

St. PETER'S UNIVERSITY

St. Peter's Institute of Higher Education and Research
(Declared under section 3 of UGC Act 1956)
Avadi, Chennai – 600 054.



B.E. (ELECTRONICS AND COMMUNICATION ENGINEERING) PROGRAMME

(I TO VIII SEMESTERS)

REGULATIONS AND SYLLABI

(REGULATIONS – 2012)

(Effective from the Academic Year 2012-'13)

B.E. (ELECTRONICS AND COMMUNICATION ENGINEERING) PROGRAMME

Regulations and Syllabi

(Effective from the Academic Year 2012-'13)

1. Eligibility:

(1) Candidates who passed the following Examination or any other equivalent Examination thereto and who appeared for the entrance test conducted by the University or approved institutions wherever prescribed are eligible for admission to Four Year B.E. (Electronics and Communication Engineering) Programme.

Higher Secondary Examination with Mathematics, Physics and Chemistry conducted by the Government of Tamil Nadu or its equivalent in the relevant subjects.

(2) Candidates who passed Three Year Diploma in Technical Education in the concerned subject conducted by the Government of Tamil Nadu are eligible for admission to Second Year of Four Year B.E. (Electronics and Communication Engineering) Programme.

2. Duration: Four Years comprising 8 Semesters. Each semester has a minimum 90 working days with a minimum of 5 hours a day.

3. Medium: English is the medium of instruction and examination.

4. Weightage for Continuous and End Assessment: The weightage for Continuous Assessment (CA) and End Assessment (EA) be 25:75 unless the ratio is specifically mentioned in the scheme of Examinations.

5. Credit System: Credit system be followed with 18 credits for each semester and each credit is equivalent to 25 hours of effective study provided in the Time Table.

6. Scheme of Examinations

I Semester

Code No.	Course Title	Credit	Marks		
			CA	EA	Total
Theory					
112EHT01	Technical English – I	1	25	75	100
112MAT02	Mathematics – I	3	25	75	100
112PHT03	Engineering Physics – I	3	25	75	100
112CYT04	Engineering Chemistry – I	3	25	75	100
112EGT05	Engineering Graphics – I	3	25	75	100
112FCT06	Fundamentals of Computing – I	3	25	75	100
Practical					
112CLP01	Computer Practices Laboratory – I	1	25	75	100
112ELP02	Engineering Practices Laboratory –I	1	25	75	100
Total		18	200	600	800

II Semester

Code No.	Course Title	Credit	Marks		
			CA	EA	Total
Theory					
212EHT01	Technical English – II	2	25	75	100
212MAT02	Mathematics – II	3	25	75	100
212PHT03	Engineering Physics – II	2	25	75	100
212CYT04	Engineering Chemistry – II	2	25	75	100
212EDT05	Electric Circuits and Electron Devices	3	25	75	100
212CMT06	Basic Civil & Mechanical Engineering	3	25	75	100
Practical					
212CLP01	Computer Practices Laboratory – II	1	25	75	100
212PCP02	Physics & Chemistry Laboratory – II	1	25	75	100
212CDP03	Circuits and Devices Laboratory	1	25	75	100
Total		18	225	675	900

III Semester

Code No.	Course Title	Credit	Marks		
			CA	EA	Total
Theory					
312MAT01	Transforms and Partial Differential Equations	3	25	75	100
312ECT02	Electrical Engineering	2	25	75	100
312ECT03	Data Structures and Object Oriented Programming in C++	2	25	75	100
312ECT04	Digital Electronics	2	25	75	100
312ECT05	Signals and systems	3	25	75	100
312ECT06	Electronic Circuits- I	3	25	75	100
Practical					
312ECP01	Digital Electronics Lab	1	25	75	100
312ECP02	Electronic Circuits - I Lab	1	25	75	100
312ECP03	Data structures and Object Oriented Programming Lab	1	25	75	100
Total		18	225	675	900

IV Semester

Code No.	Course Title	Credit	Marks		
			CA	EA	Total
Theory					
412ECT01	Probability and Random Processes	3	25	75	100
412ECT02	Electronic Circuits II	3	25	75	100
412ECT03	Communication Theory	3	25	75	100
412ECT04	Electromagnetic Fields	2	25	75	100
412ECT05	Linear Integrated Circuits	2	25	75	100
412ECT06	Control Systems	2	25	75	100
Practical					
412ECP01	Electronics circuits II and simulation lab	1	25	75	100
412ECP02	Linear Integrated Circuit Lab	1	25	75	100
412ECP03	Electrical Engineering and Control System Lab	1	25	75	100
Total		18	225	675	900

V Semester

Code No.	Course Title	Credit	Marks		
			CA	EA	Total
Theory					
512ECT01	Digital Communication	3	25	75	100
512ECT02	Digital Signal Processing	3	25	75	100
512ECT03	Computer Architecture and Organization	3	25	75	100
512ECT04	Transmission Lines and Wave guides	3	25	75	100
512ECT05	Environmental Science and Engineering	1	25	75	100
512ECT06	Microprocessors and Microcontrollers	2	25	75	100
Practical					
512ECP01	Digital Signal Processing Lab	1	25	75	100
512ECP02	Communication Systems Lab	1	25	75	100
512ECP03	Microprocessor and Microcontroller Lab	1	25	75	100
Total		18	225	675	900

VI Semester

Code No.	Course Title	Credit	Marks		
			CA	EA	Total
Theory					
612ECT01	Principles of Management	2	25	75	100
612ECT02	Measurements and Instrumentation	2	25	75	100
612ECT03	Computer Networks	3	25	75	100
612ECT04	Antenna and Wave Propagation	3	25	75	100
612ECT05	VLSI Design	3	25	75	100
612ECT06	Elective – I: Digital image processing	3	25	75	100
Practical					
612ECP01	Computer Networks Lab	1	25	75	100
612ECP02	VLSI Design Lab	1	25	75	100
Total		18	200	600	800

VII Semester

Code No.	Course Title	Credit	Marks		
			CA	EA	Total
Theory					
712ECT01	Wireless Communication	2	25	75	100
712ECT02	Optical Communication and Networking	2	25	75	100
712ECT03	RF and Microwave Engineering	3	25	75	100
712ECT04	Elective II :Advanced Digital Signal Processing	3	25	75	100
712ECT07	Elective II : Information Theory				
712ECT12	Elective III :High Speed Networks	3	25	75	100
712ECT17	Elective IV : Electromagnetic Interference and Compatibility	3	25	75	100
Practical					
712ECP01	Electronics System Design Lab	1	25	75	100
712ECP02	Optical & Microwave Lab	1	25	75	100
Total		18	200	600	800

VIII Semester

Code No.	Course Title	Credit	Marks		
			CA	EA	Total
Theory					
812ECT04	Elective V : Mobile Adhoc Networks	3	25	75	100
812ECT10	Elective VI : Satellite Communication	3	25	75	100
Practical					
812ECP01	Project Work	12	25	65	100
	Viva voce			10	
Total		18	75	225	300

