Regulations and Curriculum

for

B. Tech. Electronics and Communication Engineering

2009-2010
1. CONDITIONS FOR ADMISSION:

(a) Candidates for admission to the first semester of the 8 semester B.Tech. Degree programme should be required to have passed:

The Higher Secondary Examination of the (10+2) curriculum (Academic Stream) prescribed by the Government of Tamil Nadu or any other examination equivalent there to with minimum of 45% marks (a mere pass for OBC and SC/ST candidates) in aggregate of subjects – Mathematics, Physics and any one of the following optional subjects: Chemistry / Biotechnology/ Computer Science / Biology (Botany & Zoology) or an Examination of any University or Authority recognized by the Executive Council of the Pondicherry University as equivalent thereto.

(b) For Lateral entry in to third semester of the eight semester B.Tech programme:

The minimum qualification for admission is a pass in three year diploma or four year sandwich diploma course in engineering / technology with a minimum of 60 % marks (50% marks for OBC and a mere pass for SC/ST candidates) in aggregate in the subjects covered from 3rd to final semester or a pass in any B.Sc. course with mathematics as one of the subjects of study with a minimum of 60 % marks ( 50% marks for OBC and a mere pass for SC/ST candidates) in aggregate in main and ancillary subjects excluding language subjects. The list of diploma programs approved for admission for each of the degree programs is given in Annexure A.

2. AGE LIMIT:

The candidate should not have completed 21 years of age as on 1st July of the academic year under consideration. For Lateral Entry admission to second year of degree programme, candidates should not have completed 24 years as on 1st July of the academic year under consideration. In the case of SC/ST candidates, the age limit is relaxable by 3 years for both the cases.

3. DURATION OF PROGRAMME:

The Bachelor of Technology degree programme shall extend over a period of 8 consecutive semesters spread over 4 academic years – two semesters constituting one academic year. The duration of each semester shall normally be 15 weeks excluding examinations.
4. ELIGIBILITY FOR THE AWARD OF DEGREE:

No candidate shall be eligible for the award of the degree of Bachelor of Technology, unless he/she has undergone the course for a period of 8 semesters (4 academic years) / 6 semesters (3 academic years for Lateral Entry candidates) in the faculty of Engineering and has passed the prescribed examinations in all the semesters.

5. BRANCHES OF STUDY:

Branch I - Civil Engineering  
Branch II - Mechanical Engineering  
Branch III - Electronics & Communication Engineering  
Branch IV - Computer Science & Engineering  
Branch V - Electrical & Electronics Engineering  
Branch VI - Chemical Engineering  
Branch VII - Electronics & Instrumentation Engineering  
Branch VIII - Information Technology  
Branch IX - Instrumentation & Control Engineering  
Branch X - Biomedical Engineering

or any other branches of study as and when offered. The branch allocation shall be ordinarily done at the time of admission of the candidate to the first semester.

6. SUBJECTS OF STUDY:

The subjects of study shall include theory and practical courses as given in the curriculum and shall be in accordance with the prescribed syllabus. The subjects of study for the first two semesters shall be common for all branches of study.

7. EXAMINATIONS:

The theory and practical examinations shall comprise continuous assessment throughout the semester in all subjects as well as university examinations conducted by Pondicherry University at the end of the semester (November / December or April / May).

(a) Theory courses for which there is a written paper of 75 marks in the university examination.

The Internal Assessment marks of 25 has to be distributed as 10 marks each for two class tests and 5 marks for class attendance in the particular subject. The distribution of marks for attendance is as follows:
5 marks for 95% and above  
4 marks for 90% and above but below 95%  
3 marks for 85% and above but below 90%  
2 marks for 80% and above but below 85%  
1 mark for 75% and above but below 80%

A minimum of three tests are to be conducted for every theory subject and, of them two best are to be considered for computation of internal assessment marks.

(b) Practical courses for which there is a university practical examination of 50 marks:
Every practical subject carries an internal assessment mark of 50 distributed as follows: (i) Regular laboratory exercises and records – 20 marks (ii) Internal practical test-15 marks (iii) Internal viva-voce – 5 marks and (iv) Attendance – 10 marks.
The marks earmarked for attendance are to be awarded as follows: 
10 marks for 95% and above  
8 marks for 90% and above but below 95%  
6 marks for 85% and above but below 90%  
4 marks for 80% and above but below 85%  
2 marks for 75% and above but below 80%

8. REQUIREMENT FOR APPEARING FOR UNIVERSITY EXAMINATION:

A candidate shall be permitted to appear for university examinations at the end of any semester only if:

(i) He / She secures not less than 75% overall attendance arrived at by taking into account the total number of periods in all subjects put together offered by the institution for the semester under consideration.

(Candidates who secure overall attendance greater than 60% and less than 75% have to pay a condonation fee as prescribed by the University along with a medical certificate obtained from a medical officer not below the rank of Assistant Director)

(ii) He / She earns a progress certificate from the Head of the institution for having satisfactorily completed the course of study in all the subjects pertaining to that semester.

(iii) His / Her conduct is found to be satisfactory as certified by the Head of the institution.

A candidate who has satisfied the requirement (i) to (iii) shall be deemed to have satisfied the course requirements for the semester.

9. PROCEDURE FOR COMPLETING THE COURSE:

A candidate can join the course of study of any semester only at the time of its normal commencement and only if he/she has satisfied the course requirements for the previous
semester and further has registered for the university examinations of the previous semester in all the subjects as well as all arrear subjects if any.

However, the entire course should be completed within 14 consecutive semesters (12 consecutive semesters for students admitted under lateral entry).

10. PASSING MINIMUM:

   (i) A candidate shall be declared to have passed the examination in a subject of study only if he/she secures not less than 50% of the total marks (Internal Assessment plus University examination marks) and not less than 40% of the marks in University examination.

   (ii) A candidate who has been declared “Failed” in a particular subject may reappear for that subject during the subsequent semesters and secure a pass. However, there is a provision for revaluation of failed or passed subjects provided he/she fulfills the following norms for revaluation.

   (a) Applications for revaluation should be filed within 4 weeks from the date of declaration of results or 15 days from the date of receipt of marks card whichever is earlier.

   (b) The candidate should have attended all the college examinations as well as university examinations.

   (c) If a candidate has failed in more than two papers in the current university examination, his/her representation for revaluation will not be considered.

   (d) The request for revaluation must be made in the format prescribed duly recommended by the Head of the Institution along with the revaluation fee prescribed by the University.

   The internal assessment marks obtained by the candidate shall be considered only in the first attempt for theory subjects alone. For the subsequent attempts, University examination marks will be made up to the total marks. Further the University examination marks obtained in the latest attempt shall alone remain valid in total suppression of the University examination marks obtained by the candidate in earlier attempts.

11. AWARD OF LETTER GRADES:

   The assessment of a course will be done on absolute marks basis. However, for the purpose of reporting the performance of a candidate, letter grades, each carrying certain points, will be awarded as per the range of total marks (out of 100) obtained by the candidate, as detailed below:
<table>
<thead>
<tr>
<th>Range of Total Marks</th>
<th>Letter Grade</th>
<th>Grade Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 to 100</td>
<td>S</td>
<td>10</td>
</tr>
<tr>
<td>80 to 89</td>
<td>A</td>
<td>9</td>
</tr>
<tr>
<td>70 to 79</td>
<td>B</td>
<td>8</td>
</tr>
<tr>
<td>60 to 69</td>
<td>C</td>
<td>7</td>
</tr>
<tr>
<td>55 to 59</td>
<td>D</td>
<td>6</td>
</tr>
<tr>
<td>50 to 54</td>
<td>E</td>
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<tr>
<td>0 to 49</td>
<td>F</td>
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</tr>
<tr>
<td>Incomplete</td>
<td>FA</td>
<td></td>
</tr>
</tbody>
</table>

Note: ‘F’ denotes failure in the course. ‘FA’ denotes absent / detained as per clause 8.

After results are declared, grade sheets will be issued to the students. The grade sheets will contain the following details:

(a) The college in which the candidate has studied.

(b) The list of courses enrolled during the semester and the grades scored.

(c) The Grade Point Average (GPA) for the semester and The Cumulative Grade Point Average (CGPA) of all enrolled subjects from first semester onwards.

(d) GPA is the ratio of sum of the products of the number of credits (C) of courses registered and the corresponding grades points (GP) scored in those courses, taken for all the courses and sum of the number of credits of all the courses

\[
GPA = \frac{\text{Sum of } (C \times GP)}{\text{Sum of } C}
\]

CGPA will be calculated in a similar manner, considering all the courses enrolled from first semester. FA grades are to be excluded for calculating GPA and CGPA.

(e) The conversion of CGPA into percentage marks is as given below

\[
\% \text{ Mark} = (\text{CGPA} - 0.5) \times 10
\]

12. AWARD OF CLASS AND RANK:

(i) A candidate who satisfies the course requirements for all semesters and who passes all the examinations prescribed for all the eight semesters (six semesters for lateral entry candidates) within a maximum period of 7 years (6 years for lateral entry candidates) reckoned from the commencement of the first semester to which the
candidate was admitted shall be declared to have qualified for the award of degree.

(ii) A candidate who qualifies for the award of the degree passing in all subjects pertaining to semesters 3 to 8 in his/her first appearance within 6 consecutive semesters (3 academic years) and in addition secures a CGPA of 8.50 and above for the semesters 3 to 8 shall be declared to have passed the examination in FIRST CLASS with DISTINCTION.

(iii) A candidate who qualifies for the award of the degree by passing in all subjects relating to semesters 3 to 8 within a maximum period of eight semesters after his/her commencement of study in the third semester and in addition secures CGPA not less than 6.5 shall declared to have passed the examination in FIRST CLASS.

(iv) All other candidates who qualify for the award of degree shall be declared to have passed the examination in SECOND CLASS.

(v) For the Award of University ranks and Gold Medal for each branch of study, the CGPA secured from 1st to 8th semester alone should be considered and it is mandatory that the candidate should have passed all the subjects from 1st to 8th semester in the first attempt. Rank certificates would be issued to the first ten candidates in each branch of study.

13. PROVISION FOR WITHDRAWAL:

A candidate may, for valid reasons, and on the recommendation of the Head of the Institution be granted permission by the University to withdraw from writing the entire semester examination as one Unit. The withdrawal application shall be valid only if it is made earlier than the commencement of the last theory examination pertaining to that semester. Withdrawal shall be permitted only once during the entire course. Other conditions being satisfactory, candidates who withdraw are also eligible to be awarded DISTINCTION whereas they are not eligible to be awarded a rank.

14. DISCONTINUATION OF COURSE:

If a candidate wishes to temporarily discontinue the course for valid reasons, he/she shall apply through the Head of the Institution in advance and obtain a written order from the University permitting discontinuance. A candidate after temporary discontinuance may rejoin the course only at the commencement of the semester at which he/she discontinued, provided he/she pays the prescribed fees to the University. The total period of completion of the course reckoned from the commencement of the first semester to which the candidate was admitted shall not in any case exceed 7 years, including of the period of discontinuance.

15. REVISION OF REGULATIONS AND CURRICULUM:

The University may from time to time revise, amend or change the regulations of curriculum and syllabus as and when found necessary.

http://ece.pec.edu
ANNEXURE – A
(Diploma programs for admission for B.Tech. Lateral Entry)

<table>
<thead>
<tr>
<th>B.Tech courses in which admission is sought</th>
<th>Diploma courses eligible for admission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civil Engineering</td>
<td>Civil Engineering Civil and Rural Engineering Architectural Assistantship Architecture Agricultural Engineering</td>
</tr>
<tr>
<td>Chemical Engineering</td>
<td>Chemical Engineering Chemical Technology Petrochemical Technology Petroleum Engineering Ceramic Technology Plastic Engineering Paper &amp; Pulp Technology Polymer Technology</td>
</tr>
</tbody>
</table>

http://ece.pec.edu
# PONDICHERRY UNIVERSITY B.Tech (Electronics and Communication Engineering) CURRICULUM

## I Semester

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Name of the Subjects</th>
<th>Periods</th>
<th>Credits</th>
<th>Marks</th>
</tr>
</thead>
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<td>L</td>
<td>T</td>
<td>P</td>
</tr>
<tr>
<td><strong>Theory</strong></td>
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<tr>
<td>T101</td>
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<tr>
<td>T102</td>
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<td>T103</td>
<td>Chemistry</td>
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<td>T110</td>
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<tr>
<td>T111</td>
<td>Engineering Mechanics</td>
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<tr>
<td>T112</td>
<td>Communicative English</td>
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<td><strong>Practical</strong></td>
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<tr>
<td>P104</td>
<td>Physics Laboratory</td>
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<tr>
<td>P105</td>
<td>Chemistry Laboratory</td>
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<td>P106</td>
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<th>Credits</th>
<th>Marks</th>
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<td>P</td>
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<tr>
<td>T109</td>
<td>Environmental Science</td>
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<tr>
<td>T104</td>
<td>Basic Electrical and Electronics Engineering</td>
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<td>T105</td>
<td>Engineering Thermodynamics</td>
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<td>P102</td>
<td>Engineering Graphics</td>
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<tr>
<td>P103</td>
<td>Basic Electrical &amp; Electronics Laboratory</td>
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<td>-</td>
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<tr>
<td>P107</td>
<td>NSS / NCC *</td>
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</table>

