English.
- To list and quote high frequency words by giving relevant examples.
- To categorize, apply and use data as per the requirement.
- To construct and make use of idioms, phrasal verbs and other expressions used in professional contexts.
- To critically evaluate reading material for better comprehension

**Course Outcomes:**

**Quantitative Aptitude – I**

<table>
<thead>
<tr>
<th>By the end of the course student will be able to:</th>
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<tr>
<td>1. Solve problems related to numerical computations in company specific and other competitive tests</td>
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<tr>
<td>2. Recall and use the concepts to solve problems numerical estimation with respect to company specific and competitive tests.</td>
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<tr>
<td>3. Apply basic principles related to geometry and mensuration &amp; solve questions in company specific and competitive tests.</td>
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**Verbal Aptitude-I:**

<table>
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<th>By the end of the course student will be able to:</th>
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<tr>
<td>1. Detect grammatical errors in the text/sentences and rectify them while answering their competitive company specific tests and frame grammatically correct sentences while writing.</td>
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<tr>
<td>2. Answer questions on synonyms, antonyms, hyponyms, hypernyms and other vocabulary based exercises while attempting company specific and other competitive tests.</td>
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<td>3. Use their logical thinking ability and solve questions related to reasoning based exercises.</td>
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<td>4. Choose the appropriate word/s/phrases suitable to the given context in order to make the sentence/paragraph coherent</td>
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<tr>
<td>5. Analyze the given data/text and find out the correct responses to the questions asked based on the reading exercises; identify relationships or patterns within groups of words or sentences.</td>
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</table>
SYLLABUS

Section –A (Quantitative Aptitude –I)
UNIT I 6 Periods
Numerical computation:
Applications based on Numbers, Chain Rule, Ratio Proportion

UNIT II 6 Periods
Numerical estimation - I
Applications Based on Time and work, Time and Distance

UNIT III 4 Periods
Numerical estimation – II
Applications based on Percentages, Profit Loss and Discount, Simple interest and Compound Interest Partnerships, Shares and dividends

UNIT IV 4 Periods
Data interpretation
Data interpretation related to Averages, Mixtures and allegations, Bar charts, Pie charts, Venn diagrams

UNIT V 4 Periods
Application to industry in Geometry and Mensuration

Books for practice
1. Quantitative aptitude by RS Agarwal, S Chand Publications
2. Verbal and non verbal Reasoning by RS Agarwal from S Chand publications

References
1. Barron’s by Sharon Welner Green and Ira K Wolf (Galgotia Publications pvt. Ltd.)
2. Quantitative Aptitude by U Mohan Rao Scitech publications
3. Quantitative Aptitude by Arun Sharma McGrawhill publications
4. Quantitative Aptitude by Ananta Asisha Arihant publications
5. Quantitative Aptitude by Abhijit Guha
6. Quantitative Aptitude by Pearson publications
7. Material from ‘IMS, Career Launcher and Time’ institutes for competitive exams.
8. Elementary and Higher algebra by HS Hall and SR knight.

Websites:
www.m4maths.com
www.Indiabix.com
800score
Official GRE site
Official GMAT site
Section –B (Verbal Aptitude –I)

UNIT I
Grammar:
Parts of speech( with emphasis on appropriate prepositions, co-relative conjunctions, pronouns-number and person, relative pronouns), articles(nuances while using definite and indefinite articles), tenses(with emphasis on appropriate usage according to the situation), subject – verb agreement ( to differentiate between number and person) , clauses (use of the appropriate clause , conditional clauses), phrases(use of the phrases, phrasal verbs), degrees of comparison(comparing apples and oranges, comparison and number), modifiers(misplaced and dangling modifiers, absence of modifiers), determiners, parallelism in structure(symmetry in two part sentences), word order, subjunctive mood, redundancy, special types of sentences, miscellaneous types, identifying errors in a given sentence, correcting errors in sentences.

UNIT II
Vocabulary:
Synonyms and synonym variants (with emphasis on high frequency words), antonyms and antonym variants (with emphasis on high frequency words), homonyms, hyponyms, hypernyms and General idioms.

UNIT III
Reasoning:
Critical reasoning (understanding the terminology used in CR- premise, assumption, inference, conclusion), Sequencing of sentences (to form a coherent paragraph, to construct a meaningful and grammatically correct sentence using the jumbled text), to use logical reasoning and eliminate the unrelated word from a group.

UNIT IV
Usage:
Sentence completion (with emphasis on signpost words and structure of a sentence), contextual meanings (to use the appropriate word according to the situation), supplying a suitable beginning/ending/middle sentence to make the paragraph coherent, idiomatic language (with emphasis on business communication), punctuation depending on the meaning of the sentence, run on errors, sentence fragments, coma splices.