LIST OF ELECTIVE COURSES

Code No.	Course Title	Credit
Elective – I		
612ECT06	Digital Image Processing	3
612ECT07	Medical Electronics	3
612ECT08	Operating Systems	3
612ECT09	Solid State Electronic Devices	3
612ECT10	Speech Processing	3
612ECT11	Numerical Methods	3
612ECT12	Multicore Programming	3
Elective – II		
712ECT04	Advanced Digital Signal Processing	3
712ECT05	Total Quality Management	3
712ECT06	Cryptography and Network Security	3
712ECT07	Information Theory	3
712ECT08	Intellectual Property Rights	3
712ECT09	Professional Ethics in Engineering	3
Elective – III		
712ECT10	Advanced Microprocessors	3
712ECT11	Internet and Java	3
712ECT12	High Speed Networks	3
712ECT13	Soft Computing	3
712ECT14	Multimedia Compression & Communication	3
712ECT15	Parallel and Distributed Processing	3
Elective – IV		
712ECT17	Electromagnetic Interference and Compatibility	3
712ECT18	Power Electronics	3
712ECT19	Television and Video Engineering	3
712ECT20	Nano Electronics	3
712ECT21	Avionics	3
Elective – V		
812ECT01	Embedded and Real Time Systems	3
812ECT02	Advanced Electronic system design	3
812ECT03	Optoelectronic devices	3
812ECT04	Mobile Adhoc Networks	3
812ECT05	Wireless Sensor Networks	3
812ECT06	Remote Sensing	3
812ECT07	Engineering Acoustics	3
Elective – VI		
812ECT08	Wireless networks	3
812ECT09	Telecommunication Switching and Networks	3
812ECT10	Satellite Communication	3
812ECT11	Telecommunication System Modeling and Simulation	3
812ECT12	Radar and Navigational Aids	3
812ECT13	Optical Networks	3

7. Passing Requirements: The minimum pass mark (raw score) be 50% in End Assessment (EA) and 50% in Continuous Assessment (CA) and End Assessment (EA) put together. No minimum mark (raw score) in Continuous Assessment (CA) be prescribed unless it is specifically mentioned in the Scheme of Examination.

8. Grading System: Grading System on a 10 Point Scale be followed with 1 mark = 0.1 Grade point to successful candidates as given below.

CONVERSION TABLE

(1 mark = 0.1 Grade Point on a 10 Point Scale)

Range of Marks	Grade Point	Letter Grade	Classification
90 to 100	9.0 to 10.0	O	First Class
80 to 89	8.0 to 8.9	A	First Class
70 to 79	7.0 to 7.9	B	First Class
60 to 69	6.0 to 6.9	C	First Class
50 to 59	5.0 to 5.9	D	Second Class
0 to 49	0 to 4.9	F	Reappearance

Procedure for Calculation

Cumulative Grade Point Average (CGPA) = $\frac{\text{Sum of Weighted Grade Points}}{\text{Total Credits}}$

$$= \frac{\sum (CA+EA) C}{\sum C}$$

Where Weighted Grade Points in each Course = Grade Points (CA+EA)
multiplied by Credits

$$= (CA+EA)C$$

Weighted Cumulative Percentage of Marks(WCPM) = CGPAx10

C- Credit,

CA-Continuous Assessment,

EA- End Assessment

9. Pattern of the Question Paper: The question paper for End Assessment will be set for three hours and for the maximum of 100 marks with following divisions and details.

Part A: 10 questions (with equal distribution to all units in the syllabus).
Each question carries 2 marks.

Part B: 5 questions with either or type (with equal distribution to all units in the syllabus). Each question carries 16 marks.

The total marks scored by the candidates will be reduced to the maximum prescribed in the Regulations.

10. Effective Period of Operation for the Arrear Candidates : Two Year grace period is provided for the candidates to complete the arrear examination, if any.

Registrar

11. Syllabus

112EHT01 - TECHNICAL ENGLISH – I

AIM:

To encourage students to actively involve in participative learning of English and to help them acquire Communication Skills.

OBJECTIVES:

- To help students develop listening skills for academic and professional purposes.
- To help students acquire the ability to speak effectively in English in real-life situations.
- To inculcate reading habit and to develop effective reading skills.
- To help students improve their active and passive vocabulary.
- To familiarize students with different rhetorical functions of scientific English.
- To enable students write letters and reports effectively in formal and business situations.

UNIT I

General Vocabulary - changing words from one form to another - Adjectives, comparative adjectives - Adverbs - Active and passive voice - Tenses - simple present, present continuous - Adverb forms - Nouns - compound nouns - Skimming and scanning - Listening and transfer of information - bar chart, flowchart - Paragraph writing, description - Discussing as a group and making an oral report on the points discussed, conversation techniques - convincing others.

Suggested activities:

1. Matching words & meanings - Using words in context - Making sentences.
2. Changing sentences from active to passive voice & vice versa.
3. Skimming, cloze exercises, exercises transferring information from text to graphic form - bar charts, flow charts.
4. Writing descriptions using descriptive words & phrases, and technical vocabulary.
5. Role play, conversation exercises, discussions, oral reporting exercises
Any other related relevant classroom activity

UNIT II

Vocabulary - prefixes & suffixes - simple past tense - Spelling and punctuation - 'wh' Question forms - Scanning, inference - Listening & note-taking - Paragraph writing - comparison and contrast - Creative thinking and speaking.

Suggested Activities:

1. a. Vocabulary activities using prefixes and suffixes.
b. Exercises using questions - asking & answering questions.
2. Scanning the text for specific information
3. Listening guided note-taking - Writing paragraphs using notes, giving suitable headings and subheadings for paragraphs. Using expressions of comparison and contrast.
4. Discussion activities and exploring creative ideas.
Any other related relevant classroom activity

UNIT III

Tenses - simple past, simple future and past perfect - Reading in Context -Listening & note-taking - single line - Definitions - sequencing of sentences - instruction - Persuasive speaking.

Suggested activities:

1. a. Providing appropriate context for the use of tenses
2. Listening and note-taking
3. (a) Writing sentence definitions, instructions
(b) Identifying the discourse links and sequencing jumbled sentences / writing instructions.
4. Speaking exercises, discussions, role play exercises using explaining, convincing and persuasive strategies Any other related relevant classroom activity

UNIT IV

Modal verbs and Probability – Concord subject verb agreement – Correction of errors - Cause and effect expressions – Extended Definition - Speaking about the future plans.

Suggested activities:

1. a. Making sentences using modal verbs to express probability
b. Gap filling using relevant grammatical form of words.
2. 2. Writing extended definitions
3. Speaking - role play activities, discussions, extempore speaking exercises speculating about the future.
Any other related relevant classroom activity

UNIT V

'If' conditionals – Gerunds - Intensive reading - Speaking – Presentation of problems & solutions - Itinerary – planning for an industrial visit - Formal Letter writing – Letter to the editor, invitation letter, accepting, declining letter and permission letter.