* To be completed in I and II semesters, under Pass / Fail option only and not counted for CGPA calculation.

http://ece.pec.edu
## III Semester

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Name of the Subjects</th>
<th>Periods</th>
<th>Credits</th>
<th>Marks</th>
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<td>P</td>
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<td>EC T33</td>
<td>Data Structures and Algorithms</td>
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<td>EC T34</td>
<td>Electron Devices</td>
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<td>EC T35</td>
<td>Circuit Theory</td>
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<td>EC T36</td>
<td>Engineering Electromagnetics and Waves</td>
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<td>EC P31</td>
<td>Electrical Engineering Laboratory</td>
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<td>EC P32</td>
<td>Data Structures and Algorithms Laboratory</td>
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## IV Semester

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<td>P</td>
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<td>MA T41</td>
<td>Numerical Methods and Techniques</td>
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<td>EC T42</td>
<td>Electronic Circuits-I</td>
<td>3</td>
<td>1</td>
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<td>EC T43</td>
<td>Signals and Systems</td>
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<td>EC T44</td>
<td>Networks and Transmission Lines</td>
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<td>EC T45</td>
<td>Digital Circuits</td>
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<td>Analog Communication Systems</td>
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* Student is required to secure a pass and no grade will be awarded
## V Semester

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<th>Name of the Subjects</th>
<th>Periods</th>
<th>Credits</th>
<th>Marks</th>
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<td></td>
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<td>P</td>
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<td>Electronic Circuits-II</td>
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<td>System Design using ICs</td>
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<td>EC T54</td>
<td>Digital Signal Processing</td>
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<td>EC T55</td>
<td>Linear and Digital Control Systems</td>
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<td>EC T56</td>
<td>Waveguides, Antennas and Wave Propagation</td>
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<td>EC P52</td>
<td>System Design using ICs Laboratory</td>
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<td>EC P53</td>
<td>Networks and Transmission Lines Laboratory</td>
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<td>HS P54</td>
<td>General Proficiency – I</td>
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## VI Semester

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<th>Marks</th>
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<td>Information Theory and Coding</td>
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### VII Semester

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# LIST OF ELECTIVES

## VI Semester
- EC E61  Soft Computing
- EC E62  VLSI Design
- EC E63  Digital Signal Processors and Applications
- EC E64  Operating Systems
- EC E65  Consumer Electronics
- EC E66  Object Oriented Programming

## VII Semester
- EC E71  Digital image Processing
- EC E72  Special Topics in Communication Engineering
- EC E73  Cryptography and Network security
- EC E74  Spread spectrum Communication

## VIII Semester
- EC E81  Cellular Mobile communication
- EC E82  Satellite Communication Systems
- EC E83  Microwave Integrated Circuit Design
- EC E84  Optoelectronic Devices
- EC E85  RF Circuit Design
- EC E86  Speech Processing
T101 - MATHEMATICS – I

UNIT - I

Calculus: Curvature, radius of curvature, evolutes and involutes. Beta and Gamma functions and their properties.

UNIT - II

Multiple Integrals and Applications: Multiple integrals – change of order of integration. Applications: Areas (double integration) and volumes by triple integration (Cartesian and polar) – mass and center of mass (constant and variable densities).

UNIT - III

Analytical Solid Geometry: Directional cosines and ratios – angle between two lines – the equation of plane - equations to a straight line and shortest distance between two skew lines.

UNIT - IV

Differential Equations: Exact equations, First order linear equations, Bernoulli’s equation, orthogonal trajectories, growth and decay, geometrical applications and electric circuits. Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut’s type.

UNIT - V

Differential Equations (Higher order):
Linear differential equations of higher order – with constant coefficients, the operator D - Euler’s linear equation of higher order with variable coefficients - simultaneous linear differential equations – solution by variation of parameters method – simple applications to electric circuits.

Text Book:


Reference Book:

T102 - PHYSICS

UNIT - I
Acoustics and NDT: Ultrasonics - Ultrasonic Waves Productions (Piezoelectric and Magnetostriction method) – Detections (Acoustic Grating)
Acoustics - Factors affecting Acoustic of Buildings (Reverberation, Loudness, Focusing, Echo, Echelon Effect and Resonance) and their Remedies - Sabine’s formula for Reverberation Time. NDT applications - Pulse Echo Method - Liquid Penetrant Method

UNIT - II

UNIT - III
Fiber Optics - Principle and Propagation of light in optical fiber – Numerical aperture and acceptance angle – Types of optical fibers (material, refractive index, mode)

UNIT - IV
Wave Mechanics:

UNIT - V

Text Books:

Reference Books:

**T103 – CHEMISTRY**

**UNIT - I**


**UNIT - II**


**UNIT - III**

**Electrochemical Cells:** Galvanic cells, single electrode potential, standard electrode potential, electromotive series. EMF of a cell and its measurement. Nernst equation. Electrolyte concentration cell. Reference electrodes-hydrogen calomel, Ag /AgCl and glass electrodes. Batteries - primary and secondary cells, lacanche cell, lead acid storage cell, Ni-Cd battery and alkaline battery. Fuel cells - H2-O2 fuel cell.

**UNIT - IV**

**Corrosion And Its Control:** Chemical and electrochemical corrosion-Galvanic series-galvanic, pitting, stress and concentration cell corrosion. Factors influencing corrosion- corrosion control methods - cathodic protection and corrosion inhibitors. Protective coating - types of protective coatings-metallic coating-tinning and galvanizing, cladding, electropating and anodizing.

**UNIT - V**

**Phase Rule:** Definition and derivation of phase rule. Application to one component system - water and sulphur systems. Thermal analysis, condensed phase rule. Two component alloy systems - Pb-Ag, Cu-Ni and Mg-Zn systems.

**Text books:**

**Reference Books:**
2. B. K. Sharma, Engineering Chemistry, 3rd edition Krishna Prakashan Media (P)
T 110 - BASIC CIVIL AND MECHANICAL ENGINEERING

PART - A CIVIL ENGINEERING

UNIT - I
Buildings, Building Materials: Buildings-Definition-Classification according to NBC-plinth area, Floor area, carpet area, floor space index-construction materials-stone, brick, cement, cement-mortar, concrete, steel- their properties and uses.

UNIT - II

UNIT - III

PART - B MECHANICAL ENGINEERING

UNIT - IV
Internal and External Combustion Systems: Working principles of IC engines - Classification – Diesel and petrol engines: two stroke and four stroke engines. Steam generators(Boilers) – Classification – Constructional features (of only low pressure boilers) – Boiler mountings and accessories.


UNIT - V

Casting : Green and dry sand moulding processes for ferrous and non-ferrous metals – applications.

UNIT - VI
Metal Joining: Elements of arc and gas welding, brazing and soldering – Bolted joint types – Adhesive Bonding; classification of adhesives – applications. Sheet Metal Processing-Punching, blanking, shearing, bending, and deep drawing processes; descriptions and applications.
Text Books:


Reference Books

T111 - ENGINEERING MECHANICS

UNIT - I
Fundamental of Mechanics: Basic Concepts Force System and Equilibrium, Definition of Force, Moment and Couple, Principle of Transmissibility, Varignon’s theorem, Resultant of force system – Concurrent and non concurrent coplanar forces, Condition of static equilibrium for coplanar force system, stability of equilibrium, concept of free body diagrams, applications in solving the problems on static equilibrium of bodies.

UNIT - II
Plane Trusses: Degrees of freedom, Types of supports and reactions, Types of loads, Analysis of Trusses-method of joints, method of sections
Friction: Introduction, Static dry friction, simple contact friction problems, ladders, wedges, screws and belt friction.

UNIT - III
Properties of Surfaces: Properties of sections – area, centroids of lines, areas and volumes, moment of inertia first moment of inertia, second moment of inertia and product moment of inertia, polar moment of inertia, radius of gyration, mass moment of inertia.

UNIT - IV

UNIT - V
Kinematics and Kinetics of Rigid bodies: Plane motion, Absolute motion, Relative motion, translating axes and rotating axes, work and energy, impulse and momentum

Text Books

Reference Books

http://ece.pec.edu
T112 - COMMUNICATIVE ENGLISH

UNIT - I

Basic Communication Theory: Importance of Communication – stages of communication, modes of communication – barriers to communication – strategies for effective communication – Listening: Importance, types, barriers – Developing effective listening skills.

UNIT - II

Comprehension and Analysis: Comprehension of technical and non-technical material – Skimming, scanning, inferring-Note making and extension of vocabulary, predicting and responding to context- Intensive Reading and Reviewing

UNIT - III

Writing: Effective sentences, cohesive writing, clarity and conciseness in writing – Introduction to Technical Writing – Better paragraphs, Definitions, Practice in Summary Writing – Four modes of writing – Use of dictionaries, indices, library references – making bibliographical entries with regard to sources from books, journals, internet etc.

UNIT - IV


UNIT - V


Reference Books:

P104 - PHYSICS LABORATORY

List of experiments (Any 10 Experiments)

1. Thermal conductivity – Lee’s DISC
2. Thermal conductivity - Radial flow
3. Spectrometer – Prism or Hollow prism
4. Spectrometer – Transmission grating
5. Spectrometer - Ordinary & Extraordinary rays
6. Newton’s rings
7. Air – wedge
8. Half shade polarimeter – Determination of specific rotatory power
9. Jolly’s experiment – determination of $\alpha$
10. Magnetism: $i - h$ curve
11. Field along the axis of coil carrying current
12. Vibration magnetometer – calculation of magnetic moment & pole strength
13. Laser experiment: wavelength determination using transmission grating, reflection grating (vernier calipers) & particle size determination
14. Determination of optical absorption coefficient of materials using laser
15. Determination of numerical aperture of an optical fiber
P105 - CHEMISTRY LABORATORY

List of experiments (Any 10 Experiments)

1. Determination of dissolved oxygen in water.
2. Determination of total hardness of water by EDTA method.
3. Determination of carbonate and bicarbonate in water.
4. Estimation of chloride content in water.
5. Estimation of magnesium by EDTA.
7. Estimation of ferrous by permanganometry.
8. Estimation of ferrous and ferric iron in a solution mixture by dichrometry.
10. Estimation of copper in copper sulphate solution.
11. Estimation of calcium by permanganometry.
12. Estimation of iron by colorimetry.

Demonstration Experiments (Any two of the following)

1. Determination of COD of water sample.
2. Determination of lead by conductometry.
3. Percentage composition of sugar solution by viscometry.
P106 - WORKSHOP PRACTICE

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<td>Fitting</td>
<td>Study of tools and Machineries. Exercises on symmetric joints and joints with acute angle.</td>
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<tr>
<td>2.</td>
<td>Welding</td>
<td>Study of arc and gas welding equipment and tools – Edge preparation – Exercises on lap joint and V Butt joints – Demonstration of gas welding</td>
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<tr>
<td>4.</td>
<td>Carpentry</td>
<td>Study of tools and Machineries – Exercises on Lap joints and Mortise joints</td>
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</table>

LIST OF EXERCISES

I - Fitting

1. Study of tools and Machineries  
2. Symmetric fitting  
3. Acute angle fitting

II - Welding

1. Study of arc and gas welding equipment and tools  
2. Simple lap welding (Arc)  
3. Single V butt welding (Arc)

III - Sheet metal work

1. Study of tools and machineries  
2. Funnel  
3. Waste collection tray

IV - Carpentry

1. Study of tools and machineries  
2. Half lap joint  
3. Corner mortise joint.
T107 - MATHEMATICS – II

UNIT - I

Algebra: Binomial, exponential and logarithmic series (without proof) – problems on summation, approximation and coefficients.

UNIT - II


UNIT - III

Trigonometry: Expansions for $\sin^n \theta$, $\cos^n \theta$, $\tan^n \theta$, $\sin(n\theta)$, $\cos(n\theta)$, $\tan(n\theta)$. Exponential, circular, hyperbolic, inverse hyperbolic and logarithmic functions of a complex variable – separation of real and imaginary parts.

UNIT - IV

Vector Analysis: Scalar fields and Vector fields – Gradient, Divergence and Curl – their properties and relations – Gauss and Stokes theorems (without proof), simple problems for their verification.

UNIT - V

Statistics: Moments, kurtosis and skewness based on moments only. Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions. Correlation and regression – rank correlation.

Text Books:

Reference Book:
UNIT - I


UNIT - II


UNIT - III


UNIT - IV


UNIT - V

Advanced Materials: Liquid Crystals – Types – Application as Display Devices – Metallic Glasses – Nanomaterials (one, Two & three Dimensional) – Physical Properties and Applications of Carbon Nano Tubes

Text books:


Reference Books:

T109 - ENVIRONMENTAL SCIENCE

UNIT - I

UNIT - II

UNIT - III
Air Pollution: Air pollution-sources of air pollution. Sources, effects and control measures of oxides of nitrogen, oxides of sulphur, oxides of carbon, hydrocarbon, chlorofluoro carbons and particulates. Green house effect-causes and effects on global climate and consequences. Ozone depletion-causes, mechanism and effect on the environment. Smog-sulfurous and photochemical smog-effect on the environment. Acid rain-theory of acid rain and effects.