UNIT V
Reading Comprehension:
Types of passages (to understand the nature of the passage), types of questions (with emphasis on inferential and analytical questions), style and tone ( to comprehend the author’s intention of writing a passage), strategies for quick and active reading(importance given to skimming, scanning), summarizing ,reading between the lines, reading beyond the lines, techniques for answering questions related to vocabulary (with emphasis on the context), supplying suitable titles to the passage, identifying the theme and central idea of the given passages.

7 Periods
4 Periods
5 Periods
4 Periods
4 Periods
Books for Practice
1. Practical English Grammar A. J. Thomson, A. V. Martinet by Oxford University press
2. Remedial English Grammar for Foreign Students by FT wood published by Macmillan Publishers
3. Objective English-Edgar Torpe, Showick Thorpe-Pearson Education
4. Cambridge and Oxford Dictionaries

Reference Books and websites:
1. Barron’s by Sharon Welner Green and Ira K Wolf (Galgotia Publications Pvt.Ltd.)
2. Websites: Indiabix, 800 score, official CAT, GRE and GMAT sites
4. Collins Cobuild English Grammar by Goyal Publishers
5. Word Power Made Easy by Norman Lewis-Goyal Publishers
**MICROWAVE & RADAR ENGINEERING**

<table>
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<tr>
<th>ECE 321</th>
<th>Credits : 3</th>
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<td>Instruction : 3 periods &amp; 1 Tutorial/Week</td>
<td>Sessional Marks : 40</td>
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<td>End Exam : 3 Hours</td>
<td>End Exam Marks: 60</td>
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**Prerequisites:** Nil

**Course Objectives:**
- To Understand the theoretical principal underlying in the operation of microwave devices and circuits
- To understand the principles behind the measurement of various microwave parameters and required bench setup
- To understand different microwave sources and amplifiers
- To understand the basics of the Radar Engineering

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

1. Understand and use the microwave components in design of different microwave setup
2. Analyze and design microwave circuits using S-Parameters
3. Understand the principles involved in generating/amplifying microwave signals and different devices there of.
4. Carry out microwave measurements for the designed gadgets.
5. Understand the basic of Radar Engineering that includes range equation radar block diagram and different types of radars

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

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**SYLLABUS**

**UNIT I**

**Microwave Components:**
Introduction to Microwaves, advantages and applications; Coaxial Line Components; Theory of Guided Waves-Waves in between parallel plates parallel plate, Wave Guide – Derivation of Field Equations, Modes of Propagations, and their parameters, Types of Wave-guides; Excitation methods for different TE and TM modes, Evanescent mode, Wave impedance in waveguide; Attenuators; Ferrite Devices - Isolators, Circulators; Cavity Resonators, Re-entrant Cavities, Wave-meters, Waveguide Iris, posts, screws, Microwave Filters, Detectors.

**UNIT II**

**Microwave Circuits:**
UNIT III 12 periods
Microwave Signal Generators and Amplifiers:
Resonant Cavity Devices, Reflex Klystron, Two – Cavity Klystron, Multi – Cavity Klystron, Slow – Wave Devices,
TWT, Crossed Field Devices, Magnetrons, Semiconductor Devices, Microwave BJTs, FETs, Tunnel Diodes, Gunn
Diode, IMPATT, TRAPATT Diodes, Crystal Diode.

UNIT IV 12 periods
Microwave Measurements:
Introduction to Microwave bench setup, Measurement of Frequency, Wavelength, VSWR, Unknown impedance,
attenuation. Coupling, Isolation and Directivity measurements of Directional coupler. Microwave power
measurement, dielectric constant measurement.

UNIT V 12 periods
Radar Engineering:
Radar Range Equation, Radar Block Diagram and Operation, Prediction of Range, Minimum Detectable Signal,
Receiver Noise, Radar Cross-section, Transmitter Power, PRF and Range Ambiguities, Radar Antenna Parameters,
Synthetic Aperture Radar, Phased Array Radar Semi Active and Active Array Radars – Introduction.

Text Books:
2. G.S.N. Raju, “Microwave Engineering”,1st ed., IK International Publishers,

Reference Books:
DIGITAL SIGNAL PROCESSING

ECE 322  
Credits : 4  
Sessions : 4 periods & 1 Tutorial/Week  
End Exam : 3 Hours  
Sessional Marks : 40  
End Exam Marks : 60

Prerequisites: ECE 214

Course Objectives:
- Use the DFT and FFTs which are popular frequency transformation techniques in Digital Signal Processing.
- Learn about the various design procedures in IIR and FIR Digital filter techniques.
- Learn about DSP processors which can be used for practical applications.
- Explore applications of digital signal processing methods.

Course Outcomes:
By the end of the course, the student will be able to:
1. Design new digital signal processing systems.
2. Design and realize FIR, IIR filters.
3. Design of interpolator and decimator for sampling rate conversions.
4. Program a DSP processor to filter signals.