Suggested activities:

1. a) Sentence completion exercises using 'If' conditionals.
b) Gap filling exercises using gerunds and present participle forms
2. Reading comprehension exercises.
3. Role play, discussion, debating and speaking activities for stating, discussing
a. problems and suggesting solutions.
4. Planning a tour, Writing a travel itinerary. Writing letters to officials and to the
a. editor in formal/official contexts.
Any other related relevant classroom activity

TEXT BOOK:

1. Department of Humanities & Social Sciences, Anna University, 'English for Engineers and Technologists' Combined Edition (Volumes 1 & 2), Chennai: Orient Longman Pvt. Ltd., 2006. Themes 1 – 4 (Resources, Energy, Computer, Transport)

REFERENCES:

1. Meenakshi Raman and Sangeeta Sharma, 'Technical Communication English skills for Engineers', Oxford University Press, 2008.
2. Andrea, J. Rutherford, 'Basic Communication Skills for Technology', Second Edition, Pearson Education, 2007.

Extensive Reading:

1. A.P.J. Abdul Kalam with Arun Tiwari, 'Wings of Fire' An Autobiography, University Press (India) Pvt. Ltd., 1999, 30th Impression 2007.

NOTE:

The book given under Extensive Reading is meant for inculcating the reading habit of the students. They need not be used for testing purposes.

112MAT02 - MATHEMATICS – I

UNIT I MATRICES

Characteristic equation – Eigen values and eigen vectors of a real matrix – Properties – Cayley-Hamilton theorem (excluding proof) – Orthogonal transformation of a symmetric matrix to diagonal form – Quadratic form – Reduction of quadratic form to canonical form by orthogonal transformation.

UNIT II THREE DIMENSIONAL ANALYTICAL GEOMETRY

Equation of a sphere – Plane section of a sphere – Tangent Plane – Equation of a cone – Right circular cone – Equation of a cylinder – Right circular cylinder.

UNIT III DIFFERENTIAL CALCULUS

Curvature in Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature – Evolutes – Envelopes – Evolute as envelope of normals.

UNIT IV FUNCTIONS OF SEVERAL VARIABLES

Partial derivatives – Euler's theorem for homogenous functions – Total derivatives – Differentiation of implicit functions – Jacobians – Taylor's expansion – Maxima and Minima – Method of Lagrangian multipliers.

UNIT V MULTIPLE INTEGRALS

Double integration – Cartesian and polar coordinates – Change of order of integration – Change of variables between Cartesian and polar coordinates – Triple integration in Cartesian co-ordinates – Area as double integral – Volume as triple integral

TEXT BOOK:

1. Bali N. P and Manish Goyal, "Text book of Engineering Mathematics", Third edition, Laxmi Publications(p) Ltd.,(2008).
2. Grewal. B.S, "Higher Engineering Mathematics", 40th Edition, Khanna Publications, Delhi, (2007).

REFERENCES:

1. Ramana B.V, "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi, (2007).
2. Glyn James, "Advanced Engineering Mathematics", 7th Edition, Pearson Education, (2007).
3. Jain R.K and Iyengar S.R.K," Advanced Engineering Mathematics", 3rd Edition, Narosa Publishing House Pvt. Ltd., (2007).

112PHT03 – ENGINEERING PHYSICS I

UNIT-I: ACOUSTICS & ULTRASONICS

Classifications of sound – Characteristics of musical sound – Intensity – Loudness – Weber Fechner law – Decibel – reverberation – reverberation time, derivation of Sabine's formula for reverberation – (Jager's Method) - absorption coefficient and its determination – factors affecting acoustics of building (optimum reverberation time, loudness, focusing, echo, echelon, effect, resonance, and noise) and their remedies – Ultrasonic production –Magnetostriction and piezoelectric methods – Properties – applications of ultrasonic with particular reference to detection of flaws in metal (Non – Destructive testing NDT) – SONAR.

UNIT II LASER & ITS APPLICATIONS

Introduction – Principle of Spontaneous emission and stimulated emission. Population inversion, pumping. Einsteins A and B Coefficient – derivations. Types of lasers – He-Ne, CO₂, Nd-YAG, Semiconductor lasers (homojunction & heterojunction) Qualitative Industrial Applications – Lasers in welding, heat treatment, cutting – Medical applications – Holography (construction & reconstruction).

UNIT III CRYSTAL PHYSICS

Lattice –Unit cell –Bravais lattice –Lattice Planes – Miller indices – d spacing in cubic lattice – Calculation of number of atoms per unit cell – atomic radius – Coordination number –Packing factor for SC, BCC, FCC and HCP structure –Polymorphism and allotropy – Crystal defects – point, line and surface defects.

UNIT IV PROPERTIES OF MATTER

Elasticity – types of moduli of elasticity – stress strain diagram –Young's modulus of elasticity – rigidity modulus – bulk modulus – Factors affecting elasticity – twisting couple on a wire – Torsional pendulum – determination of rigidity modulus of a wire – depression of a cantilever – Young's modulus by cantilever – uniform and non uniform bending – viscosity – Coefficient of viscosity – Determination of viscosity - Poiseuille's Method –Ostwalds viscometer – comparison of viscosities.

Unit V OPTICS & FIBER OPTICS

Air Wedge theory and experiment – testing of flat surfaces –anti reflection coating – Michelson interferometer – types of fringes, determination of wave length of monochromatic source and thickness of a thin transparent sheet – Double refraction – Photoelasticity – Photoelastic effect – Photoelastic analysis –Photoelastic material – Block diagram of a photoelastic bench. Principle and propagation of light in optical fibres – Numerical aperture and Acceptance angle – Types – Types of optical fibres (material, refraction index, mode)- Double crucible technique of fibre drawing – Fibre drawing – Fibre optical communication system (Block diagram)

Text Book:

1. S.Stella Mary , m. Parasuraman and a. Mohammed Hidayathullah , 'Engineering Physics I R.K. Publishers, Coimbatore (2012)

REFERENCES:

1. R.K. Gaur and S.C.Gupta, "Engineering Physics" Dhanpat Rai Publications , New Delhi(2003)
2. M.N. Avadhanulu and PG Kshirsagar, 'A Text book of Engineering Physics' S.Chand and company, Ltd. New Delhi, 2005.
3. Serway and Jewett, 'Physics for Scientists and Engineering with Modern Physics', 6th Edition, Thomson Brooks/Cole, Indian reprint (2007).
4. Rajendran, Vand Marikani A, 'Engineering Physics' Tata McGraw Hill Publications Ltd,III edition New Delhi,(2004).
5. Palaniswamy, P.K. 'Engineering Physics' Scitech publications,Chennai,(2007)
6. Jayakumar.s 'Engineering Physics' , R.K.publishers, Coimbatore. (2007)
7. Jayakumar. S 'Engineering Physics', Pearson Education,New Delhi, (2007).
8. Dr. P. Santhana Raghavan, Dr.P. Ramasamy, Crystal Growth- Process and Methods – KRU Publications-Kumbakonam.

Aim

To impart a sound knowledge on principles of Chemistry involving industrial application oriented topics required for all engineering branches.