UNIT - IV
Water Pollution and Solid Waste Management Sources: effects and control measures of –water pollution, soil pollution, marine pollution, noise pollution, thermal pollution and radioactive pollution. Solid waste management – causes, effect and control measures of
urban and industrial wastes.

UNIT - V


**Text Books:**


**Reference Books:**

2. G. S. Sodhi, Fundamental concepts of environmental chemistry, Narosa publishing house, New Delhi
T104 - BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

PART A – ELECTRICAL

UNIT – I


UNIT – II

Node and mesh methods of analysis of DC circuits and simple AC circuits - Introduction to three phase circuits, Introduction to three phase system - phase and line parameters – relations, power measurement – voltmeter and ammeter method, two and three wattmeter methods.

UNIT – III

Principle of DC generator and motor - Transformer, synchronous generator, induction motor (single phase). Sources for electrical energy conversion-thermal and hydraulic plant (Block diagram approach only). Components of AC transmission and distributions systems – line diagram.

PART B – ELECTRONICS

UNIT – IV

Half-wave rectifier and Full-wave rectifier- filters - Amplifiers-common emitter and common collector amplifiers- Hartley oscillator and RC phase shift oscillator. Transducers – Resistance temperature detector (RTD) – Linear variable differential transformer (LVDT) - Strain gauge – Piezo electric transducer.

UNIT – V


UNIT – VI

Model of communication system – Analog and digital – Wired and wireless channel. Block diagram of various communication systems – Microwave, satellite, optical fiber and cellular mobile system. Network model – LAN, MAN and WAN – Circuit and packet switching – Overview of ISDN.
Text Books:


Reference Books:

2. J.B.Gupta, A Course in Electrical Power, Katson Publishing House, New Delhi,
T105 – ENGINEERING THERMODYNAMICS

UNIT - I

Basic Concepts and Definitions: Energy conversion and efficiencies - System, property and state - Thermal equilibrium - Temperature - Zeroth law of Thermodynamics.

UNIT - II

First Law of Thermodynamics: The concept of work and adiabatic process - First law of thermodynamics - Conservation of Energy principle for closed and open systems - Calculation of work for different processes of expansion of gases

UNIT - III


UNIT - IV

Gas Power Cycles: Air standard cycles: The air standard Carnot cycle - Air standard Otto cycle, diesel cycle, dual cycle and Bryton cycles and their efficiencies

UNIT - V

Refrigeration Cycles and Systems: Reverse Carnot cycle - COP - Vapor compression refrigeration cycle and systems (only theory) - Gas refrigeration cycle - Absorption refrigeration system (only theory) - Liquifaction and solidification of gases

Text Books:


Reference Books:

T106 - COMPUTER PROGRAMMING

UNIT – I


UNIT – II

Problem solving techniques – Program – Program development cycle – Algorithm design – Flowchart - Pseudo code.
Introduction to C – C tokens – data types – Operators and expressions – I/O functions

UNIT – III

Decision making statements – branching and looping – arrays – multidimensional arrays – Functions – Recursion – Passing array to functions Storage classes – Strings – String library functions

UNIT – IV

Structures – Arrays and Structures – nested structures – passing structures to functions – user defined data types– Union
Pointers – pointers and arrays – pointers and functions - pointers and strings - pointers and structures

UNIT – V

Files – operations on a file – Random access to files – command line arguments
Introduction to preprocessor – Macro substitution directives – File inclusion directives – conditional compilation directives – Miscellaneous directives

Text Books:


Reference Books:

P101 - COMPUTER PROGRAMMING

LABORATORY List of Exercises:

OS Commands, Word Processor and Spreadsheets

1. Study of OS commands-Compilation and execution of simple C programs
2. Use of mail merge in word processor
3. Use of spreadsheet to create Charts( XY, Bar, Pie) and apply the formulae wherever necessary C Programming (Flowcharts and algorithms are essential for the programming exercises)
4. Greatest of three numbers using conditional operator and if statement
5. Read two numbers and swap those two numbers using temporary variable and without using temporary variable.
6. Solve quadratic equation for different sets of inputs.
7. Use of Switch….Case statements
8. Generation of prime and Fibonacci series
9. Evaluate the COSINE series using for, while and do..while loops
10. Matrix operations
   (a) Addition
   (b) Transpose
   (c) Multiplication
11. Evaluate the sin(x) series using functions and recursive functions
12. Read a string and find solution to remove the duplicates of a given string from the given sentence
13. Create an array of structures for a list of items with the following details

<table>
<thead>
<tr>
<th>Item_Code</th>
<th>Item_Name</th>
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</thead>
<tbody>
<tr>
<td>102</td>
<td>Paste – Colgate</td>
</tr>
<tr>
<td>102</td>
<td>Paste – Pepsodent</td>
</tr>
<tr>
<td>102</td>
<td>Paste – Close-up</td>
</tr>
<tr>
<td>101</td>
<td>Soap-Cinthol</td>
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<tr>
<td>101</td>
<td>Soap-Lux</td>
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<td>Soap-Hamam</td>
</tr>
<tr>
<td>101</td>
<td>Soap-Dove</td>
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</table>

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<thead>
<tr>
<th>Item_Code</th>
<th>Item_Name</th>
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<td>Paste – Colgate</td>
</tr>
<tr>
<td>102</td>
<td>Paste – Close-up</td>
</tr>
</tbody>
</table>

14. Use of Structure to define a user defined data types, input the data and write the data into the file
15. Use of pointers and array of pointers
16. Functions with static data types
17. Write command line program to implement the following DOS commands using files
   - Del
   - Copy
P102 - ENGINEERING GRAPHICS

Unit - 0

Introduction to Standards for Engineering Drawing practice, Lettering, Line work and Dimensioning

Unit - I

Conic sections, Involutes, Spirals, Helix. Projection of Points, Lines and Planes

Unit - II

Projection of Solids and Sections of Solids.

Unit - III

Development of surfaces - Intersection of surfaces (cylinder-cylinder, cylinder-cone)

Unit - IV

Isometric projections and Orthographic projections

Unit - V

Computer Aided Drafting: Introduction to Computer Aided Drafting hardware - Overview of application software - 2D drafting commands (Auto CAD) for simple shapes - Dimensioning.

Text Books


Reference Books

P103 - BASIC ELECTRICAL AND ELECTRONICS LABORATORY

ELECTRICAL LABORATORY

1. Study of tools and accessories
2. Study of joints
3. Staircase wiring
4. Doctor’s room wiring
5. Godown wiring
6. Tube Light and Fan connection
7. Lamp controlled from three different places - wiring

ELECTRONICS LABORATORY

1. Rectifiers
   Construction of half wave and full wave rectifiers with and without filters – Calculation of ripple factors.
2. Frequency Response of RC Coupled Amplifiers
   Determination of frequency response of given RC coupled amplifier – calculation of bandwidth.
3. Verification of Kirchoff’s Voltage and Current Laws
   Determine the voltage and current in given circuits using Kirchoff’s laws theoretically and verify the laws experimentally.
4. Study of Logic Gates
   (a) Verification of Demorgan’s theorems
   (b) Verification of truth tables of OR, AND, NOT, NAND, NOR, EX-OR, EX-NOR gates and Flipflops - JK, RS, T and D
   (c) Implementation of digital functions using logic gates
5. Study of CRO
   (a) Measurement of AC and DC voltages
   (b) Frequency and phase measurements (using Lissajou’s figures)
6. Study of Transducers
   (a) Displacement and load measurements with transducers
   (b) Temperature measurement with thermocouple
P107 - NCC / NSS

NCC/NSS training is compulsory for all the Undergraduate students:

1. The above activities will include Practical/field activities/Extension lectures.
2. The above activities shall be carried out outside class hours.
3. In the above activities, the student participation shall be for a minimum period of 45 hours.
4. The above activities will be monitored by the respective faculty incharge and the First Year Coordinator.
5. Pass/Fail will be determined on the basis of participation, attendance, performance and behaviour. If a candidate Fails, he/she has to repeat the course in the subsequent years
6. Pass in this course is mandatory for the award of degree.
MA T31 - MATHEMATICS - III

UNIT - I


UNIT - II


UNIT - III

Complex Integration: Cauchy’s theorem -Cauchy’s integral formula - Taylor’s and Laurent series - Residue theorem - Contour integration round the unit circle and semi-circular contour.

UNIT - IV


UNIT - V

Fourier Transform: Definition and properties - Fourier Integral theorem - statement - Fourier sine transform and cosine transforms - Inverse Fourier transform.

Text Books:

Reference Books:
EC T32 - ELECTRICAL ENGINEERING

UNIT - I


UNIT - II


UNIT - III


UNIT - IV


UNIT - V


Text Books:


Reference Books:

EC T33 - DATA STRUCTURES AND ALGORITHMS

UNIT – I

Introduction to data structures: Information and meaning – Arrays in C – Structures in C
Stack: Definition and examples – Representing stacks in C – Infix, postfix and prefix

UNIT – II


Queues and Lists: The queue and its sequential representation – Linked Lists – Lists in C – Simulation using linked lists – Other list structures.

UNIT – III


UNIT – IV

Sorting: General background – Exchange sorts – Selection and tree sorting – Insertion sorts – Merge and radix sorts
Searching: Basic search techniques – Tree searching – General search trees - Hashing

UNIT – V

Graphs and their applications: Graphs – A flow problem – Linked representation of graphs – Graph traversal and spanning forests
Storage management: General lists – Automatic list management – Dynamic memory management.

Note: It is expected to mention the type of algorithm such as greedy, dynamic programming, divide and conquer, backtracking etc., for every problem discussed in this paper.

Text Book:

EC T34 - ELECTRON DEVICES

UNIT- I

Electron Ballistics and Semiconductor Theory: Force on charge in electric field – two dimensional motion- force in a magnetic field - parallel and perpendicular electric and magnetic field – electrostatic and magnetic deflection in CRT. Energy band structure of insulators, conductors and semiconductors – conductivity of an intrinsic semiconductor – Fermi Dirac distribution and energy band diagram – Fermi levels in extrinsic semiconductor – Hall effect.

UNIT- II


UNIT- III


UNIT- IV

Special Diodes and Photonic Devices: Construction, Principle of operation, application and characteristics of Schottky barrier diode, Varactor diode, Tunnel diode, PIN diode. LED, LCD, Seven segment display, Photoconductivity – Photodiode, APD, Phototransistor, Solar cells- Concept of DLP.

UNIT- V


Text Books:


Reference Books:

1. David A. Bell, “Electronic Devices and Circuits”, PHI Learning Private Limited, Fourth
EC T35 - CIRCUIT THEORY

UNIT- I

DC Circuit Analysis: Sources-Transformation and manipulation, Network theorems - Superposition theorem, Thevenin’s theorem, Norton’s theorem, Reciprocity theorem, Millman’s theorem, Compensation theorem, Maximum power transfer theorem and Tellegen’s theorem – Application to DC circuit analysis.

UNIT- II


UNIT- III


UNIT- IV

Magnetically Coupled Circuits: Self inductance - Mutual inductance - Dot rule - Coefficient of coupling - Analysis of multiwinding coupled circuits - Series, Parallel connection of coupled inductors - Single tuned and double tuned coupled circuits.

UNIT- V


Text Book:


Reference Books:

EC T36 - ENGINEERING ELECTROMAGNETICS AND WAVES

UNIT-I


UNIT-II


UNIT-III


UNIT-IV

EM Waves and Wave Equations: Maxwell’s equation in point and integral form– Poynting’s theorem – Energy in electromagnetic field, Electromagnetic wave equation, wave equation for free space and conducting medium.

UNIT-V


Text Books:


Reference Books:


http://ece.pec.edu
EC P31 - ELECTRICAL ENGINEERING LABORATORY

1. OC and SC test on single phase transformer.
2. Load test on single phase transformer.
3. Load test on DC shunt motor.
4. OCC characteristics of generator.
5. Two wattmeter method of power measurement.
6. Swinburne’s test.
7. Load test on single phase IM.
8. Load test on 3 phase transformer.
9. Load test on 3 phase induction motor.
EC P32 - DATA STRUCTURES AND ALGORITHMS LABORATORY

1. Recursion:
   a) Fibonacci Series.
   b) Factorial Computation.

2. Linked list:
   a) Implementing Singly Linked List- Creation, Insertion, Deletion.
   b) Implementing Doubly Linked List- Creation, Insertion, Deletion.
   c) Implementing Circular Linked List- Creation, Insertion, Deletion.