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

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SYLLABUS

UNIT I  
12 Periods

UNIT II  
12 Periods
UNIT III

IIR & FIR Digital Filter Design Techniques: Analog filter approximations – Butterworth and
Chebyshev, Design of IIR Digital filters from analog filters, Frequency transformations, Bilinear
Transformations method, Impulse and Step invariance method. Design Examples: Analog-
Digital transformations, Characteristics of FIR Digital Filters, frequency response. Design of FIR
Digital Filters using Window Techniques, Frequency Sampling technique, Comparison of IIR &
FIR filters.

UNIT IV

Multirate Digital Signal Processing: Decimation, interpolation, sampling rate conversion,
Implementation of sampling rate conversion. Digital Filter Banks, sub band coding of speech
signals.

UNIT V

Introduction to DSP Processors & DSP Applications: Introduction to programmable DSPs -
Multiplier and Multiplier Accumulator (MAC), Modified Bus Structures and Memory Access
schemes in DSPs, Multiple Access Memory - Multiport memory - VLSI architecture – Pipelining
- Special addressing modes - On-Chip Peripherals - Architecture of TMS 320C5X - Introduction,
Bus Structure - Central Arithmetic Logic Unit - Auxiliary Register - Index Register - Block
Move Address Register - Parallel Logic Unit - Memory mapped registers - program controller -
Some flags in the status registers - On-chip registers, On-chip peripherals.
DSP Applications: Application of DSP in Speech Processing – DSP applications in Bio-Medical
Engineering.

Text Books:
1. John G. Proakis, Dimitris G.Manolakis, Digital Signal Processing, Principles,
4. B.Venkataramani, M.Bhaskar, Digital Signal Processors – Architecture, Programming

Reference Books:
1. Alan V. Oppenheim and Ronald W. Schafer, Digital Signal Processing, PHI.
   Graw Hill.
   using Matlab Engineering;
MICROCONTROLLERS & EMBEDDED SYSTEMS

ECE 323 Credits: 3
Instruction: 3 Periods & 1 Tut/week
End Exam: 3 Hours

Prerequisites:
Digital Electronics, Computer Architecture & Organization, Microprocessors and Interfacing

Course Objectives:
- In the current World, all types of Electronic Gadgets are becoming Smart / Intelligent i.e. each of them do possess some sort of inherent processing and storage capabilities. Several types of Microcontrollers embedded into these so called Smart Devices are providing this Smartness. This course aims to introduce the architecture, programming, interfacing and applications of Microcontroller Intel 8051.
- To develop an understanding of the technologies behind the embedded systems and learn about hardware/software tradeoffs involved in the design.
- To acquire knowledge about various advanced embedded architectures and protocols.

Course Outcomes:
By the end of the course, the student will be able to:
1. Acquire knowledge of architecture, hardware and operation of microcontroller - 8051
2. Understand instruction set of 8051 and apply them to write assembly language programs
3. Interface 8051 with various peripherals
4. Understand and apply the hardware/software tradeoffs involved in the design of embedded systems.
5. Acquire knowledge of advanced embedded architectures and protocols

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

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UNIT II 12 Periods
Assembly Language Programming of 8051

UNIT III 16 Periods
Interfacing 8051
Interfacing with Keyboards, Displays, D/A and A/D converters, Multiple Interrupts, Serial Data Communication.

UNIT IV 10 Periods
Introduction To Embedded Systems
Embedded systems overview, design challenge, Processor technology, IC technology, Design Technology, Trade-offs.

UNIT V 12 Periods
Introduction to advanced architectures
ARM and SHARC, Processor and memory organization and Instruction level parallelism; Networked embedded systems: Bus protocols, I2C bus and CAN bus; Internet-Enabled Systems, Design Example-Elevator Controller.

Text Books:

Reference Books:
2. David E. Simon, An Embedded Software Primer, Pearson Education
3. Satish Shah, 8051 Microcontrollers: MCS 51 Family and Its Variants, 1/e, Oxford University Press, 2010
5. Wayne Wolf, Computers as Components-principles of Embedded computer system design, Elsevier
ANALOG IC DESIGN

ECE 324(a)  Credits : 3
Instruction : 3 Periods & 1 Tut/Week Sessional Marks : 40
End Exam : 3 Hours End Exam Marks : 60

Prerequisites:
Network Analysis and Synthesis, Electronic Circuits Analysis-I, Electronic Circuits Analysis-II

Course Objective:
➢ To lay good foundation on the design and analysis of analog integrated circuits.

Course Outcomes:
By the end of the course, the student will be able to:
1. Understand the basic MOS device physics and models
2. Analyze and design single stage amplifiers and differential amplifiers
3. Analyze and design current sources/sinks/mirrors
4. Analyze and design basic operational amplifiers

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

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SYLLABUS

UNIT-I  12 Periods
Basic MOS Device Physics:
MOSFET as a switch, MOSFET structure and symbols, Threshold voltage, Derivation of I-V characteristics, second order effects.