Objectives

- * The student should be conversant with the principles, treatment of water for potable and industrial purposes
- Principles of polymer chemistry and its application in industries
- Industrial application of surface chemistry
- Conventional and Non- conventional energy sources and Principle and working of energy storage devices
- Chemistry of engineering materials and their industrial applications.

UNIT I WATER TECHNOLOGY

Characteristics –alkalinity-types of alkalinity and determination - Water - Hardness and problems -Estimation of Hardness by EDTA method - Problems in EDTA Titrations - Domestic water treatment-Disinfection methods (boiling, bleaching powder, chlorination UV treatment, ozonisation) Boiler feed water- Requirements -Disadvantages of using hard water in boilers- Scale and sludge formation, Carry over trouble, Caustic embrittlement and Boiler corrosion – Internal conditioning- colloidal, carbonate, phosphate and calgon conditioning methods. External conditioning -Zeolite Process and Demineralization process- Desalination - Reverse osmosis and Electro dialysis

UNIT II POLYMERS AND COMPOSITES

Polymers - Definition –Nomenclature -Functionality- Polymerization –Types -addition condensation, copolymerization and co-ordination polymerization –Mechanism of free radical and Co-ordination polymerization -Plastics-Classification -Preparation ,properties and uses of PVC, Teflon – Polycarbonates, Polyurethanes, Nylon 6,6, PET- Rubber-Vulcanisation of rubber ,synthetic rubber, Butyl rubber ,SBR.

Composites- Definition – Types of Composites - Polymer matrix composites –Metal matrix composites – Ceramic matrix composites ,properties and their application

UNIT III SURFACE CHEMISTRY

Adsorption – Terminology –Types- physical adsorption and chemical adsorption -Differences - Adsorption of gases on solids -Adsorption isotherms -Freundlich adsorption isotherm - Langmuir adsorption isotherm – Limitation. Adsorption of solutes from solutions - Ion exchange adsorption- Pollution abatement -Chromatography
Catalysis –Types-- Role of adsorbent in catalysis.

UNIT IV NON –CONVENTIONAL ENERGY SOURCES AND ENERGY STORAGE DEVICES

Nuclear energy – Difference between chemical and nuclear reactions -fusion and fission reactions – Binding energy – Mass defect-problems- Nuclear reactor- components -Light water nuclear power plant -Breeder reactor –Atom bomb.

Solar energy conversion-Solar cells, wind energy --Fuel cells– Hydrogen-oxygen fuel cell – Batteries – Dry cell- alkaline battery -Lead - acid battery –Nickel –Cadmium battery - Lithium battery- Lithium – Sulphur battery.

UNIT V ENGINEERING MATERIALS

Refractories –classification –acidic, basic and neutral refractories-properties of refractories – refractoriness- refractoriness under load –dimensional stability-porosity-thermal spalling-chemical inertness-Manufacture of alumina, magnesite and zirconia bricks - Abrasives- natural and synthetic abrasives- Quartz, corundum, emery, garnet, diamond, silicon carbide ,alundum and boron carbide- Lubricants- Mechanism of lubrication – Classification - Solid lubricants- graphite and molybdenum disulphide.- Semi -Solid lubricants – Grease- Liquid lubricants - Synthetic lubricants - Blended oils -Properties- Viscosity ,Viscosity index, Flash and fire points, Cloud and pour points,Oiliness. and their significance –Adhesives -Classification and applications Nano chemistry- Introduction –Properties –Carbon nanotubes –Classification – Synthesis – Applications.

Text Books

1. P.C.Jain and Monica Jain , 'Engineering Chemistry', Dhanpat Rai Pub Co Ltd New Delhi (2002)
2. S.S.Dara , ' A Text Book of Engineering Chemistry', S.Chand & Co Ltd New Delhi (2006)
3. Dr.Sayeeda Sultana " Engineering chemistry " Vol-I Professional and Technical Publishers, Coimbatore (2011)

Reference Books

1. B.K.Sharma 'Engineering Chemistry', Krishna Prakasan Media (P) Ltd Meerut (2001)
2. B.Shiva Sankar 'Engineering Chemistry', Tata McGraw-Hill Pub Co Ltd New Delhi (2008)

112EGT05 - ENGINEERING GRAPHICS

AIM

To develop graphic skills in students.

OBJECTIVES

To develop in students graphic skill for communication of concepts, ideas and design of engineering products and expose them to existing national standards related to technical drawings.

Concepts and conventions (Not for Examination)

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

UNIT I PLANE CURVES AND FREE HAND SKETCHING

Curves used in engineering practices:

Conics – Construction of ellipse, Parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves.

Free hand sketching:

Representation of Three Dimensional objects – General principles of orthographic projection – Need for importance of multiple views and their placement – First angle projection – layout views – Developing visualization skills through free hand sketching of multiple views from pictorial views of objects.

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES

Projection of points and straight lines located in the first quadrant – Determination of true lengths and true inclinations – Projection of polygonal surface and circular lamina inclined to both reference planes.

UNIT III PROJECTION OF SOLIDS

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.

UNIT IV SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES

Sectioning of above solids in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other – Obtaining true shape of section.

Development of lateral surfaces of simple and truncated solids – Prisms, pyramids, cylinders and cones – Development of lateral surfaces of solids with cylindrical cutouts, perpendicular to the axis.

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS

Principles of isometric projection – isometric scale – isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones.

Perspective projection of prisms, pyramids and cylinders by visual ray method.

TEXT BOOKS:

1. N.D. Bhatt, "Engineering Drawing" Charotar Publishing House, 46th Edition, (2003).

REFERENCES:

1. K. V. Natrajan, "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai (2006).
2. M.S. Kumar, "Engineering Graphics", D.D. Publications, (2007).
3. K. Venugopal & V. Prabhu Raja, "Engineering Graphics", New Age International (P) Limited (2008).
4. M.B. Shah and B.C. Rana, "Engineering Drawing", Pearson Education (2005).
5. K. R. Gopalakrishnana, "Engineering Drawing" (Vol.I&II), Subhas Publications (1998).
6. Dhananjay A.Jolhe, "Engineering Drawing with an introduction to AutoCAD" Tata McGraw Hill Publishing Company Limited (2008).
7. Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, (2008).

Publication of Bureau of Indian Standards:

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.
2. IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.
3. IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.
4. IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

Special points applicable to University Examinations on Engineering Graphics:

1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.
4. Whenever the total number of candidates in a college exceeds 150, the University Examination in that college will be conducted in two sessions (FN and AN on the same day) for 50 percent of student (approx) at a time.

112FCT06 - FUNDAMENTALS OF COMPUTING AND PROGRAMMING

AIM :

To provide an awareness to Computing and Programming

OBJECTIVES :

- To enable the student to learn the major components of a computer system
- To know the correct and efficient ways of solving problems
- To learn to use office automation tools
- To learn to program in C

UNIT I INTRODUCTION TO COMPUTERS

Introduction – Characteristics of Computers – Evolution of Computers - Computer Generations – Classification of Computers – Basic Computer organization – Number Systems

UNIT II COMPUTER SOFTWARE

Computer Software –Types of Software – Software Development Steps – Internet Evolution - Basic Internet Terminology – Getting connected to Internet Applications.