3. Stack:
   a) Implementing Stack Operation- Push, Pop.
   b) Implementing Double Stack Operation- Push, Pop.

4. Queue:
   a) Implementing Queue Operation.
   b) Implementing Circular Queue Operation.

5. Binary tree:
   a) Binary Search Tree – Searching, Insertion & Deletion.
   b) Binary Tree Traversal.

6. Minimum spanning tree:
   a) Prim’s Algorithm.
   b) Kruskal’s Algorithm.

7. Graph:
   a) All Pair Shortest Path.
   b) 8 – Queen problem.

8. Sort:
   a) Bubble Sorting.
   b) Quick sorting.
   c) Merge Sorting.
   d) Insertion Sorting.

9. Hashing:
   Implementing Hashing Techniques.
EC P33 - ELECTRON DEVICES LABORATORY

1. V-I characteristics of semiconductor diodes
   a) PN Junction diode
   b) Point contact diode
   c) Zener diode

2. Characteristics of BJT in CB configuration
   a) Determination of input and output characteristics
   b) Determination of voltage gain, current gain, input and output resistances from the characteristics

3. Characteristics of BJT in CE configuration
   a) Determination of input and output characteristics
   b) Determination of voltage gain, current gain, input and output resistances from the characteristics

4. Characteristics of JFET
   a) Determination of output and transfer characteristics
   b) Determination of pinch off voltage, $r_d$, $g_m$ and $\mu$ from the characteristics

5. Characteristics of MOSFET
   a) Determination of output and transfer characteristics
   b) Determination of $r_d$, $g_m$ and $\mu$ from the characteristics

6. Characteristics of SCR and TRIAC

7. Characteristics of UJT
   Determination of intrinsic stand off ratio

8. Characteristics of photonic devices
   a) Determination of V-I characteristics of LED
   b) Determination of V-I and intensity characteristics of phototransistor

9. Clipper circuits using diodes
   Positive, negative, biased and combinational clippers

10. Switching circuit
    a) AND and OR logic gates using diodes
    b) NOT gate using transistor
MA T41 - NUMERICAL METHODS AND TECHNIQUES

UNIT - I

Solution of Algebraic and Transcendental Equation and Eigen Value Problem:
Solution of algebraic and transcendental equation by the method of bisection, the method of false position, Newton-Raphson method and Graeffe’s Root squaring method. Eigen value problem by power method and Jacobi method.

UNIT-II

Solution of System of Equations and Matrix Inversion:

UNIT-III

Interpolation: Finite Differences, Relation between operators - Interpolation by Newton’s forward and backward difference formulae for equal intervals. Newton’s divided difference method and Lagrange’s method for unequal intervals. Numerical differentiation in one variable. Numerical Integration by Trapezoidal and Simpson’s rule with respect to one and two variables.

UNIT-IV

Solution of Ordinary Differential Equation:

UNIT - V

Solution of Partial Differential Equations:

Text Book:


References:

EC T42 - ELECTRONIC CIRCUITS –I

UNIT- I

Biasing and Stabilization: Operating point and Q-point - Different types of BJT biasing – Fixed bias, Collector to base bias, Self bias - Stabilization of Q point and stability factor – Bias compensation- Thermistor and sensistor compensation –Thermal runaway and thermal stability. FET biasing – gate bias, self bias and voltage divider biasing – MOSFET biasing

UNIT- II

Transistor Low Frequency Analysis: Two port devices and hybrid model – transistor hybrid model and h parameters - determination of h-parameters from the characteristics – Analysis of transistor amplifier using h-parameters – emitter follower -comparison of transistor amplifier configurations - CE amplifier with an emitter resistance; Low frequency FET model –Common source and Common drain amplifiers

UNIT- III

Transistor High Frequency Analysis: Hybrid pi CE transistor model – Hybrid pi conductances and capacitances - CE short circuit current gain and current gain with resistance- CE transistor amplifier response. High frequency FET model – common source and common drain amplifiers at high frequencies.

UNIT- IV


UNIT- V


Text Books:

Reference Books:
EC T43 - SIGNALS AND SYSTEMS

UNIT- I


UNIT- II


UNIT- III


UNIT- IV


UNIT- V


Text Book:

Reference Books:

http://ece.pec.edu
EC T44 - NETWORKS AND TRANSMISSION LINES

UNIT- I


UNIT- II


UNIT- III


UNIT- IV


UNIT-V


Text Books:

Reference Books:
ECT45 - DIGITAL CIRCUITS

UNIT - I

**Number System:** Review of Binary, Octal and Hexadecimal Number Systems – Conversion methods. Number Representations – Signed Numbers and Complements, Unsigned, Fixed point, and Floating point numbers. Addition and subtraction with 1’s and 2’s complements.

**Codes:** Binary code for decimal numbers- Gray code-Codes for detecting and correcting errors: Even and Odd parity codes, Hamming Codes, Checksum codes, m-out-of-n-codes, codes for serial data transmission and storage.

UNIT – II

**Boolean Algebra:** Basic theorems- Postulates- Duality – Canonical form.

**Simplification of Boolean Function:** Karnaugh map method – Incompletely specified functions. Realization of logic functions - NAND gate realization - NOR gate realization - Multilevel synthesis.

UNIT - III


**Programmable Logic Devices:** PROM – EPROM – EEPROM- Programmable Logic Array (PLA) – Programmable Array Logic (PAL) -Realization of combinational circuits using PLDs.

UNIT – IV

**Sequential Circuits:** General model of sequential circuits –latches – Master-slave Configuration- Flip-Flops - Concept of State – State diagram – State Table.


**Sequential PLDs** - Introduction to CPLD and Field programmable Gate Array (FPGA).

UNIT – V

Text Books:


Reference Books:

EC T46- ANALOG COMMUNICATION SYSTEMS

UNIT-I

Noise and Amplitude Modulation: General communication systems-external and internal noise-Noise figure and noise temperature-AWGN-Need for modulation-Amplitude modulation-Frequency spectrum-Power relation-Different types of AM modulators-SSB and VSB generation-AM transmitters-Block diagram-Functions of each block-High level transmitter.

UNIT-II

Angle Modulation: Principle of frequency and phase modulation-Relation between FM and PM waves-Bandwidth of FM-Narrow band and wideband FM-Generation of FM wave-Direct and Indirect methods-FM transmitters-Block diagram-Function of each block.

UNIT-III


UNIT-IV


UNIT-V

Television: Introduction of Television-Television systems and standards-Black and white transmission-black and white reception-color transmission and reception-Introduction to modern TV cameras, LCD and plasma displays

Text Book:

Reference Books:
EC P41 - ELECTRONIC CIRCUITS – I LABORATORY

*1. Design and testing of biasing circuits
   i. Fixed bias
   ii. Collector to base bias
   iii. Self bias

*2. Design and measurement of frequency response, signal handling capacity, input and output impedances of CE amplifier

*3. Design and measurement of frequency response, signal handling capacity, input and output impedances of Emitter follower.

*4. Design and measurement of frequency response, signal handling capacity, input and output impedances of common drain FET amplifier.

*5. Design and measurement of frequency response, signal handling capacity, input and output impedances of cascade amplifier.

*6. Design and measurement of frequency response, input and output impedances of Darlington pair.

*7. Design and measurement of frequency response, input and output impedances of Cascode amplifier.

   Differential mode performance, Common mode performance and measurement of CMRR.

*9. Bridge rectifier
   Determination of ripple factor for bridge rectifier with and without filters

10 Voltage regulation characteristics of shunt, series and IC regulators

* Practical performance is to be compared with PSPICE simulated results.
EC P42 –DIGITAL CIRCUITS LABORATORY

1. Adder and Subtractors
   a) Boolean function implementations using NAND/NOR logic gates
   b) Study of half-adder, full-adder, half-subtractor and full-subtractor

2. Code convertors
   Design, realization and study of the following code convertors
   a) Gray to 8421BCD
   b) 8421BCD to Excess-3-code
   c) 8421BCD to Gray code
   d) Excess-3-code to 8421BCD

3. Parity generator/checker, magnitude comparator
   a) Implementation of error detection circuit using odd and even parity generator/checker
   b) Study of 4-bit magnitude comparator IC
   c) Realization of 8-bit magnitude comparator using 4-bit magnitude comparator ICs

4. Multiplexers and Encoders
   a) 4×1 multiplexer IC
   b) Realization of 16×1 multiplexer using 4×1 multiplexer ICs
   c) Realization of combinational circuit using multiplexer
   d) Priority encoder

5. Decoders and Demultiplexers
   a) 3 to 8 line decoder IC
   b) 3 to 8 line decoder as demultiplexer
   c) Realization of 4 to 16 line decoder using 3 to 8 line decoder ICs
   d) Realization of combinational circuits using decoder.

6. Study of Flip-Flops
   a) Flip-Flops using RS,JK, and D type FF ICs
   b) Conversion of one type of FF to another type

7. Shift register
   a) Various modes of operation of shift register
   b) Ring counter and its timing diagram
   c) Johnson counter and its timing diagram

8. Ripple Counters and their timing diagrams
   a) Binary ripple counters
   b) Binary up/down counters
   c) BCD counter using mod-10 counter ICs
9  Design and implementation of Synchronous Counters and study of their timing diagrams
   a) Binary counters
   b) Non-sequential binary counter
   c) Binary up/down counters,

10. Memory chips
    a) READ and WRITE involving memory chips
    b) Expansion of memory size
EC P43 - COMMUNICATION LABORATORY-I

1. AM modulator and demodulator
   a) To construct AM modulator and demodulator circuit and to trace message, carrier, modulated and demodulated signal.
   b) To determine the modulation index of AM by classical method and trapezoidal method.

2. FM modulator and demodulator
   a) To construct frequency modulator and demodulator circuit and to trace message, carrier, modulated and demodulated signal.

3. Sample & hold and PAM
   a) To construct sample and hold circuit and to trace the message and sample and hold signal.
   b) To construct PAM circuit and to trace the input and PAM signal.

4. Pre-emphasis and de-emphasis
   a) To construct pre-emphasis and de-emphasis circuit and to determine the frequency response.

5. Tuned and wideband amplifiers
   a) To construct tuned and wideband amplifiers and to determine the frequency response.

6. Frequency mixer and ring modulator
   a) To construct a frequency mixer and to test its operation.
   b) To construct a ring modulator and to trace the DSB-SC waveform.

7. Simple and delayed AGC
   a) To construct simple and delayed with and without AGC circuit and to test its impact.

8. PWM and PPM
   a) To construct PWM and PPM circuit and trace the output waveforms.

9. TDM
   a) To construct TDM circuit and to trace the multiplexed and de-multiplexed waveform.

10. Simulation of AM, FM, PAM, PWM and PPM
    a) To simulate AM modulator and demodulator using PSPICE/EWB and to trace the time domain and frequency domain signal.
    b) To simulate Direct and Indirect FM generation and detection using MATLAB and to trace the time domain and frequency domain waveform.
    c) To simulate PAM, PWM and PPM circuits using PSPICE/EWB and to trace the time domain signal.
    d) To simulate PAM, PWM and PPM using MATLAB and to trace the time domain and frequency domain waveform.

11. Simulation of Pre-emphasis, De-emphasis, TDM and FDM
    a) To simulate TDM and FDM using PSPICE/EWB and to trace the multiplexed and de-multiplexed signal.
    b) To simulate Pre-emphasis and De-emphasis using PSPICE/EWB and to trace their characteristics.
SP P44 - PHYSICAL EDUCATION

Physical Education is compulsory for all the Undergraduate students

1. The above activities will include games and sports / extension lectures.
2. In the above activities, the student participation shall be for a minimum period of 45 hours.
3. The above activities will be monitored by the Director of Physical Education.
4. Pass /Fail will be determined on the basis of participation, attendance, performance and behaviour. If a candidate Fails, he/she has to repeat the course in the subsequent years
5. Pass in this course is mandatory for the award of degree.
MA T51 - PROBABILITY AND RANDOM PROCESSES

UNIT - I

Discrete Random Variables: Random Variables and their event spaces The probability mass function Distribution functions Special discrete distributions (Bernoulli, Binomial, Geometric, Negative Binomial, Poisson, Hypergeometric, Discrete Uniform, Constant and Indicator) Probability Generating function.

UNIT - II

Continuous Random Variables: The Exponential distribution The Reliability, Failure density and Hazard function - Some important distributions (Hypoexponential, Erlang, Gamma, Hyper exponential, Weibull, Gaussian, Uniform and Pareto distributions).

UNIT - III


UNIT - IV


UNIT - V

Continuous Parameter Markov Chain: The Birth and Death process (MM/1, M/M/c, M/M/1/N, MM/c/N (c<N), MM/c/c, M/M/ models only, derivation of mean number of customer in the system, in the queue and waiting time Simple applications) Special case of Birth and Death model (Pure Birth and Pure Death Processes)

Text Books:


Reference Book:

EC T52 - ELECTRONIC CIRCUITS –II

UNIT - I

Feedback Amplifiers: Concept of feedback- topological classification-voltage series, voltage shunt, current series, current shunt - effect of feedback on gain, stability, distortion, band width, input and output impedances – practical feedback amplifier circuits and their analysis – multistage feedback amplifier.

UNIT - II


UNIT - III


UNIT - IV


UNIT - V

Large Signal Amplifiers: Classification of power amplifiers - Class A power amplifier- direct and transformer coupled amplifiers; - Class B - Push-pull arrangements and complementary symmetry amplifiers; conversion efficiency calculations, cross over distortion – class AB amplifier - amplifier distortion – power transistor heat sinking – Class C and D amplifiers.

Text Books:

Reference Books:

http://ece.pec.edu
EC T53 - SYSTEM DESIGN USING INTEGRATED CIRCUITS

UNIT- I


UNIT- II


UNIT- III

Digital Integrated Circuits: Digital IC characteristics, Digital IC families -RTL and DTL, HTL, I^2L, TTL, ECL, MOS and CMOS logic circuits, Comparison of digital IC families.