UNIT-II  12 Periods
Device Modeling:
DC Models, Small signal models, use of device models in circuit analysis, DC MOSFET model, and small signal MOSFET model, High frequency MOSFET Model, Measurement of MOSFET Model parameters.

UNIT-III  12 Periods
Single stage amplifiers:
Basic concepts, CS stage with resistive load, CS stage with diode connected load, CS stage with Current-Source load, CS stage with Triode load, CS stage with Source degeneration, Source follower, Common gate stage, Cascode stage
UNIT-IV 12 Periods
Differential amplifiers:
Single ended and differential operation, qualitative and quantitative analysis of Basic differential pair, common mode response, differential pair with MOS Loads
Passive and Active current mirrors: Basic current mirrors, Cascode current mirrors, Active current mirrors.

UNIT-V 12 Periods
Operational amplifiers:
Performance parameters, one stage op-amps, two stage op-amps, gain boosting, common mode feedback, input range limitations, slew rate, power supply rejection.

Textbooks:

References:
ELECTROMAGNETIC INTERFERENCE / COMPATABILITY

ECE 324(b) | Credits : 3
Instruction : 3 periods & 1 Tutorial/Week | Sectional Marks : 40
End Exam : 3 Hours | End Exam Marks: 60

Prerequisites: Nil

Course Objectives:
- To understand and apply the basics of EMI & EMC including the emission and susceptibility
- To understand the problem in interference and compatibility and model the same
- To understand the concepts of hardening of electronic systems
- To explore the EMC methodology environment and measurements and standards.

Course Outcomes:
By the end of the course, students will be able to:
1. Understand the concept of EMI / EMC, related to product design & development.
2. Analyze the different EM coupling principles and its impact on performance of electronic system.
3. Ensure that a designed system conforms itself to certain standard through a thorough understanding of various standards in different countries.
4. Have broad knowledge of various EM radiation measurement techniques.
5. Model a given electromagnetic environment/system so as to comply with the standards.

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

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SYLLABUS

UNIT I

UNIT II
Elimination/Reduction Methodologies:
Grounding Techniques, Shielding Techniques, Electrical Bonding Techniques, Cabling Techniques, Power Supply Filters, Power Supplies, Connectors and Components/Accessories.
UNIT III  12 Periods  
EMC Regulation/ Standards:  
Introduction to different commercial and defense Standards like FCC, CISPR/IEC, VDE, IEEE/ ANSI, MIL-STD

UNIT IV  12 Periods  
EMI/EMC Measurement Technologies:  
Introduction to various instruments used in the measurements and their characteristics, Radiated Interference Measurements, Conducted Interference Measurements, Pitfalls in EMI Measurements, Measurements of pulsed EMI, Introduction of Measurement Environment – OATS, Anechoic Chamber, TEM, GTEM cell. Software in EMI/EMC Measurements, Different EMI Test Instruments and their comparisons.

UNIT V  12 Periods  
EMI/EMC Modeling:  
Modeling of filter for suppression of EMI in the design, choice of various electronic components, Pulse Interference Immunity, EMC computer modeling and Simulation, Signal Integrity EMC design, Guidelines, Probabilistic

Text Book

Reference Books:
ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

ECE 324(c)  
CREDITS: 3

Instruction: 3 Periods & 1 Tutorial/Week  
End Exam: 3 Hours

Sessional Marks: 40  
End Exam Marks: 60

Prerequisites: Nil

Course Objective:
- To learn the different terms used for characterizing the performance of an instrument/measurement system and to identify the various types of errors in measuring instruments
- To study about the functioning of different meters associated with measurements of signal characteristics
- To introduce the basic concepts related to the operation of electronic measuring instruments
- To study in detail about different bridges employed for electronic measurements
- To acquire knowledge in different types of transducers with their operation

Course Outcomes:
At the end of the course, the student will be able to:
1. Measure various parameters with accuracy, precision and resolution and understand the operation of PMMC and EMMC with their applications
2. Understand the principle of operation, working of different electronic instruments
3. Apply the knowledge of cathode ray oscilloscopes and understand the functioning, specification, applications of signal analyzing instruments
4. Understand principles of measurement associated with different bridges
5. Select appropriate passive or active transducers for measurement of physical phenomenon

Mapping of course outcomes with POs and PSO’s:

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SYLLABUS

UNIT-I  
Basic measurement concepts:
Objectives of engineering measurement, performance characteristics-static and dynamic. Errors in measurement, sources of error, types of errors, statistical analysis, classification of standards, permanent magnet moving coil(PMMC) meter, DC ammeter, DC voltmeter, voltmeter sensitivity, series ohmmeter, shunt ohmmeter, Electrodynamometer, problems