UNIT III PROBLEM SOLVING AND OFFICE APPLICATION SOFTWARE

Planning the Computer Program – Purpose – Algorithm – Flow Charts – Pseudocode - Application Software Packages- Introduction to Office Packages (not detailed commands for examination).

UNIT IV INTRODUCTION TO C

Overview of C – Constants, Variables and Data Types – Operators and Expressions – Managing Input and Output operators – Decision Making - Branching and Looping.

UNIT V FUNCTIONS AND POINTERS

Handling of Character Strings – User-defined Functions – Definitions – Declarations - Call by reference – Call by value – Structures and Unions – Pointers – Arrays – The Preprocessor – Developing a C Program : Some Guidelines

TEXT BOOKS:

1. Ashok.N.Kamthane, " Computer Programming", Pearson Education (India) (2008).
2. Behrouz A.Forouzan and Richard.F.Gilberg, "A Structured Programming Approach Using C", II Edition, Brooks-Cole Thomson Learning Publications, (2007).

REFERENCES:

1. Pradip Dey, Manas Ghoush, "Programming in C", Oxford University Press. (2007).
2. Byron Gottfried, "Programming with C", 2nd Edition, (Indian Adapted Edition), TMH publications, (2006).
3. Stephen G.Kochan, "Programming in C", Third Edition, Pearson Education India, (2005).
4. Brian W.Kernighan and Dennis M.Ritchie, "The C Programming Language", Pearson Education Inc., (2005).
5. E.Balagurusamy, "Computing fundamentals and C Programming", Tata McGraw-Hill Publishing Company Limited, (2008).
6. S.Thamarai Selvi and R.Murugan, "C for All", Anuradha Publishers, (2008).

LIST OF EXERCISES

a) Word Processing

1. Document creation, Text manipulation with Scientific notations.
2. Table creation, Table formatting and Conversion.
3. Mail merge and Letter preparation.
4. Drawing - flow Chart

b) Spread Sheet

5. Chart - Line, XY, Bar and Pie.
6. Formula - formula editor.
7. Spread sheet - inclusion of object, Picture and graphics, protecting the document and sheet.
8. Sorting and Import / Export features.

Simple C Programming

9. Data types, Expression Evaluation, Condition Statements.
10. Arrays
11. Structures and Unions
12. Functions

*** For programming exercises Flow chart and pseudo code are essential**

HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS

Hardware

- LAN System with 33 nodes (OR) Standalone PCs – 33 Nos.
- Printers – 3 Nos.

Software

- OS – Windows / UNIX Clone
- Application Package – Office suite
- Compiler – C

112ELP02 - ENGINEERING PRACTICES LABORATORY

OBJECTIVES

To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.

GROUP A (CIVIL & MECHANICAL)

I CIVIL ENGINEERING PRACTICE

Buildings:

- (a) Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

Plumbing Works:

- (a) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.
- (b) Study of pipe connections requirements for pumps and turbines.
- (c) Preparation of plumbing line sketches for water supply and sewage works.
- (d) Hands-on-exercise:
 - Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.
- (e) Demonstration of plumbing requirements of high-rise buildings.

Carpentry using Power Tools only:

- (a) Study of the joints in roofs, doors, windows and furniture.
- (b) Hands-on-exercise:
 - Wood work, joints by sawing, planing and cutting.

II MECHANICAL ENGINEERING PRACTICE

Welding:

- (a) Preparation of arc welding of butt joints, lap joints and tee joints.
- (b) Gas welding practice

Basic Machining:

- (a) Simple Turning and Taper turning
- (b) Drilling Practice

Sheet Metal Work:

- (a) Forming & Bending:
- (b) Model making – Trays, funnels, etc.
- (c) Different type of joints.

Machine assembly practice:

- (a) Study of centrifugal pump
- (b) Study of air conditioner

Demonstration on:

(a) Smithy operations, upsetting, swaging, setting down and bending. Example

-

Exercise – Production of hexagonal headed bolt.

(b) Foundry operations like mould preparation for gear and step cone pulley.

(c) Fitting – Exercises – Preparation of square fitting and vee – fitting models.

GROUP B (ELECTRICAL & ELECTRONICS)**III ELECTRICAL ENGINEERING PRACTICE**

1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
2. Fluorescent lamp wiring.
3. Stair case wiring
4. Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.
5. Measurement of energy using single phase energy meter.
6. Measurement of resistance to earth of an electrical equipment.

IV ELECTRONICS ENGINEERING PRACTICE

1. Study of Electronic components and equipments – Resistor, colour coding measurement of AC signal parameter (peak-peak, rms period, frequency) using CR.
2. Study of logic gates AND, OR, EOR and NOT.
3. Generation of Clock Signal.
4. Soldering practice – Components Devices and Circuits – Using general purpose PCB.
5. Measurement of ripple factor of HWR and FWR.

REFERENCES:

1. K.Jeyachandran, S.Natarajan & S, Balasubramanian, "A Primer on Engineering Practices Laboratory", Anuradha Publications, (2007).
2. T.Jeyapoovan, M.Saravanapandian & S.Pranitha, "Engineering Practices Lab Manual", Vikas Pupliching House Pvt.Ltd, (2006)
3. H.S. Bawa, "Workshop Practice", Tata McGraw – Hill Publishing Company Limited, (2007).
4. A. Rajendra Prasad & P.M.M.S. Sarma, "Workshop Practice", Sree Sai Publication, (2002).
5. P.Kannaiah & K.L.Narayana, "Manual on Workshop Practice", Scitech Publications, (1999).

SEMESTER EXAMINATION PATTERN

The Laboratory examination is to be conducted for Group A & Group B, allotting 90 minutes for each group, with a break of 15 minutes. Both the examinations are to be taken together in sequence, either in the FN session or in the AN session. The maximum marks for Group A and Group B lab examinations will be 50 each, totaling 100 for the Lab course. The candidates shall answer either I or II under Group A and either III or IV under Group B, based on lots.

Engineering Practices Laboratory

List of equipment and components (For a Batch of 30 Students)

CIVIL

1. Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings. 15 Sets.
2. Carpentry vice (fitted to work bench) 15 Nos.
3. Standard woodworking tools 15 Sets.
4. Models of industrial trusses, door joints, furniture joints 5 each
5. Power Tools:
 - (a) Rotary Hammer 2 Nos
 - (b) Demolition Hammer 2 Nos
 - (c) Circular Saw 2 Nos
 - (d) Planer 2 Nos
 - (e) Hand Drilling Machine 2 Nos
 - (f) Jigsaw 2 Nos

MECHANICAL

1. Arc welding transformer with cables and holders 5 Nos.
2. Welding booth with exhaust facility 5 Nos.
3. Welding accessories like welding shield, chipping hammer, wire brush, etc. 5 Sets.
4. Oxygen and acetylene gas cylinders, blow pipe and other welding outfit. 2 Nos.
5. Centre lathe 2 Nos.
6. Hearth furnace, anvil and smithy tools 2 Sets.
7. Moulding table, foundry tools 2 Sets.
8. Power Tool: Angle Grinder 2 Nos
9. Study-purpose items: centrifugal pump, air-conditioner One each.