UNIT- IV


UNIT- V

Text Books:


Reference Books:

EC T54 - DIGITAL SIGNAL PROCESSING

UNIT- I


UNIT- II


UNIT- III


UNIT- IV


UNIT- V


Text Books:

Reference Books:
EC T55 - LINEAR AND DIGITAL CONTROL SYSTEMS

UNIT - I

System Modelling: Introduction to control system - Basic elements in control system - Open and closed loop control systems - Differential equation representation of physical systems - Transfer function - Mathematical modeling of electrical and mechanical systems (Translational and Rotational) - Analogous systems - Block diagram representation of systems - Block diagram reduction techniques - Signal flow graph - control system components - synchros - tachometer - dc and ac servomotors - stepper motors.

UNIT - II


UNIT - III

Frequency Domain Analysis: Frequency response - Frequency domain specifications - Correlation between time domain and frequency domain specifications - Bode plot - Stability analysis using Bode plot - transfer function from bode plot - Polar plot - Nyquist stability criterion.

UNIT - IV


UNIT - V

State Space Analysis: Introduction - Concepts of state, state variables and state model - State model of linear systems - system realization - State space representation using physical, phase and canonical variables - diagonal canonical form - Jordan canonical form - diagonalization - Time domain solution of state equation - State transition matrix - Laplace transform solution of state equations - Derivation of transfer function from the state model - Controllability and observability - State space representation of discrete time systems

Text Book:

Reference Books:
EC T56 - WAVE GUIDES, ANTENNAS AND WAVE PROPAGATION

UNIT - I

UNIT - II
Circular Wave Guides: Introduction – TE and TM waves in circular waveguide- Wave impedance - Attenuation factor and Q of wave guides- Wave impedance- Excitation modes in circular wave guides. Microwave resonators introduction – Coaxial resonator- Waveguide, rectangular and circular cavity resonator - Cavity excitation and tuning - Q factor of micro wave cavities (Qualitative treatment only).

UNIT-III

UNIT-IV
Special Purpose Antennas: (Qualitative treatment only) Loop antennas, Travelling wave antennas, V and rhombic antennas, Horn antennas, Yagi-Uda arrays, Wideband antennas, Log periodic antennas. Babinet’s principle – Slot radiators- Parabolic reflectors – Radiation pattern, aperture efficiencies – Feeding techniques for parabolic antennas.

UNIT-V
Propagation: Factors involved in the propagation of radio waves - Ground wave, reflection of radio waves by the surface of the earth - Space wave propagation, considerations in space wave propagation, atmospheric effect in space wave propagation - Ionosphere and its effect on radio waves, Mechanism of ionospheric propagation- Ray paths – Skip distance -Critical frequency-Maximum usable frequency -Fading of signal - Types of fading- Diversity reception.

Text Books:

Reference Books:
EC P51 - ELECTRONIC CIRCUITS – II LABORATORY

1. Negative feedback amplifier
   a. To design, construct and test response of
      i. voltage shunt
      ii. voltage series feedback amplifiers with and without feedback for
         the given specification
   b. To compare their frequency response through PSPICE simulation

2. RC Phase shift oscillators
   To design, construct and test the
   a. RC Phase shift oscillator
   b. Wien bridge oscillator for the given specification

3. Hartley and Colpitts oscillators
   To design, construct and test the
   a. Hartley oscillator
   b. Colpitts oscillator for the given specification

4. Clampers and Voltage Multipliers
   a. To design, construct and observe output of
      i. Positive, negative and biased clampers
      ii. Voltage doubler and tripler
   b. To simulate the circuits using PSPICE

5. Astable multivibrator and Monostable multivibrator
   a. To design, construct and observe output of a transistor astable multivibrator
   b. To design, construct and observe output of a transistor monostable multivibrator

6. Bistable multivibrator and Schmitt trigger
   To design, construct and observe output of a transistor bistable multivibrator and
   Schmitt trigger circuits

7. Time base generators
   To construct and observe output waveforms of a Miller integrator and Bootstrap
   ramp generator

8. UJT saw tooth generator
   To construct and observe output waveforms of a UJT sweep circuit

9. Class A power amplifier
   To obtain the frequency Vs power and load Vs power characteristics

10. Class B complementary symmetry amplifier
    To obtain the frequency Vs power and load Vs power characteristics
EC P52 - SYSTEM DESIGN USING INTEGRATED CIRCUITS LABORATORY

1. Applications of Op-amp
   To study the application of Opamp IC741 as
   a. Inverting amplifier
   b. Non-inverting amplifier
   c. Voltage follower
   d. Summer
   e. Subtractor

2. Differentiator and Integrator
   To study the op-amp performance as differentiator and integrator for various time constants

3. Comparator circuits
   To study zero crossing detector, window detector and Schmitt trigger using opamp 741

4. Signal converters
   To study operation of op-amp as V to I and I to V converters

5. Active filters using Op-amp
   To design and test the performance of a 2nd order LPF, HPF, BPF and BSF

6. Log, antilog and instrumentation amplifier
   To study 1. logarithmic and antilog amplifiers 2. Instrumentation amplifier

7. Multivibrators using Op-Amp
   To design and study the working of a. astable multivibrator
   b. monostable multivibrator using IC 741.

8. Data converters
   Construction and study performance of
   a. DAC circuits – R-2R and ladder type.
   b. Successive approximation type ADC.

9. Multivibrators using IC 555
   To design and study the working of a. astable multivibrator
   b. monostable multivibrator using IC 555.

10. Frequency synthesizers
    To study performance of
    a. Frequency multiplier using PLL IC 565
    b. Frequency synthesizer using IC XR2240

11. Precision rectifiers
    To study performance of half wave and full wave precision rectifiers using IC 741.
EC P53 - NETWORKS AND TRANSMISSION LINES LABORATORY

1. Design of k type Low pass and high pass filters.
   a. Frequency and phase response of the Low pass filter using Lumped elements.

2. Design of k type Band pass and Band stop filters.
   b. Frequency and phase response of the Band stop and notch filter using Lumped elements.

3. Design of m derived filters.
   a. Frequency and phase response of the m derived low pass filter.
   b. Frequency and phase response of the m derived high pass filter.

4. Simulation of filters.
   Design of LPF/HPF/BPF/BEF, T / π, constant k/m derived /composite for the given cutoff frequency using MATLAB - phase and frequency response.

5. Design of switched Twin T network.
   Frequency and phase response of a Twin T network.

   a. Measurement of attenuation of a transmission line for various lengths (like 25, 50, 75, 100 meters) - frequency response of the line at a fixed length.
   b. Study of frequency response of an equalizer that can boost or attenuate frequencies 50Hz, 1 KHz and 10 kHz.

7. Simulation of equalizer.
   Design of an attenuator/phase equalizer and obtain the relevant responses.

8. Impedance (Z) and ABCD Parameters of a transmission line

9. Design of LC resonant circuit
   Frequency response – measurement of quality factor of a LC resonant circuit.

    a. Measurement of characteristic impedance of the twin pair transmission line.
    b. Measurement of capacitance and inductance per unit length of a coaxial cable.
    c. Measurement of voltage reflection coefficient and voltage standing wave ratio of a twin pair using VSWR meter.

11. Impedance matching on transmission line
    a) Maximizing the power across a given load connected to a twin pair transmission line using a single stub and smith chart analysis
    b) Maximizing the power across a given load connected to a twin pair transmission line using a double stub and smith chart analysis
HS P54 - GENERAL PROFICIENCY-I

UNIT - I

Art of Communication:  Verbal and Non-verbal Communication – Barriers to Communication – Importance of Body Language – Effective Listening – Feedback

UNIT - II


UNIT - III

Writing: Importance of Writing – Written Vs Spoken Language – Formal and Informal Styles of writing – Resources for improving writing – Grammar and Usage – Vocabulary Building – SWOT analysis

UNIT - IV


UNIT - V

Aptitude: Verbal and Numerical aptitude

References:

EC T61 - INFORMATION THEORY AND CODING

UNIT- I

Introduction to Information Theory: Measure of information- Entropy of symbols - Continuous and discrete cases, Conditional entropies- Basic relationship among different entropies- Mutual information and Trans information, Redundancy and Efficiency

UNIT- II

Channel Classification and Capacity: Continuous and discrete communication channels- Discrete memoryless channels-Channel representations- noiseless channel, lossless channel, deterministic, Binary Symmetric channel, Binary Erasure channel and their capacities - Continuous and discrete channels with noise- Shannon Hartley theorem and its implications.

UNIT- III


UNIT- IV

Source Coding: Purpose of encoding- Uniquely decipherable codes- Code efficiency and redundancy, Shannon’s first and second fundamental theorem, Shannon’s encoding algorithm, Shannon Fano code, Huffman code

UNIT- V

Error Correcting Codes: Linear block codes, cyclic codes- Hamming, Block codes, BCH and RS codes, Convolutional codes- Viterbi algorithm, Concatenated codes, Trellis code modulation, Turbo codes- coding, decoding and performance, LDPC codes- construction and decoding

Text Book:

Reference Books:
EC T62 - DIGITAL COMMUNICATION

UNIT- I

UNIT- II
Band Pass Transmission: ASK, FSK, PSK, QPSK, DQPSK, MSK, QAM - Detection of signals in noise - Coherent and Non-coherent detection of ASK, FSK and PSK - Comparison of error performance of non-coherently and coherently detected ASK, FSK and PSK systems - M-ary signaling - Vectorial view of MPSK and MFSK - error performance

UNIT- III
Spread Spectrum Communication: Spread spectrum technologies - spreading techniques - PN sequences - Direct sequence spread spectrum systems - Frequency hopping spread spectrum systems - Hybrid systems - Demodulation schemes - RAKE Receivers - Use of spread spectrum with code division multiple access

UNIT- IV
Synchronization: Receiver synchronization - Coherent systems - Symbol and frame synchronization - Network synchronization - Open and closed loop transmitter synchronization - Tracking and acquisition in spread spectrum system

UNIT- V
Encryption and Decryption: Model encryptor - decryptor - Classical encryption techniques - Cipher principles - Data encryption standard - Stream encryption - Key management - Diffie-Hellman key exchange - Elliptic curve architecture and cryptography - Public key encryption system - RSA algorithm

Text Books:

Reference Books:
EC T63 - COMPUTER COMMUNICATION NETWORKS

UNIT- I


UNIT- II

**Data Link Control:** Types of errors- Error detection and correction- Checksum- Framing- Flow control-Error control- Stop and wait protocol- Go-back N- Selective repeat protocols- HDLC- Random access protocols- Controlled access- Wired LANs- Ethernet- Fast Ethernet- Gigabit Ethernet- IEEE standards, IEEE 802.3, 802.4, 802.5 and 802.6- Wireless LANs- IEEE 802.11 and Bluetooth.

UNIT- III

**Network Routing Algorithms:** Logical addressing- IPv4 addresses- IPv6- Internet protocol- Transition from IPv4 to IPv6- Mapping logical to physical address- Mapping physical to logical address- ICMP-Direct Vs indirect delivery- Forwarding- Unicast and Multicast routing protocols- Routers and gateways.

UNIT- IV

**Congestion and Traffic Management:** Queuing analysis- Queuing models- Single server and multi server queues- Congestion control in data networks and internets- Effects of congestion- Congestion and control- Traffic management- Congestion control in packet networks- TCP flow control- TCP congestion control- Requirements for ATM traffic and congestion control- Performance of TCP over ATM.

UNIT- V


**Text Books:**

Reference Books:

EC T64 - MICROPROCESSORS AND MICROCONTROLLERS

UNIT I

UNIT II
Microprocessor Peripheral interfacing: Programmable Peripheral interface 8255 – Keyboard and display interface 8279– Programmable timer 8253, USART 8251, Programmable Interrupt controller 8259.
Introduction to 8086 Hardware Architecture and features.

UNIT III

UNIT IV

UNIT V
Case Studies: Data Acquisition System, Temperature monitoring system, Manipulator Robot Arm.

Text books:

References:
EC P61 - COMMUNICATION LABORATORY- II

1. Construct an Amplitude Shift Keying (ASK) modulator and demodulator circuit. Obtain the ASK modulated and demodulated waveforms.

2. Construct a Frequency Shift Keying (FSK) modulator and demodulator circuit. Obtain the FSK modulated and demodulated waveforms.

3. Construct a Binary Phase Shift Keying (BPSK) modulator and demodulator circuit. Obtain the BPSK modulated and demodulated waveforms.

4. To study the different line coding techniques 1) NRZ unipolar format 2) NRZ polar format 3) NRZ bipolar format and 4) Manchester format. Obtain the waveforms of the different formats.

5. Construct a Pulse code modulator and demodulator circuit. Obtain the coded output for the given sine wave.

6. Construct a Delta modulator and demodulator circuit. Obtain the coded output for the given sine wave.

7. To design and construct DS-CDMA circuit and verify its operation. Obtain the DS-CDMA waveform.

8. Construct a time division multiplexing circuit to combine two different data streams onto a single channel by assigning time slots to each. Obtain the TDM output.