[10 periods]
UNIT-II [15 periods]
Basic electronic instruments: 
Instruments for measuring basic parameters-Amplified DC meter, AC voltmeter using rectifier, true RMS responding voltmeter, electronic multimeter, Q-meter, vector-impedance meter, vector voltmeter, rf and power measurement 
Digital instruments: digital voltmeters and its different types-ramp, stair case ramp,integrating, continuous balance, successive approximation, resolution and sensitivity of digital meters, Digital multimeter, digital frequency meter, digital measurement of time, phase meter 

UNIT-III [15 periods]
Oscilloscopes and signal analysis: 
Introduction, oscilloscope block diagram cathode ray tube, crt circuits, vertical deflection system, delay line, horizontal deflection system, oscilloscope probes and transducers, Measurement of amplitude, time, frequency and phase (Lissajous method). Principle of sampling oscilloscope, digital storage oscilloscope 
Signal analysis-basic wave analyzer, heterodyne wave analyzer, harmonic distortion analyzer, spectrum analyzer 

UNIT-IV Bridge measurements: [10 periods] 
Wheatstone bridge, Kelvin bridge, digital read-out bridges, microprocessor controlled bridge AC bridges: Measurement of inductance-Maxwell’s bridge, hay bridge, Anderson Bridge. Measurement of capacitance- Schering Bridge, measurement of frequency-Wien bridge, wagners earth connection 

UNIT-V [10 periods]
Transducers 
Active and passive transducers: Measurement of displacement (Resistance, capacitance, inductance; LVDT) Force (strain gauges) Pressure (piezoelectric transducers) Temperature (resistance thermometers, thermocouples, and Thermistors), Velocity, Acceleration, vibration, pH measurement signal conditioning circuits, data acquisition systems, telemetry systems, IEEE 488 standard bus 

Text Books: 

Reference Books: 
2. Oliver and Cage,”electronic measurements and instrumentation, TMH
TELECOMMUNICATION SWITCHING AND NETWORKS

ECE 324(d) CREDITS: 3
Instruction: 3 Periods & 1 Tutorial/Week Sessional Marks: 40
End Exam : 3 Hours End Exam Marks: 60

Prerequisites:
Digital Electronics, Signals and Systems, Electronic Circuit Analysis.

Course Objectives:
➢ To understand the characteristics of various switching systems
➢ To introduce and classify various types of time division switching
➢ To introduce the field of traffic engineering
➢ To study the motivation and need for ISDN
➢ To outline the various layers involved in data transmission in networks

Course Outcomes:
By the end of the Course, the students will be able to:
1. Understand and describe the concepts of multiplexing and switching.
2. Apply probability related concepts to resolve traffic and network related issues
3. Analyze and solve problems in traffic engineering
4. Recognize the significance of ISDN and outline its architecture
5. Obtain an overview of end to end transmission in data networks

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

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SYLLABUS

UNIT-I
Telecommunication Switching Systems:
Basics of Switching Systems, Principles of Cross Bar Switching, Electronic Space Division Switching: Stored Program Control, Centralized SPC, Distributed SPC, Two Stage Networks, Three Stage Networks.

UNIT-II
Time Division Switching:
Basic Time Division Space Switching, Basic Time Division Time Switching, Time Multiplexed Space Switching, Time Multiplexed Time Switching, Combination Switching, Three Stage Combination Switching.
UNIT-III  
20 Periods

Telephone Networks :
Subscriber Loop Systems, Switching Hierarchy and Routing, Transmission Plan, Signaling Techniques: In Channel Signaling, Common Channel Signaling.


UNIT-IV  
10 Periods

Integrated Services Digital Network (ISDN) :
Motivation For ISDN, Network & Protocol Architecture, Transmission Channels, User Network Interfaces, Numbering, Addressing, ISDN Standards, Broadband ISDN.

UNIT-V  
15 Periods

Data Networks :
Data transmission in PSTNs, Switching techniques for data transmission, Data communication architecture, Link-to-link layers, End-to-End layers, Local Area Networks, Metropolitan Area Networks, Data Network Standards, Protocol Stacks, Internetworking.

Text Book:

Reference Books:
DIGITAL COMMUNICATIONS
ECE 325  
CREDITS: 3

Instruction: 3 Periods & 1 Tutorial/Week  
End Exam: 3 Hours

Sessional Marks: 40  
End Exam Marks: 60

Prerequisites:

Course Objectives:
- To understand the basic building blocks of digital communication system
- To understand and analyze the signal flow in a digital communication system
- To analyze error performance of a digital communication system in presence of noise and other interferences
- To understand the concept of spread spectrum communication system
- To understand the fundamental concepts of information theory and error control coding.

Course Outcomes:

By the end of the Course, the student will be able to:

1. Learn the elements of digital communications systems, analyze the various methods of digital modulation and can acquire the knowledge of different M-Array modulation techniques
2. Calculate probability of error for various digital modulation techniques to analyze the performance of DCS in the presence of noise.
3. Analyze the performance of spread spectrum code acquisition and tracking circuits.
4. Evaluate the amount of information, entropy and channel capacity.
5. Use source coding techniques and channel coding techniques.