ELECTRICAL

1. Assorted electrical components for house wiring 15 Sets
2. Electrical measuring instruments 10 Sets
3. Study purpose items: Iron box, fan and regulator, emergency lamp 1 each
4. Megger (250V/500V) 1 No.
5. Power Tools: (a) Range Finder 2 Nos
(b) Digital Live-wire detector 2 Nos

ELECTRONICS

- | | |
|---|---------|
| 1. Soldering guns | 10 Nos. |
| 2. Assorted electronic components for making circuits | 50 Nos. |
| 3. Small PCBs | 10 Nos. |
| 4. Multimeters | 10 Nos. |
| 5. Study purpose items: Telephone, FM radio, low-voltage power supply | |

COMMON TO ALL BRANCHES

PHYSICS LABORATORY (Any Ten Experiments)

1. Determination of Young's modulus of the material – non uniform bending.
2. Determination of Young's modulus of the material – uniform bending .
3. Determination of viscosity of liquid – Poiseuille's method.
4. Torsional pendulum – Determination of rigidity modulus.
5. Determination of the thermal conductivity of a bad conductor – Lee's Disc method.
6. Determination of the thickness of a thin wire – Air Wedge method.
7. (a) Particle size determination using Diode Laser.
(b) Determination of Laser Parameters – Wave length, and angle of divergence.
(c) Determination of acceptance angle in an optical fiber.
8. Spectrometer dispersive power of a prism.
9. Determination of Wave length of mercury spectrum –Spectrometer grating.
10. Determination of Band Gap of a Semiconductor diode.
11. Determination of velocity of sound and compressibility of liquid- Ultrasonic Interferometer.
12. Determination of Hysteresis loss in a ferromagnetic material

CHEMISTRY LABORATORY – I

LIST OF EXPERIMENTS

1. Estimation of hardness of Water by EDTA method
2. Estimation of Copper in brass by EDTA method
3. Determination of DO in water (Winkler's method)
4. Estimation of Chloride in Water sample (Argentometric)
5. Estimation of alkalinity of Water sample
6. Determination of molecular weight and degree of polymerization of a polymer by viscometry.
7. Determination of cloud and pour point of a Lubricating oil
 - Any five experiments

II Semester

212EHT01 - TECHNICAL ENGLISH II

AIM:

To encourage students to actively involve in participative learning of English and to help them acquire Communication Skills.

OBJECTIVES:

1. To help students develop listening skills for academic and professional purposes.
2. To help students acquire the ability to speak effectively in English in real-life situations.
3. To inculcate reading habit and to develop effective reading skills.
4. To help students improve their active and passive vocabulary.
5. To familiarize students with different rhetorical functions of scientific English.
6. To enable students write letters and reports effectively in formal and business situations.

UNIT I

Technical Vocabulary - meanings in context, sequencing words, Articles- Prepositions, intensive reading& predicting content, Reading and interpretation, extended definitions, Process description

Suggested activities:

1. Exercises on word formation using the prefix 'self' - Gap filling with preposition.
2. Exercises - Using sequence words.
3. Reading comprehension exercise with questions based on inference – Reading headings and predicting the content – Reading advertisements and interpretation.
4. Writing extended definitions – Writing descriptions of processes – Writing paragraphs based on discussions – Writing paragraphs describing the future.

UNIT II

Phrases / Structures indicating use / purpose – Adverbs-Skimming – Non-verbal communication - Listening – correlating verbal and non-verbal communication -Speaking in group discussions – Formal Letter writing – Writing analytical paragraphs.

Suggested activities:

1. Reading comprehension exercises with questions on overall content – Discussions analyzing stylistic features (creative and factual description) - Reading comprehension exercises with texts including graphic communication - Exercises in interpreting non-verbal communication.
2. Listening comprehension exercises to categorise data in tables.
3. Writing formal letters, quotations, clarification, complaint – Letter seeking permission for Industrial visits– Writing analytical paragraphs on different debatable issues.

UNIT III

Cause and effect expressions – Different grammatical forms of the same word - Speaking – stress and intonation, Group Discussions - Reading – Critical reading - Listening, - Writing – using connectives, report writing – types, structure, data collection, content, form, recommendations .

Suggested activities:

1. Exercises combining sentences using cause and effect expressions – Gap filling exercises using the appropriate tense forms – Making sentences using different grammatical forms of the same word. (Eg: object –verb / object – noun)
2. Speaking exercises involving the use of stress and intonation – Group discussions–analysis of problems and offering solutions.
3. Reading comprehension exercises with critical questions, Multiple choice question.
4. Sequencing of jumbled sentences using connectives – Writing different types of reports like industrial accident report and survey report – Writing recommendations.

UNIT IV

Numerical adjectives – Oral instructions – Descriptive writing – Argumentative paragraphs – Letter of application - content, format (CV / Bio-data) - Instructions, imperative forms - Checklists, Yes/No question form – E-mail communication.

Suggested Activities:

1. Rewriting exercises using numerical adjectives.
2. Reading comprehension exercises with analytical questions on content – Evaluation of content.
3. Listening comprehension – entering information in tabular form, intensive listening exercise and completing the steps of a process.
4. Speaking - Role play – group discussions – Activities giving oral instructions.
5. Writing descriptions, expanding hints – Writing argumentative paragraphs – Writing formal letters – Writing letter of application with CV/Bio-data – Writing general and safety instructions – Preparing checklists – Writing e-mail messages.

UNIT V

Speaking - Discussion of Problems and solutions - Creative and critical thinking – Writing an essay, Writing a proposal.

Suggested Activities:

1. Case Studies on problems and solutions
2. Brain storming and discussion
3. Writing Critical essays
4. Writing short proposals of 2 pages for starting a project, solving problems, etc.
5. Writing advertisements.

TEXT BOOK:

1. Chapters 5 – 8. Department of Humanities & Social Sciences, Anna University, 'English for Engineers and Technologists' Combined Edition (Volumes 1 & 2), Chennai: Orient Longman Pvt. Ltd., 2006. Themes 5 – 8 (Technology, Communication, Environment, Industry)

REFERENCES:

1. P. K. Dutt, G. Rajeevan and C.L.N Prakash, 'A Course in Communication Skills', Cambridge University Press, India 2007.
2. Krishna Mohan and Meera Banerjee, 'Developing Communication Skills', Macmillan India Ltd., (Reprinted 1994 – 2007).
3. Edgar Thorpe, Showick Thorpe, 'Objective English', Second Edition, Pearson Education, 2007.

Extensive Reading:

1. Robin Sharma, 'The Monk Who Sold His Ferrari', Jaico Publishing House, 2007

Note:

The book listed under Extensive Reading is meant for inculcating the reading habit of the students. They need not be used for testing purposes.