9. Construct a frequency synthesizer circuit using PLL for the given frequency. Obtain the synthesized waveform.


12. Implementation of data encryption and decryption using Matlab.
EC P62 - COMPUTER NETWORKS LABORATORY

1. Simulation of ON-OFF and voice traffic model
   a) To simulate the ON-off traffic model and plot the following waveform
      i. User numbers Vs ON period.
      ii. Time slot Vs number of users.
      iii. Time slot Vs bandwidth allotted.
   b) To simulate voice traffic model and obtain
      i. Time slot Vs bandwidth plot.
      ii. Time slot Vs error plot.
      iii. Average error rate.
      iv. The optimum buffer size for which error rate will be less than stipulated value.

2. Simulation of data traffic and video traffic model
   a) To simulate the data traffic and multiple rate video traffic for multiple users and to obtain
      i. Time slot Vs bandwidth plot.
      ii. Time slot Vs BER plot.
      iii. The optimum buffer size for which error rate will be less than stipulated value.

3. Simulation of ISDN traffic model
   a) To simulate the ISDN traffic model for multiple users and to obtain
      i. Time slot Vs bandwidth plot.
      ii. Time slot Vs BER plot.
      iii. Time slot Vs un-served video user.
      iv. Time slot Vs un-served data user.

4. PN sequence generation and testing
   a) To generate maximal and non maximal length PN sequence and test its randomness properties.

5. M/M/I queuing model
   a) To simulate M/M/I queuing model and obtain
      i. Time slot Vs packet loss plot.
      ii. Maximum and average packet loss without buffer.
      iii. Buffer size for the given loss.
      iv. Maximum and average packet loss with buffer.

6. M/G/I and G/G/I queuing model
   a) To simulate a M/G/I and G/G/I queuing model and obtain
      i. Time slot Vs packet loss plot.
      ii. Maximum average packet loss without buffer.
      iii. Buffer size for the given loss.
      iv. Maximum and average packet loss with buffer.

7. Encryption and decryption
   a) To simulate and test the following encryption and decryption algorithm.
      i. Mono alphabetic cipher- caeser cipher.
      ii. Poly alphabetic cipher- Trithemius key, Vigenere key, Vigenere plain and cipher key.
iii. RSA with and without digital signature.
8. Flow control
   a) To simulate and test
      i. Stop and wait protocol
      ii. Go back N protocol
      iii. Selective repeat protocol

9. Error control protocol
   a) To simulate and test
      i. Cyclic redundancy check
      ii. Hamming code

10. Routing algorithms
    a) To simulate and test
       i. Shortest path routing algorithm
       ii. Hierarchical routing algorithm

11. Generation of PDF
    a) To study, generate and trace the following PDF
       i. Gaussian distribution
       ii. Uniform distribution
       iii. Exponential distribution
       iv. Rayleigh distribution
       v. Binomial distribution
       vi. Negative binomial distribution
       vii. Gamma distribution
       viii. Poisson distribution

12. Wireless LAN
    a) To establish wireless LAN test bed (or) wireless LAN environment and perform
       i. Uni-cast
       ii. Multicast
       iii. File transfer protocol
EC P63 - MICROPROCESSOR AND MICROCONTROLLER LABORATORY

Experiments based on 8085 Microprocessor

- 8 bit and 16 bit Arithmetic Operations
- Array operations
- Bit Manipulation operations
- Code conversions
- Subroutines
- Digital Clock simulation
- Block operations

Experiments based on 8051/PIC microcontroller

- LCD interface
- ADC /DAC interface
- Stepper motor interface
- Serial communication (kit-to-kit and/or pc-to-kit)
- Watch dog timer
- Real-time clock
- Printer interfacing
- Water level indicator
- Traffic light controller
- Elevator simulation
- Pulse width modulation
- Interfacing of relay switches
HS P64 GENERAL PROFICIENCY – II

UNIT – I

**Composition Analysis**: Technical and Non-Technical Passages (GRE Based) – Differences in American and British English – Analyzing Contemporary issues – Expanding Terminology

UNIT – II

**Writing**: Job Application Letter Writing – Resume Writing

UNIT – III


UNIT – IV

**Adapting to Corporate Life**: Corporate Etiquette – Grooming and Dressing

UNIT – V

**Aptitude**: Verbal and numerical aptitude

**Reference Books:**

1. Pushplata and Sanjay Kumar, Communicate or Collapse : A Handbook of Effective Public Speaking, Group Discussions and Interviews, PHI Learning, Delhi, 2007.
EC T71 - ENGINEERING ECONOMICS

UNIT - I


UNIT - II


UNIT - III


UNIT - IV

Replacement and Maintenance Analysis: Types of Maintenance, Types of Replacement Problem, Determination of Economic Life of an Asset, Replacement of an Asset with a New Asset – Capital Recovery with Return and Concept of Challenger and Defender, Simple Probabilistic Model for items which fail Completely.

UNIT - V

Text Books:


Reference Books:

EC T72 - MICROWAVE AND OPTICAL ENGINEERING

UNIT - I

UNIT - II
S Parameters: Scattering parameters, properties of S matrix, Conversion of ABCD and S matrix, S matrix representation of Waveguide corners, bends, twists, Directional couplers, Circulators, Isolators, Attenuators, Waveguide Tee, Hybrid Tee, Hybrid rings (rat-race) and Terminator.

UNIT - III
Microwave Measurements: VSWR, power, impedance, insertion loss, scattering parameters and dielectric constant measurement.
Antenna Measurements: Radiation pattern, gain, directivity, phase and polarization measurement

UNIT - IV

UNIT - V
Optical Networks: Optical transmitters and receivers, System block diagram - point to point link – link design, power budget analysis. WDM- DWDM and SONET/SDH. Introduction to AON, PON and FTH.

Text Books:

Reference Books:
2. Annapoorna Das and Sisir K. Das, “Microwave Engineering”, TMH.
6. Rajiv Ramaswami and Kumar N. Sivarajan, “Optical Networks – A Practical
EC T73 - EMBEDDED SYSTEMS

UNIT - I


UNIT - II


UNIT - III


UNIT - IV


UNIT - V


http://ece.pec.edu
Textbooks:


References:

EC P71 - COMMUNICATION LABORATORY - III

1. Reflex Klystron characteristics
   Mode characteristics measurement of Reflex Klystron Oscillator and estimation of bandwidth, ETS and ETR.

2. Gunn diode characteristics
   a) V-I characteristics of Gunn diode
   b) Measurement of wavelength and operating frequency of Gunn diode using slotted waveguide (without frequency meter).

3. Determination of VSWR and impedance of unknown load

4. Radiation pattern measurement of antenna
   a) Basic microwave setup establishment using Reflex Klystron oscillator
   b) Measurement of E-plane and H-plane radiation patterns of antenna.
   c) Estimation of FNBW, HPBW and side lobe level of the antenna

5. Dielectric constant measurements
   Measurement of relative and absolute dielectric constant of given dielectric materials using basic microwave setup.

6. Characterization of microwave components
   a) Characterization of given passive microwave components (DC, E-plane, Magic Tee etc.).
   b) Validation of the results obtained through simulation using any environment.

7. Study of optical fiber characteristics
   a) Frequency response
   b) Attenuation
   c) Coupling loss
   d) Numerical aperture

8. Study of fiber fault characteristics using OTDR

9. Study of TDM using optical kit and establishment of a digital link

10. Study of fiber sensors
    a) Temperature sensor
    b) Pressure sensor
    c) Strain sensor
EC P72 - EMBEDDED SYSTEMS LABORATORY

1. Voltage Measurement with display
   Designing a voltmeter to measure voltage from 0 to 5 volts and displaying the measured value using 7 segment displays

2. Design of Water Pump Controller to sense the water level in a tank

3. Digital Clock with LCD display

4. Temperature Measurement with 7 segment display

5. PC Communication
   Interfacing the microcontroller to a PC through RS232 interface and displaying the messages sent by the microcontroller on the PC using Visual Basic program running in PC

6. Remote Control through FM Link
   Establishing an FM link between two microcontrollers for data transfer.

7. Hot Chamber Controller to maintain the temperature at the set point.

8. Obstacle Detector using ultrasonic transmitter-receiver

9. Moisture sensor and sprinkler controller design

10. Designing a lamp controller having a light sensor and a timer
EC P73 - SEMINAR

Each one of the students will be assigned a Seminar Topic in the current and frontier areas. The student has to conduct a detailed study/survey of the material available on the assigned topic and prepare a report, running to 30 or 40 pages. The student will make a oral presentation for a period of about 30 minutes, followed by a brief question and answer session. The Seminar (presentation and report) will be evaluated by the internal assessment committee (comprising of the Head of the Department and two faculty members) for a total of 50 marks.

EC P74 - INDUSTRIAL VISIT/TRAINING

The students are required to undergo in plant training for a period of two weeks /four industrial visits during the summer vacation after the fourth semester. Each student has to submit a detailed report on the training programme undergone. Each student will be evaluated by an internal assessment committee (comprising of the Head of the Department and two faculty members) for a total of 50 marks.

EC PW7 - PROJECT WORK

Each batch of 2 or 3 students will be assigned an experimental or a theoretical project to be carried out under the supervision of a guide. The project work has to be carried out in the 7th and 8th semesters and completed by the end of the 8th semester. In the phase I of the project work, the progress of the work carried out in the 7th semester will be monitored and assessed internally for a total of 50 marks. A committee of departmental faculty members comprising the project guide, the Head of the Department and one more faculty member will conduct the internal assessment.
EC T81 - INDUSTRIAL MANAGEMENT

UNIT - I


UNIT - II

General Management: Basic concepts of management – Scientific management – Henry Fayal’s principles of management – Types and functions of management. Types of organization – characteristics, merits and demerits. Types of industrial ownership – characteristics, merits and demerits.

UNIT - III


UNIT - IV


UNIT - V

Marketing and Human Resources Management: Marketing Management: Core concepts of marketing; needs, wants and demands; marketing Vs selling – products and markets - pricing and relative factors: channel of distribution; promotion, advertising; market research. Human Resource Management: individual and group behaviour – motivation and morale - fatigue – accidents: causes and remedies - manpower planning – Job evaluation and merit rating.

Text / Reference Books:
EC T82 - TELECOMMUNICATION SWITCHING NETWORKS

UNIT-I

Principles and Evolution of Switching Systems: Basics of switching system, manual switching system, rotary dial telephone, signaling tones, strowger switching components, step-by-step switching, design for 100 line, 1000 line, 10,000 line exchange, touch tone dial telephone, cross bar switching and exchange organization. Four wire concept, operation of hybrid, echo suppressors. Centralized and distributed SPC, software architecture, application software, enhanced services offered by SPC.

UNIT-II

Space Division Switching: Two, three and multistage space division networks, blocking probability calculations using Lee’s method.
Time Division Switching: Basic time division space switching, time division time switching, time multiplexed space switching, time multiplexed time switching.
Combination Switching: S-T, T-S, S-T-S, T-S-T and other multistage combination switching.

UNIT-III

Traffic Engineering: Network traffic load and parameters, GOS and blocking probability, modeling switching systems, incoming traffic and service time characterization, blocking models and loss systems, delay systems.

UNIT-IV

Telephone Networks: Subscriber loop systems, high data rate digital subscriber loop, asymmetric digital subscriber loop, VDSL, transmission plan, transmission systems, numbering plan, charging plan, basics of signalling, In channel signalling, common channel signalling.

UNIT-V

Data Networks: Data transmission in PSTN, switching techniques for data transmission, OSI reference model, Satellite based data networks, fiber optic networks, protocol stacks, internetworking. ISDN services, transmission channels and user network interface in ISDN, ISDN protocol architecture, ISDN standards, ISDN numbering and addressing. Introduction to the basic principles of frame relay, TCP/IP and ATM.

Text Books:

Reference Book:
EC P81 - ADVANCED COMMUNICATION LABORATORY

1. Study of Microwave Communication Systems

2. Demonstration of ISDN concept with optical link or microwave link and the study of link response at various stages.

3. Study of Radio Communication Analyzer (RCA)

4. Spectrum analysis of modulated signals using Spectrum Analyzer and validating the results through simulation.

5. Spectrum analysis of TV signals using Spectrum Analyzer

6. Design and testing of LP/HP/BP/BS filters for FM range using Vector Network Analyzer and validating the results through simulation.

7. Design and testing of antenna using Vector Network Analyzer
   a) Antenna response (for FM range)
   b) Impedance measurement of the designed antenna.

8. Study of Radar trainer kit
   a) Detection of moving/static objects
   b) Range of the objects
   c) Velocity of the moving objects

9. Study of computer communication
   a) A secure PC to PC communication (wire/wireless).
   b) Voice and data transmission
   c) Performance evaluation

10) a) Simulation of spread spectrum, microwave, optical and satellite communication systems
    b) Simulation to determine the response of at least any two of the following using any environment:
       • Error performance of CDMA in AWGN and fading channel for multiuser environment
       • Characterizing the given microwave link and validating through analytical measure
       • Power budget and rise time link analysis of a given optical link
       • A satellite link.
EC P82 - COMPREHENSIVE VIVA-VOCE

The student will be tested for his understanding of the basic principles of the core engineering subjects. The internal assessment for a total of 50 marks will be made by a committee comprising of the faculty members of the department. The committee will conduct three written examinations of short questions type from the subjects (Test1-Analog and Digital Electronic Circuits, Electric Circuits, Microprocessor and VLSI; Test 2-Signal Processing, Electromagnetic Waves and Waveguides, Antennas Control Systems; Test 3-Analog and digital communication, Advanced communication systems). The external university examination, which carries a total of 50 marks, will be a Viva Voce examination conducted by a committee of one external examiner and one internal examiner appointed by the university.