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

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SYLLABUS

UNIT-I  
Analog to Digital Conversion and transmission:
UNIT-II  
**Data Reception:**

UNIT-III  
**Spread Spectrum Modulation:**

UNIT-IV  
**Information theory and coding:**
Concept of amount of information and its properties, Entropy and its properties, Information rate, mutual information and its properties; Source coding: Shannon’s theorem, Shannon-Fano coding, Huffman coding, channel capacity of a Gaussian noise channel, bandwidth-S/N trade off.

UNIT-V  
**Channel Coding:**
Codes-Introduction, Matrix description of Linear block codes, cyclic codes, Error detection and error correction capabilities of linear block codes, Hamming codes; Convolution Codes-encoding of convolution codes, Graphical approach: state, tree and trellis diagram.

**Text Books:**

**Reference Books**
COMMUNICATION SYSTEMS ENGINEERING LABORATORY

ECE 326

Prerequisites:

Course objective:
- To realize practical Modulator and Demodulator circuit.
- To analyse Analog modulated signals in time and frequency domain.
- To design practical filter circuits for communication system.
- To analyse the sampling and multiplexing technique.
- To Design a practical pre-emphasis and de-emphasis circuit.
- To study and measure the characteristics of practical AM Super Heterodyne Radio Receiver.

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

1. Design and Simulate different Modulation schemes
2. Design high pass and Low-pass filters used in communication system.
3. Perform multiplexing on analog signals and Retrieve useful information by observing AM and FM in frequency domain.
4. Design and Simulate a Practical Pre-emphasis and De-emphasis circuit.

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

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SYLLABUS

TRAINER KIT BASED EXPERIMENTS
1) Amplitude Modulation & Demodulation
2) Frequency Modulation & Demodulation
3) Balanced Modulator
4) Analog Time Division Multiplexing
5) Base band Sampling
6) Pulse Amplitude Modulation & Demodulation
7) Pulse Time Modulation & Demodulation
8) SSB-SC-AM Modulation
9) Super Hetero dyne Radio Receiver Parameters
10) Spectral Analyses of AM using Spectrum Analyzer
11) Spectral Analyses of FM using Spectrum Analyzer

SIMULATION BASED EXPERIMENTS(Open source/Matlab/Multisim)

1) Amplitude Modulation & Demodulation
2) Frequency Modulation & Demodulation
3) Balanced Modulator
4) SSB-SC-AM Modulation
5) Pulse Time Modulation & Demodulation
6) Pr-emphasis & De-emphasis
7) Passive Filter Design
8) Attenuator
9) Twin T Network
10) Envelope Detector
11) Frequency Mixer/IF Amplifier/Automatic Gain Control

A student has to perform minimum of 10 experiments.

Text Books
MICROCONTROLLER & EMBEDDED SYSTEMS LABORATORY

ECE327 Credits: 2
Instruction: 3 Lab periods Sessional Marks: 50
End Exam: 3 Hours End Exam Marks: 50

Prerequisites:
Microprocessors and Interfacing, Microcontroller & Embedded Systems

Course Objectives:
➢ To program both 8051 to meet the requirements of the user.
➢ To interface various peripherals
➢ To handle interrupts
➢ To design a microcomputer to meet the requirement of the user

Course Outcomes:
By the end of the course, the student will be able to:
1. Program 8051 microcontroller to meet the requirements of the user.
2. Interface peripherals like switches, LEDs, stepper motor, Traffic lights controller, etc.,
3. Handle interrupts
4. Design a microcontroller development board to meet the requirements of the user

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

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List of Experiments:
1. Study and familiarization of 8051 Microcontroller trainer kit
2. Assembly Language Program for addition of 8-bit numbers stored in an array
3. Assembly Language Program for Multiplication by successive addition of two 8-bit numbers
4. Assembly Language Program for finding largest no. from a given array of 8-bit numbers
5. Assembly Language program to arrange 8-bit numbers stored in an array in ascending order
6. Stepper motor control by 8051 Microcontroller
7. Interfacing of 8-bit ADC 0809 with 8051 Microcontroller
8. Interfacing of 8-bit DAC 0800 with 8051 Microcontroller and Waveform generation using DAC
9. Implementation of Serial Communication by using 8051 serial ports
10. Assembly Language Program for use of Timer/Counter for various applications
11. Traffic light controller/Real-time clock display
12. Simple test program using ARM 9 mini 2440 kit (Interfacing LED with ARM 9 mini 2440 kit)
NOTE:
1. It is compulsory for each student to Design/Create their own Microcontroller Development Board for personal use
2. A student has to perform a minimum of 10 experiments.

Text Books:
SOFT SKILLS LAB

ECE328  
Instruction: 3 Periods/week  
Credits: 02  
Sessional Marks: 100

Prerequisites:
Basic English language skills- LSRW, English theory, English Language Lab.