212MAT02 - MATHEMATICS – II

UNIT I ORDINARY DIFFERENTIAL EQUATIONS

Higher order linear differential equations with constant coefficients – Method of variation of parameters – Cauchy's and Legendre's linear equations – Simultaneous first order linear equations with constant coefficients.

UNIT II VECTOR CALCULUS

Gradient Divergence and Curl – Directional derivative – Irrotational and solenoidal vector fields – Vector integration – Green's theorem in a plane, Gauss divergence theorem and Stokes' theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelepipeds.

UNIT III ANALYTIC FUNCTIONS

Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy – Riemann equation and Sufficient conditions (excluding proofs) – Harmonic and orthogonal properties of analytic function – Harmonic conjugate – Construction of analytic functions – Conformal mapping : $w = z+c$, cz , $1/z$, and bilinear transformation.

UNIT IV COMPLEX INTEGRATION

Complex integration – Statement and applications of Cauchy's integral theorem and Cauchy's integral formula – Taylor and Laurent expansions – Singular points – Residues – Residue theorem – Application of residue theorem to evaluate real integrals – Unit circle and semi-circular contour(excluding poles on boundaries).

UNIT V LAPLACE TRANSFORM

Laplace transform – Conditions for existence – Transform of elementary functions – Basic properties – Transform of derivatives and integrals – Transform of unit step function and impulse functions – Transform of periodic functions.

Definition of Inverse Laplace transform as contour integral – Convolution theorem (excluding proof) – Initial and Final value theorems – Solution of linear ODE of second order with constant coefficients using Laplace transformation techniques.

TEXT BOOK:

1. Bali N. P and Manish Goyal, "Text book of Engineering Mathematics", 3rd Edition, Laxmi Publications (p) Ltd., (2008).
2. Grewal. B.S, "Higher Engineering Mathematics", 40th Edition, Khanna Publications, Delhi, (2007).

REFERENCES:

1. Ramana B.V, "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi, (2007).
2. Glyn James, "Advanced Engineering Mathematics", 3rd Edition, Pearson Education, (2007).
3. Erwin Kreyszig, "Advanced Engineering Mathematics", 7th Edition, Wiley India, (2007).
4. Jain R.K and Iyengar S.R.K, "Advanced Engineering Mathematics", 3rd Edition, Narosa Publishing House Pvt. Ltd., (2007).

212PHT03 – ENGINEERING PHYSICS II

UNIT I: CONDUCTING MATERIALS

Conductors – classical free electron theory of metals-Electrical and thermal conductivity – Derivation – Wiedemann – Franz law – Lorentz number – Draw backs of Classical free electron theory –Quantum theory – Fermi distribution function – Effect of temperature on Fermi function – Density of energy states – Carrier concentration in metals.

UNIT II: SEMICONDUCTING MATERIALS

INTRINSIC SEMICONDUCTOR: Intrinsic semiconductor – Density of electrons in conduction band – Density of holes in valence band – Intrinsic carrier concentration – derivation – Fermi level – Variation – of Fermi with temperature – electrical conductivity – mobility – band gap determination. EXTRINSIC SEMICONDUCTOR: Extrinsic semiconductors – carrier concentration derivation in n- type and p- type semiconductor variation of Fermi level with temperature and impurity concentration – compound semiconductors.

UNIT III: DIELECTRIC MATERIALS

Electrical susceptibility – dielectric constant – electronic, ionic, orientational and space charge polarization – frequency and temperature dependence of polarization- internal field – Clausius – Mosotti relation (derivation) – dielectric loss - dielectric breakdown – uses of dielectric materials (capacitor and transformer) Ferro electricity and applications.

UNIT IV: QUANTUM AND SUPER CONDUCTING MATERIALS

Black body radiation – Planck's theory (derivation) – Deduction of Wien' displacement law and Rayleigh – jeans' Law from Planck's theory - Compton Effect – Theory and experimental verification – Matter waves – Schrodinger's wave equation – Time independent and time dependent equations – Physical significance of wave function – Particle in a one dimensional box – Superconductivity: Properties – Types of super conductors – BCS theory of superconductivity(Qualitative) – High Tc superconductors – Applications of super conductors - SQUID, cryotron, magnetic levitation.

UNIT V: NEW ENGINEERING & NANO MATERIALS

Metallic glasses: Preparation, properties and applications – Shape memory alloys (SMA): Characteristic, Properties of NiTi alloy, application, advantages and disadvantages of SMA-synthesis –Plasma arcing – Chemical vapour deposition – sol-gels – eletrodeposition – ball milling – properties of nanoparticles and applications Carbon nanotubes: fabrication – arc method –pulsed laser deposition – chemical vapour deposition –Structure – properties and applications.

Text Books:

1. S. Stella Mary, M. Parasuraman and A. Mohammed Hidayathullah, 'Engineering Physics II' R.K Publishers, Coimbatore(2012).

REFERENCES:

1. Charles Kittel 'Introduction to solid state physics', John Wiley & Sons, 7th edition, Singapore (2007).
2. Charles P.Poole and Frank J. Ownen, 'Introduction to nanotechnology' Wiley India (2007)(for unit V)
3. Rajendran. v and Marikani.A. 'Materials Science' Tata McGraw hill publications, (2004) New Delhi.
4. Jayakumar. S, 'Materials Science' R.K. Publishers, Coimbatore, (2008).
5. Palanisamy P.K, 'Materials Science' , Scitech publications (India) Pvt. Ltd., Chennai, Second Edition(2007).
6. M. Arumugam, 'Materials Science' Anuradha Publications, Kumbakonam, (2006).

212CYT04 ENGINEERING CHEMISTRY –II

To impart a sound knowledge on principles of Chemistry involving industrial application oriented topics required for all engineering branches.

Objectives

- * The student should be conversant with the principles of Electrochemistry
Electrochemical cells and their applications.
- Principles of corrosion and its inhibition.
- * Chemistry of fuels and combustion.
- Importance of phase rule, alloys and their industrial application.
- Analytical techniques and their instrumentation.

UNIT I ELECTROCHEMISTRY

Electrochemical cells-Reversible and irreversible cells-Concentration cells -EMF Measurement of emf- Single electrode potential -Nernst equation(problem)-Reference electrodes-Standard hydrogen electrode-Calomel electrode-Ion selective electrode-Glass electrode-Measurement of pH- Electrochemical series-significance- Potentiometric titration (redox Fe^{2+} Vs Dichromate,) - Conductometric titrations (acid-base and precipitation titrations).

UNIT II CORROSION AND CORROSION CONTROL

Chemical corrosion -Pilling- Bedworth rule-electrochemical corrosion -mechanism Different types of corrosion-Galvanic corrosion-Differential aeration corrosion -pitting corrosion-waterline corrosion -stress corrosion -crevice corrosion-Factors influencing corrosion -corrosion control-sacrificial anode and impressed cathodic current methods-corrosion inhibitors -protective coatings-paints-constituents-functions- metallic coatings- anodic coating -cathodic coating-metal cladding -diffusion coating - electroplating of gold and electroless plating of nickel.