EC P83 - PROFESSIONAL ETHICAL PRACTICE

The course should cover the following topics by way of Seminars, Expert Lectures and Assignments:

1. Engineering Ethics – Moral issues, Ethical theories and their uses
2. Engineering as Experimentation – Code of Ethics
3. Engineer’s responsibility for safety
4. Responsibilities and rights
5. Global issues of engineering ethics

Reference Book:


EC PW8 - PROJECT WORK (PHASE II)

Extension and completion of project work started in the previous semester. On completion of the project work, each student has to prepare a project report and submit the same to the department. In the Phase II, the project work and the report will be evaluated by the internal assessment committee by conducting two reviews and one demo for a total of 50 marks. The external university examination, which carries a total of 50 marks, will have report evaluation and viva voce examination conducted by a committee of one external examiner and one internal examiner appointed by the university.
ELECTIVES OF SIXTH SEMESTER

EC E61 - SOFT COMPUTING

UNIT-I


UNIT-II

**Neural Networks:** Biological inspiration – Neuron model and Network architectures perception – Architecture, learning rule. Limitations of multiplayer perception- Back propagation algorithm – Learning rule – Computer assignments.

UNIT-III


UNIT-IV

**Evolutionary Programming:** Single and multi objective optimization-General algorithm- Binary GA, Real parameter GA, constraint handling in GA Evolution strategies general programming – Computer assignments.

UNIT-V

**Applications:** Applications to various branches of Engineering and science- Application of fuzzy, neural, GA and EP in computer science, electrical, communication, instrumentation and control, mechanical and civil engineering.

**Text Books:**

EC E62- VLSI DESIGN

UNIT I


UNIT II


UNIT III

Arithmetic Circuits: One bit adder- multibit adder –Ripple carry-Carry Skip Adder-Carry Look Ahead Adder- design of signed parallel adder-comparison of different schemes in terms of delay - multipliers – Design of serial, parallel and pipelined multipliers- different schemes and their comparison. 2’s complement array multiplication-Booth encoding-Wallace Tree multiplier.

UNIT IV

Programmable ASIC’s and FPGAs: Actel,Altera and Xilinx FPGA devices.

UNIT V

Introduction to Verilog: Basics of Verilog, operators, Data Types, Continuous assignments, Sequential and parallel statement groups. Timing control (level and edge sensitive) and delays, tasks and functions, control statements, Blocking & nonblocking assignments, If-else and case statements, For-while-repeat and forever loops, Rise, fall, min, max delays, Behavioral and synthesizable coding styles for modeling combinational logic, Behavioral & synthesizable coding styles for modeling sequential logic, Parameters
and Defines for design reuse, Verilog and logic synthesis.

TEXT BOOKS:


REFERENCE BOOKS:

EC E63 - DIGITAL SIGNAL PROCESSORS AND APPLICATIONS

UNIT-I
Freescale DSP56XXX Architecture and Programming: Introduction, Core Architecture Overview, Data Arithmetic Logic Unit, Address Generation Unit, Program Control Unit, PLL and Clock Generator, Debugging Support, Instruction Cache, External Memory Interface, DMA Controller, Operating Modes and Memory Spaces, Instruction Set, Benchmark Programs.

UNIT-II

UNIT-III
TMS320C6x Architecture: CPU Operation – Pipelined CPU- VelociTI – C64x DSP- Software tools: EVM – DSK Target C6x board – Assembly file – Memory management- Compiler utility- Code initialization – Code composer studio – Interrupt data processing.

UNIT-IV

UNIT-V
Frame Processing, Real Time Analysis and Scheduling: Frame processing: DMA DSP Host Communication- DFT and FFT Implementation- Real time FFT – Real time analysis- Real time scheduling – real time data exchange – DSP / BIOS – Data synchronization and communication.

Text Books
1. Digital Signal Processing Applications using the ADSP – 2100 Family, Volume 1 Analog devices , DSP Division Prentice Hall, 1992(Unit I,II).
2. Nasser Kehtarnavaz and Mansour Keramat, “DSP System design using the TMS320C600 Prentice hall 2001(Unit III,IV ,V)

Reference Books
1. Mohammed El-Sharkawy,Digital Signal Processing Applications With Motorola's DSP56002.
5. DSP56300 Family Manual from Freescale Semiconductors.
EC E64– OPERATING SYSTEMS

UNIT - I

UNIT - II

UNIT - III

UNIT - IV

UNIT - V
Text Books:


References Books:

EC E65- CONSUMER ELECTRONICS

UNIT – I


UNIT – II


UNIT – III


UNIT – IV


UNIT – V

Home Appliances: Basic principle and block diagram of microwave oven; washing machine hardware and software; components of air conditioning and refrigeration systems.

Text Book:

EC E66 - OBJECT ORIENTED PROGRAMMING

UNIT - I

UNIT - II

UNIT - III

UNIT - IV
Files and Threads: Files – serialization – threads- life cycle – multiple threads- synchronization – exception handling- throw catch blocks - Packages and Interfaces importing package - strings

UNIT - V
Object Oriented Design: Classification and Overview of methodologies, Object-Oriented Software life cycle models, process, analysis, design, prototyping, implementation, Testing, documentation and maintenance.

Textbooks:

References:
ELECTIVES OF SEVENTH SEMESTER

EC E71 - DIGITAL IMAGE PROCESSING

UNIT-I


UNIT-II

Mathematical Preliminaries and Image Transform: Two dimensional system and mathematical preliminaries, Image transforms – 1D DFT, 2D DFT, Discrete Cosine transform, Discrete Sine transform, Hadamard transform, Haar transform, Slant transform, KL transform, SVD transform, Wavelet transform.

UNIT-III


UNIT-IV


UNIT-V


Text Books:

Reference Book:
EC E72 - SPECIAL TOPICS IN COMMUNICATION ENGINEERING

UNIT - I
ISDN Overview: A conceptual view of ISDN- ISDN standards- service capabilities- Teleservice protocol architecture- facsimile- teletex message handling system. ISDN interfaces and function; transmission structure- user network interface configuration- ISDN protocol architecture- ISDN connection- terminal adaptation- addressing- internet working. ISDN physical layer: line coding techniques, basic user network interface- primary user role- network interface.

UNIT - II
ISDN Data Link Layer: Hap D, bearer channel link control using 465/ v 120, frame mode bearer service and protocol. ISDN network layer: ISDN call control, Frame relay connection control. Signaling system number Z: SS7 architecture, signaling- data link level-link level, network level- signaling connection control part- ISDN user part. ATM networking capabilities - ATM networking asynchronous technology problems address by ATM, ATM solution, ATM cell and its structure.

UNIT - III

UNIT - IV
Internet Concepts: The net and its features main Internet features, email news groups, telnet, gopher, browsing in WWW. Control modems: speed/ time continuum, communication software Internet finding tools, Archie, gopher commands: TCP/IP pictures, graphics and binary files via news groups: compression software: processing files-sound and images: animation. Internet resources- library card catalogues: establishing web services intranet- creating web home page.

UNIT - V

Reference Books:
EC E73 - CRYPTOGRAPHY AND NETWORK SECURITY

UNIT-I


UNIT-II


UNIT- III


UNIT- IV


UNIT- V

System Security: Intruders and intrusion detection-Malicious software, Viruses and related threats, virus counter measures, distributed denial of services attack-Firewalls design principles-Trusted systems.

Text Book:

Reference Book:
EC E74 - SPREAD SPECTRUM COMMUNICATION

UNIT-I


UNIT-II

Direct Sequence Spread Spectrum System: Coherent direct sequence systems – Model of a DS/BPSK system, Chernoff bound – Performance of encoded DS/BPSK – Constant power and pulse jammer. Coded DS/BPSK Performance for known and unknown channel states

UNIT-III


UNIT-IV


UNIT-V

Applications: Space systems – Satellite communication. Anti jam military communication – Low probability of intercept communication – Mobile communications.

Reference Books:

ELECTIVES OF EIGHTH SEMESTER

EC E81 - CELLULAR MOBILE COMMUNICATION

UNIT-I

**Introduction:** The cellular concept – Frequency reuse – Interference and system capacity – Trunking and Grade of service – Improving coverage and capacity in cellular systems - Advanced Mobile Phone service - Global system for mobile communication - EIA/TIA IS-136 Digital cellular system - EIA/TIA IS-95 Digital cellular system - cordless telephony and low tier TCS - Third generation wireless system

UNIT-II

**Mobility Management:** Handoff - Roaming management - Handoff detection – channel Assignment techniques - Radio link transfer IS-41 Network signaling – Intersystem handoff and Authentication - PACS Network Signaling - cellular digital packet data

UNIT-III

**GSM:** GSM Network signaling - GSM Mobility management GSM short message service - International roaming for GSM - GSM operation, Administration and maintenance - Mobile number Mobile number portability’s, VoIP service for mobile networks.

UNIT-IV

**Wireless Application Protocol:** WAP model - WAP Gateway - WAP Protocol, WAP UAProf and caching - Wireless bearer for WAP - WAP developer tool kits – Mobile station application execution environment.

UNIT-V

**Special Topics:** Third generation mobile services - Wireless local loop – Wireless enterprise networks - Bluetooth technology.

**Text Book:**

**Reference Books:**
EC E82 - SATELLITE COMMUNICATION SYSTEMS

UNIT-I

Introduction to Satellite Communication: Types of satellites- Satellite orbit- satellite constellation- orbital mechanics- equation of orbit-orbital elements- look angle determination- limits of visibility- eclipse- sub satellite point- sun transit outage- spacecraft technology structural, primary power, attitude and orbit control, thermal, propulsion, telemetry, tracking and command, communication and antenna subsystems- launching procedures and launch vehicles

UNIT-II

Earth Station and Satellite Link Design: Earth station technology- terrestrial interface, receiver and transmitter, antenna systems-Basic transmission theory- satellite uplink and down link analysis and design for IMMARSAT, INTELSAT etc. Link budget and E_b/N_0 calculation. Performance impairments – system noise, inter modulation and interference. Propagation characteristics and frequency consideration- system reliability and design life time

UNIT-III

Satellite Access: Types- FDMA concepts- inter modulation and back off- SPADE system- TDMA concept- frame and burst structure- satellite switch TDMA- CDMA concept- DS & FH CDMA system- comparison of multiple access scheme

UNIT-IV

Laser Satellite Communication: Inter satellite links- optical communication for satellite networks- laser cross link analysis- optical beam acquisition, tracking and pointing.

UNIT-V

Satellite Services: Packet satellite networks and services, fixed satellite services, broadcast satellite services, mobile satellite services- VSAT, global positioning satellite system maritime satellite services, gateways, ATM over satellite, role of satellite in future network.

Text Book:

Reference Books:
EC E83 - MICROWAVE INTEGRATED CIRCUIT DESIGN

UNIT-I

Transmission Lines: Characteristics of conventional transmission structures, various planar transmission lines for MICs, comparison of various MIC transmission media. Design of stripline and microstrip transmission lines. Design of coupled striplines and microstrip lines. Stripline and microstrip discontinuity. Losses of microstrip lines and frequency effects. Review of scattering, ABCD, impedance and admittance matrices for two port networks.

UNIT-II


UNIT-III

Active and Passive Microwave Devices: Microwave transistor, equivalent circuit. Basic operation principles of FET, MESFET model, power FETs. Introduction, equivalent circuit and figure of merit of schottky barrier junctions, varactor diodes, step recovery diodes and pin diodes.

UNIT-IV

Microwave Semiconductor Sources and Amplifiers: Oscillators: Introduction, concept of negative resistance, three port S-parameter characterization of transistors, oscillation and stability conditions, design of fixed frequency oscillators. Amplifiers: Two port representation of transistor, stability consideration, amplifier characterization, Non-linear behavior, biasing networks, and linear amplifier design.

UNIT-V

Fabrication of MMC's/MMIC’s: Introduction, materials, mask layouts and mask fabrication, hybrid MIC, Mimics- design considerations, design procedures and MMIC fabrication. Hybrid versus Mimics.

Text Book:

Reference Book:
EC E84 - OPTOELECTRONIC DEVICES

UNIT-I

Physics of Light and Fiber Basics: Electromagnetic waves- Wave nature of light, basic optical laws and definition-Introduction to optical fibers-Principles of light propagation through optical fiber-Different types of fibers-Structures and their properties.

UNIT-II


UNIT-III

Opto Electronic Modulator and Optical Sensors: Electro optic modulator-Magneto optic devices-Acousto optic devices-All fiber modulators- Interferometric Sensors, Fabry perot, Mach Zender, Michelson and Sagnac interferometric sensors.

UNIT-IV


UNIT-V


Text Book:

Reference Books:
EC E85 - RF CIRCUIT DESIGN

UNIT I

RF ISSUES: Importance of RF design, Electromagnetic Spectrum, RF behaviour of passive components, Chip components and Circuit Board considerations, Scattering Parameters, Smith Chart and applications.

UNIT II

RF FILTER DESIGN: Overview, Basic resonator and filter configuration, Special filter realizations, Filter implementations, Coupled filter.