Course Objectives:
➢ To inculcate effective communication skills with appropriate body language.
➢ To produce potent leaders, productive team players and effective individuals with proper professional ethics.
➢ To enable students to make successful oral presentations using relevant content.
➢ To train students for Group discussions and job Interviews which improves their employability skills.
➢ To facilitate students the importance of setting realistic goals and achieving them using time management techniques.

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

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<td>Comprehend the core engineering subjects using effective verbal and nonverbal communication skills.</td>
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<td>Present accurate and relevant information efficiently, using suitable material aids.</td>
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<td>Work effectively as an individual as well in teams and emerge as responsible leaders with appropriate professional ethics.</td>
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<td>Participate in group discussions and interviews using analytical and problem solving abilities, which enhance their employability skills.</td>
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<td>Set time bound goals and realize them through strategic plans for successful career.</td>
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SYLLABUS

UNIT - I  
Art of communication  
9 Periods

1. Definition of Communication
2. Types of Communication
3. Non-verbal Communication
4. Listening skills
5. Feed back

D.A. - Practice of proper hand shake, practice of different postures and gestures and activity on giving feedback
UNIT- II
Presentation Skills

Purpose
1. Effective presentation strategies
2. Analysis of audience
3. Preparing an outline of the presentation,
4. Audio –visual aids
5. Body language.
D.A. - Group presentation by each team

UNIT- III
Group Discussions

selection process-guidelines for GD
1. Types of GD
2. Nature of topics of G.D
3. Roles to be played by participants in a GD
4. Evaluation process
D.A– Group discussions

UNIT – IV
Team Building and Leadership
1. Importance of team work
2. Different stages of team formation
3. Good team vs. effective team
4. Team player and Team leader
5. Types of leadership
6. Decision making and negotiating skills
D.A– Decision making for a given situation

UNIT – V
Time- Management
1. Importance of time-management
2. Time-Management models
3. Prioritization
4. The art of saying ‘No’
5. Identifying Time Wasters
D.A - Time- Bound activities devised by the facilitator

UNIT- VI
Goal-Setting
Different type of Goals (Immediate and Short term)
1. ‘SMART’ Goals
2. Strategies to achieve goals
D.A - Prepare a chart of immediate, short term and long term goals
UNIT- VII

Job- Interviews

Preparing Resumes and C.V’s

1. Preparing for the interview
2. FAQ’s (Integrity, Stress management, Close- Ask questions)

D.A –Mock interviews

REFERENCE BOOKS:

### QUANTITATIVE APTITUDE - II

**ECE 329**  
**Credits:** 2  
**Instructions:** 4 Periods/week  
**Sessional Marks:** 100  
**Prerequisites:** Nil

#### Course Objectives:

**Quantitative Aptitude –II**
- To Categorize, apply and use thought process to distinguish between concepts of reasoning
- To Prepare and explain the fundamentals related to various possibilities and probabilities related to quantitative aptitude.
- To Critically evaluate numerous possibilities related to puzzles.

**Verbal Aptitude-II:**
- To prepare the students on the various aspects of writing, organizing data, and applying their writing skills in their professional career.
- To demonstrate and recommend the techniques required when interacting in different situations.
- To apply the professional qualities/skills necessary for a productive career and to instill confidence through attitude building.
- To plan activities in order to expose students to the different abilities required for working in a team, encourage them to glean information on current affairs and promote factual reading.
- To illustrate and explain the intricacies/nuances involved in framing responses to the questions asked, reading between lines and reading beyond lines.

#### Course Outcomes:

**Quantitative Aptitude –II**

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<th>By the end of the course student will be able to:</th>
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<td>1. Use their logical thinking and analytical abilities to solve reasoning questions from company specific and other competitive tests.</td>
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<td>2. Solve questions related to permutation &amp; combinations and probabilities from company specific and other competitive tests.</td>
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<td>3. Understand and solve puzzle related questions from specific and other competitive tests.</td>
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**Verbal Aptitude-II:**

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<td>1. Write paragraphs on a particular topic, essays (issues and arguments), e mails, summaries of group discussions, make notes, statement of purpose (for admission into foreign universities), letters of recommendation (for professional and educational purposes)</td>
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<td>2. Converse with ease during interactive sessions/seminars in their classrooms, compete in literary activities like elocution, debates etc., raise doubts in class, participate in JAM sessions/versant tests with confidence and convey oral information in a professional manner using reason.</td>
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<td>3. Prepare his/her resume, apply the business English concepts learnt in the course, and refine one’s overall demeanor which would be very essential to face the corporate world</td>
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<td>4. Respond to their interviewer/employer with a positive mind, customize answers to the</td>
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questions asked during their technical/personal interviews, exhibit skills required for the different kinds of interviews (stress, technical, HR) that they would face during the course of their recruitment process

SYLLABUS

Section –A (Quantitative Aptitude –II)

UNIT I8 Periods
Numerical Reasoning:
Problems related to Number series, Analogy of numbers, Classification of numbers, Letter series, Seating arrangements, Directions, blood relations and puzzle test.

UNIT II4 Periods
Combinatorics:
Counting techniques, Permutations, Combinations and Probability

UNIT III4 Periods
Data sufficiency
Syllogisms

UNIT IV4 Periods
Application of Base system:
Clocks (Base 24), Calendars (Base7), Cutting of Cubes and cuboids

UNIT V4 Periods
Puzzle Solving & Time Management using various problems solving tools and techniques:
Selective puzzles from previous year placement papers
Selective puzzles from book Puzzles to puzzle you by shakunataladevi
Selective puzzles from book more puzzles by shakunataladevi
Selective puzzles from book puzzles by George summers

Books for practice
1. Quantitative aptitude by RS Agarwal, S Chand Publications
2. Verbal and non verbal Reasoning by RS Agarwal from S Chand publications
3. Puzzles to puzzle you by shakunataladevi orient paper back publication
4. More puzzles by shakunataladevi orient paper back publication
5. Puzzles by George summers orient paper back publication.
References:

1. Barron’s by Sharon Welner Green and Ira K Wolf (Galgotia Publications pvt. Ltd.)
3. Reasoning by BS Sijwali Arihant publications
4. Reasoning Arun Sharma McGrawhill publications

Websites:

1. www.m4maths.com
2. www.Indiabix.com
3. 800score
4. Official GRE site
5. Official GMAT site

Section –B (Verbal Aptitude –II)

UNIT I
4 Periods
General Essay writing, writing Issues and Arguments( with emphasis on creativity and analysis of a topic), paragraph writing, story writing, guidance in framing a ‘Statement of purpose’, ‘Letters of Recommendation’, business letter writing, email writing, email and business letter writing etiquette, letters of complaints/responses to complaints. Information transfer is taught with the help of tables, bar diagrams, and pie charts while framing /sending lengthy data where testing is done through Reading comprehension and Critical reasoning. Contextual meanings with regard to inflections of a word, frequently confused words, words often mis-used, words often mis-spelt, multiple meanings of the same word (differentiating between meanings with the help of the given context), foreign phrases. Enhanced difficulty level in spotting errors will be taken up with reference to competitive test based exercises.

UNIT II
4 Periods
Just a minute sessions, reading news clippings in the class, extempore speech, telephone etiquette, making requests/suggestions/complaints, elocutions, debates, describing incidents and developing positive non verbal communication. Analogies, YES-NO statements (sticking to a particular line of reasoning)

UNIT III
4 Periods
Corporate readiness, business idioms and expressions, reading newspapers/magazines, brushing up on general awareness, latest trends in their respective branches, resume preparation, understanding business/corporate language, managing emotions, problem solving, importance of team work, goal orientation, professional grooming, positive attitude, assertiveness and interpersonal skills. Data sufficiency (answering questions within the ambit of the given text), Fact-Inference-Judgment (to identify statements as FIJ), Syllogisms (with emphasis on fallacies in reasoning), strong and weak arguments.
UNIT IV6 Periods
Voice, direct & indirect speech, question tags, one word substitutes, and foreign phrases. An overview on group discussions, preparation for a group discussion, intricacies of a group discussion, topics for GDs (with special focus on controversial topics), structure of participation in a group discussion, roles played by the participants in a group discussion, constructive criticism, standard procedures followed whilst participating in a group discussion, frameworks that can be used for discussion, analysis of the discussion and exposure to case-based group discussions.

UNIT V6 Periods
Different types of interviews (with emphasis on personal interview), preparation for an interview, areas of questioning, answering questions on general traits like strengths/weaknesses/hobbies/extracurricular activities, choosing role models, importance of non verbal communication while participating in interviews, tips to reduce nervousness during personal interviews, handling stress, suggestions for responding to tough/unknown questions, preparation on self and personality development.

Note: The concepts learnt in Semester I will be tested in the Mid-term and Semester end exams during the II Semester as well.

Reading/ Listening material:
2. Magazines like Frontline, Outlook and Business India.
3. News channels NDTV, National News, CNN

References:
2. Books written by Bertrand Russell-Oxford University Press

Suggested General Reading
1. Who Moved My Cheese? By Spencer Johnson-GP Putnam’s Sons
2. The art of War-Sun Tzu by Nabla, Barnes & Noble
4. The Hobbit and other books by JRR Tolkein-Harper Collins

Suggested Authors
1. William Dalrymple
2. V.S.Naipaul
3. Kushwanth Singh
4. Ernest Hemingway
5. Charles Dickens
6. Leo Tolstoy
7. R.K. Narayan
8. Amitav Ghosh
9. Oscar Wilde