UNIT III

ACTIVE RF COMPONENTS & APPLICATIONS: RF diodes, BJT, RF FETs, High electron mobility transistors; Matching and Biasing Networks – Impedance matching using discrete components, Microstripline matching networks, Amplifier classes of operation and biasing networks.

UNIT IV

RF AMPLIFIER DESIGNS: Characteristics, Amplifier power relations, Stability considerations, Constant gain circles, Constant VSWR circles, Low Noise circuits, Broadband, high power and multistage amplifiers.

UNIT V

OSCILLATORS, MIXERS & APPLICATIONS: Basic Oscillator model, High frequency oscillator configuration, Basic characteristics of Mixers; Phase Locked Loops; RF directional couplers and hybrid couplers; Detector and demodulator circuits.

Text Books:

References:
2. Mathew M. Radmanesh, Radio Frequency & Microwave Electronics, Pearson
EC E86 - SPEECH PROCESSING

UNIT – I

Speech Recognition Overview: Pattern classification, statistical pattern classification, wave basics, acoustic tube modeling of speech production, music production, room acoustics.

UNIT - II

Auditory perception: Ear physiology, psychoacoustics, models of pitch perception, Speech perception, human speech recognition.

UNIT – III

Speech features: The auditory system as filter bank, the cepstrum as a spectral analyzer, linear prediction.

UNIT – IV

Automatic Speech recognition: Feature extraction for ASR, linguistic categories for speech recognition, deterministic sequence recognition for ASR, statistical sequence recognition, statistical model training, discriminant acoustic probability estimation, Speech recognition and Understanding.

UNIT – V

Speech Coding: Formulation of linear prediction problem in time domain, solution of normal equations, interpretation of linear prediction in autocorrelation and spectral domains, vo-coders.

Text Book:


References:

INFRASTRUCTURE
AND FACULTY
REQUIREMENTS
Infrastructure and faculty requirement for I year B.Tech programme

Space requirement:

<table>
<thead>
<tr>
<th>SI.No</th>
<th>Classroom/laboratory</th>
<th>Batch size</th>
<th>Area(Sqm)</th>
<th>No.required</th>
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<td>01.</td>
<td>classroom</td>
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<td>66</td>
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<td>02.</td>
<td>Drawing hall</td>
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<tr>
<td>03.</td>
<td>Physics laboratory</td>
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<td>04.</td>
<td>Chemistry laboratory</td>
<td>30</td>
<td>150</td>
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<td>05.</td>
<td>Basic electrical laboratory</td>
<td>15</td>
<td>75</td>
<td>1</td>
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<tr>
<td>06.</td>
<td>Basic electronics laboratory</td>
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<td>75</td>
<td>1</td>
</tr>
<tr>
<td>07.</td>
<td>Computer laboratory</td>
<td>30</td>
<td>150</td>
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<tr>
<td>08.</td>
<td>Workshop practice</td>
<td>30</td>
<td>200</td>
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</table>

Requirement of Teaching and Non-Teaching Staff:

Teaching:

The number of faculty members required would be as per AICTE norms and course curriculum.

Faculty : student ratio=1:15

A minimum of two faculty members in each of the following disciplines are required

(i) Maths  
(ii) Physics  
(iii) Chemistry  
(iv) Mechanical

A minimum of one faculty member in each of the following disciplines are required

(i) English
(ii) Electronics & Electronics Engineering/Electronics and Communication Engineering
(iii) Civil Engineering
(iv) Computer Science and Engineering

Non-Teaching:
Total number of non-teaching staff (includes technical & ministerial) shall be in the ratio of Teaching : Non-teaching = 1:1.2

FACULTY QUALIFICATION:

Science and Humanities
A first class Master degree in the respective discipline with Net qualification / M.Phil / Ph.D.

Engineering discipline
A first class B.E / B.Tech degree in the respective discipline.

(or)
A first class ME / M.Tech degree in the respective discipline.

COMPUTER PROGRAMMING LABORATORY
(For a batch of 30 students)

Hardware
1. 1 No. of computer system : Server
2. 35 Nos. of computer system : Node with Pentium 4 or above processor
3. 1 UPS 5k VA
4. Dot Matrix Printer / Laser Printer – 3 nos.
5. Node with Pentium 4 or above processor

Software
1. Licensed Microsoft Server OS / Linux Server OS / UNIX Server Software / Any other open source server software
2. Licensed client OS / Open source client OS for minimum of 30 user
3. Borland ‘C’ Complier / Microsoft ‘C’ Complier with 30 user license
   MS Office / any other open source word processor, spread sheet and presentation software with 30 user license.
BASIC ELECTRICAL AND ELECTRONICS LABORATORY

(For a batch of 30 students)

Electrical
1. 15 boards
2. 15 tool sets
   Each set includes Screw Driver, Poker, Cutting pliers, Tester, Knife etc.
3. Accessories such as PVC pipes, boards, Ts, Wires, (single and multispread)
   electrical accessories like switches (SPST, SPDT, OPDT), lamp holders, bulbs etc.
4. Demo experiment with few workshop tools – fan, tube light, wiring etc.

Electronics
1. Regulated power supply (0-15v) - 2
2. Signal Generator (0-1 MHz) - 2
3. CRO (20 MHz) - 2
4. Digital IC trainer kit - 1
5. Transformer (230/6, 230/12) - 2
6. Strain Gauge / Thermocouple / LVDT / Transducer kit

PHYSICS LABORATORY

(For a batch of 30 students)

List of Major equipments required

1. Lee’s Disc Apparatus - 3 nos.
2. Calorimeter with sterer - 6 nos.
3. Spectrometer - 6 nos.
4. Traveling Microscope - 6 nos.
5. Laurent Halt Shade Polari meter - 3 nos.
7. Deflection Magnetometer - 3nos.
8. He Ne Laser - 3nos.
9. Stop watch, Vernier Caliper, Screw gauge - 6nos. each
10. Electronic Weighting Machine - 2nos

CHEMISTRY LABORATORY
(For a batch of 30 students)

2. Pipette - 35nos.
3. Conical flask - 35nos.
4. Wash bottle 500 ml - 35nos.
5. Funnel - 35nos
6. Volumetric flask 1000 ml
   100 ml - 70nos
    1000 ml - 5nos
7. Beakers
   1000 ml - 10nos
   500 ml - 10nos
   250 ml - 70nos
   100 ml - 15nos
8. Reagent bottle 5000 ml
   250 ml - 35nos
   60ml - 35nos
9. Measuring jar 100ml
   25ml - 10nos
   10ml - 10nos
   5ml - 10nos
   2ml - 10nos
10. Round bottom flask 250ml - 35nos
11. Condenser 300mm - 35nos
12. COD bottle - 5nos

EQUIPMENT

1. Electronic weighing balance 0.1mg-200gm - 2nos
2. Conductivity meters - 7nos
3. Caloriometer - 7nos
4. Potentiometer - 7nos
5. Hot plates - 7nos
6. Polythene cans 10 liters - 10nos

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<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 liters</td>
<td>-10nos</td>
</tr>
<tr>
<td>7. Viscometers</td>
<td>-35nos</td>
</tr>
<tr>
<td>9. Water distillation plant 5 lit cap</td>
<td>-1 no.</td>
</tr>
<tr>
<td>10. Burette stands with clamp</td>
<td>-35 nos.</td>
</tr>
</tbody>
</table>

**BASIC WORKSHOP**

*(For a batch of 30 students)*

1. Work benches fitted with bench-wise / carpentry wise of 8 for a batch size of 30.
2. Fitting tools – 8 sets
3. Carpentry tools – 8 sets
4. Welding tools – 8 sets
5. Sheet metal tools – 8 sets
6. Power hacksaw – 1 no.
7. Drilling machines – 1 no.
8. Anvil – 1 no.
9. Welding work tables – 2 nos.
10. Welding Transformer – 2 nos.
11. Hand shear for sheet metal
12. Pedestal Grinder
13. Surface table with light gauge
14. Different stag for forming shapes
Infrastructure and Faculty Requirement for B.Tech. Electronics and Communication Engineering

Infrastructure

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Name of the Laboratory</th>
<th>Area(sq.m)</th>
<th>Maximum batch size</th>
<th>No. Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Class Rooms</td>
<td>66</td>
<td>66</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Electronics Lab</td>
<td>75</td>
<td>22</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Communication Lab</td>
<td>75</td>
<td>22</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Computer Lab</td>
<td>75</td>
<td>22</td>
<td>1</td>
</tr>
</tbody>
</table>

Requirement of Teaching and Non-Teaching Staff:

Teaching:
The number of faculty members required would be as per AICTE norms and course curriculum.

  Faculty: Student Ratio=1.15
  A total of 12 faculty members are required including a teaching faculty for mathematics (180/15).

Non-Teaching Staff:

Teaching: Non-Teaching=1:1.2
  Each laboratory should have one laboratory attender/Mechanic. In addition, one more attender is required for department office.

  Total requirement of Non-Teaching Staff is =6(5 Teaching +1 Non Teaching).

Faculty Qualification:
  (or)
  A First Class M.E. /M.Tech. Degree in any one of the specialization of Electronics and

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Communication Engineering.

### DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

#### LABORATORY EQUIPMENTS LIST

[BASED ON REVISED SYLLABUS 2009-2010]

<table>
<thead>
<tr>
<th>S.No.</th>
<th>REQUIREMENTS</th>
<th>QTY.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regulated power supply</td>
<td>40</td>
</tr>
<tr>
<td>2</td>
<td>CRO (20MHz/30MHz/60MHz/100MHz)</td>
<td>45</td>
</tr>
<tr>
<td>3</td>
<td>Signal generator and Function generator</td>
<td>40</td>
</tr>
<tr>
<td>4</td>
<td>Multimeter</td>
<td>20</td>
</tr>
<tr>
<td>5</td>
<td>Digital trainer kit</td>
<td>10</td>
</tr>
<tr>
<td>6</td>
<td>Microwave test bench(Klystron)</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>Microwave test bench(Gunn diode)</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>Fiber optic trainer</td>
<td>3</td>
</tr>
<tr>
<td>9</td>
<td>Spectrum analyzer</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Vector Network Analyser</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>OTDR</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>Radio communication</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>Arbitrary waveform generator</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td><strong>VLSI trainer kit:</strong></td>
<td>5 user license</td>
</tr>
<tr>
<td></td>
<td>List of software required</td>
<td></td>
</tr>
<tr>
<td></td>
<td>a) Simulator and Synthesizer tool with down loader</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(VHDL/Verilog)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No. of FPGA kits required with</td>
<td>5 nos.</td>
</tr>
<tr>
<td></td>
<td>a) I/O cards</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Add on card for FPGA</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>DC Ammeter (100mA,10mA,250µA)</td>
<td>7(each)</td>
</tr>
<tr>
<td>16</td>
<td>DC Voltmeter(3V,10V,30V,300V)</td>
<td>7(each)</td>
</tr>
<tr>
<td>17</td>
<td>Decade resistance box</td>
<td>12</td>
</tr>
<tr>
<td>18</td>
<td>Decade inductance box</td>
<td>12</td>
</tr>
<tr>
<td>19</td>
<td>Decade capacitance box</td>
<td>12</td>
</tr>
<tr>
<td>20</td>
<td>Audio power meter</td>
<td>1</td>
</tr>
<tr>
<td>21</td>
<td>PC with LAN connection</td>
<td>30</td>
</tr>
<tr>
<td>22</td>
<td>Network Simulator Software</td>
<td>10</td>
</tr>
<tr>
<td>23</td>
<td>Microcontroller 8051 kit with facility</td>
<td>7</td>
</tr>
</tbody>
</table>

[http://ece.pec.edu]
a. 16×4(12×3) Keyboard  
b. 16×2 LCD display  
c. Four digit 7 segment display  
d. Parallel I/O pins are all available(Terminated) to interface to the circuits assembled while conducting experiments.  
e. Bread board to mount circuit components to build the interfaces.  
f. Connect to PC and on board programmable facility.

<table>
<thead>
<tr>
<th>S.No.</th>
<th>REQUIREMENTS</th>
<th>QTY.</th>
</tr>
</thead>
<tbody>
<tr>
<td>24.</td>
<td>Pspice / Orcad / Multisim – Design Software.</td>
<td>10</td>
</tr>
<tr>
<td>25.</td>
<td>Flash Programmer</td>
<td>7</td>
</tr>
<tr>
<td>26.</td>
<td>Matlab software</td>
<td>10 users</td>
</tr>
</tbody>
</table>

The requirement specified below can be shared with the CSE, EEE or IT department lab.

<table>
<thead>
<tr>
<th>S.No.</th>
<th>REQUIREMENTS</th>
<th>QTY.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Microprocessor and Microcontroller kit</td>
<td>12</td>
</tr>
</tbody>
</table>
| 2.    | Microcontrollers Kit (8051)  
a. 16 x 2 LCD display.  
b. Four digit 7 segment display.  
c. Parallel I/O pins are all available (terminated) to interface to the circuits assembled.  
d. Bread board to mount circuit components to build the interface. | 12   |
| 3.    | 8257, ARM, PIC Processors | 2(each) |
| 4.    | Various Interface Kits (Stepper motor, Keyboard, D/A, A/D converters, PI controller, serial.) | 3(each) |