UNIT III FUELS AND COMBUSTION

Calorific value -Classification-coal -Proximate analysis and Ultimate analysis-Metallurgical Coke-Manufacture by Bee-hive oven and Otto-Hoffmann method-Petroleum processing and fractions-Cracking -Catalytic cracking and methods-Knocking -octane number -cetane number-Synthetic petrol-Fischer -Tropsch and Bergius process-Gaseous fuels-,Water gas-Producer gas., CNG and LPG-Flue gas analysis-Orsat apparatus-Theoretical air for combustion-Problems.

UNIT IV PHASE RULE AND ALLOYS

Statement and Explanation of terms involved with examples- Phase diagram-One Component system-Water system- Condensed phase rule-Construction of phase diagram by Thermal analysis-Simple eutectic system(Lead-silver system only)- Limitations of phase rule-Alloys-importance of Ferrous alloys-Nichrome-Alnico -Stainless steel-Heat treatment of steel -Non-Ferrous alloys -Brass and Bronze.

UNIT V ANALYTICAL TECHNIQUES

Spectroscopy -Atomic and molecular spectroscopy-Absorption spectrum -Emission spectrum - Absorbance-Beer-Lamberts law-Problems-UV Visible spectroscopy -IR spectroscopy-(principle,instrumentation (block diagram only)and applications colorimetry(principle ,instrumentation and applications)-Estimation of iron by colorimetry.Flame photometry-(principle , instrumentation and applications)-Estimation of Sodium by Flame photometry-Atomic absorption spectroscopy(principle , instrumentation and applications)-Estimation of Nickel by Atomic absorption spectroscopy.

Text Books

1. P.C.Jain and Monica Jain , "Engineering Chemistry", Dhanpat Rai Pub Co Ltd ,New Delhi (2002)
2. S.S.Dara , " A Text Book of Engineering Chemistry", S.Chand & Co Ltd New Delhi (2006)
3. Dr.Sayeeda Sultana " Engineering chemistry " Vol -II, Professional and Technical publishers ,Coimbatore (2011)

Reference Books

1. B.K.Sharma "Engineering Chemistry",Krishna Prakasan Media (P) Ltd Meerut (2001)
2. B.Shiva Sankar "Engineering Chemistry",Tata McGraw-Hill Pub Co Ltd New Delhi (2008)

212EDT05 - ELECTRIC CIRCUITS AND ELECTRON DEVICES
(For ECE, CSE, IT and Biomedical Engg. Branches)

UNIT I CIRCUIT ANALYSIS TECHNIQUES

Kirchoff's current and voltage laws – series and parallel connection of independent sources – R, L and C – Network Theorems – Thevenin, Superposition, Norton, Maximum power transfer and duality – Star-delta conversion.

UNIT II TRANSIENT RESONANCE IN RLC CIRCUITS

Basic RL, RC and RLC circuits and their responses to pulse and sinusoidal inputs – frequency response – Parallel and series resonances – Q factor – single tuned and double tuned circuits.

UNIT III SEMICONDUCTOR DIODES

Review of intrinsic & extrinsic semiconductors – Theory of PN junction diode – Energy band structure – current equation – space charge and diffusion capacitances – effect of temperature and breakdown mechanism – Zener diode and its characteristics.

UNIT IV TRANSISTORS

Principle of operation of PNP and NPN transistors – study of CE, CB and CC configurations and comparison of their characteristics – Breakdown in transistors – operation and comparison of N-Channel and P-Channel JFET – drain current equation – MOSFET – Enhancement and depletion types – structure and operation – comparison of BJT with MOSFET – thermal effect on MOSFET.

UNIT V SPECIAL SEMICONDUCTOR DEVICES
(Qualitative Treatment only)

Tunnel diodes – PIN diode, varactor diode – SCR characteristics and two transistor equivalent model – UJT – Diac and Triac – Laser, CCD, Photodiode, Phototransistor, Photoconductive and Photovoltaic cells – LED, LCD.

TEXT BOOKS:

1. Joseph A. Edminister, Mahmood, Nahri, "Electric Circuits" – Shaum series, Tata McGraw Hill, (2001)
2. S. Salivahanan, N. Suresh kumar and A. Vallavanraj, "Electronic Devices and Circuits", Tata McGraw Hill, 2nd Edition, (2008).
3. David A. Bell, "Electronic Devices and Circuits", Oxford University Press, 5th Edition, (2008).

REFERENCES:

1. Robert T. Paynter, "Introducing Electronics Devices and Circuits", Pearson Education, 7th Edition, (2006).
2. William H. Hayt, J.V. Jack, E. Kemmebly and Steven M. Durbin, "Engineering Circuit Analysis", Tata McGraw Hill, 6th Edition, 2002.
3. J. Millman & Halkins, Satyabranta Jit, "Electronic Devices & Circuits", Tata McGraw Hill, 2nd Edition, 2008.

212CMT06 - BASIC CIVIL & MECHANICAL ENGINEERING
(For ECE, CSE, IT and Biomedical Engg. Branches)

A – CIVIL ENGINEERING

UNIT I SURVEYING AND CIVIL ENGINEERING MATERIALS

Surveying: Objects – types – classification – principles – measurements of distances – angles – leveling – determination of areas – illustrative examples.

Civil Engineering Materials: Bricks – stones – sand – cement – concrete – steel sections.

UNIT II BUILDING COMPONENTS AND STRUCTURES

Foundations: Types, Bearing capacity – Requirement of good foundations.

Superstructure: Brick masonry – stone masonry – beams – columns – lintels – roofing – flooring – plastering – Mechanics – Internal and external forces – stress – strain – elasticity – Types of Bridges and Dams – Basics of Interior Design and Landscaping.

B – MECHANICAL ENGINEERING

UNIT III POWER PLANT ENGINEERING

Introduction, Classification of Power Plants – Working principle of steam, Gas, Diesel, Hydro-electric and Nuclear Power plants – Merits and Demerits – Pumps and turbines – working principle of Reciprocating pumps (single acting and double acting) – Centrifugal Pump.

UNIT IV I C ENGINES

Internal combustion engines as automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines – Boiler as a power plant.

UNIT V REFRIGERATION AND AIR CONDITIONING SYSTEM

Terminology of Refrigeration and Air Conditioning. Principle of vapour compression and absorption system – Layout of typical domestic refrigerator – Window and Split type room Air conditioner.

REFERENCES:

1. Shanmugam G and Palanichamy M S, "Basic Civil and Mechanical Engineering", Tata McGraw Hill Publishing Co., New Delhi, (1996).
2. Ramamrutham. S, "Basic Civil Engineering", Dhanpat Rai Publishing Co. (P) Ltd. (1999).
3. Seetharaman S. "Basic Civil Engineering", Anuradha Agencies, (2005).
4. Venugopal K and Prahu Raja V, "Basic Mechanical Engineering", Anuradha Publishers, Kumbakonam, (2000).
5. Shantha Kumar S R J., "Basic Mechanical Engineering", Hi-tech Publications, Mayiladuthurai, (2000).

212CLP01 - COMPUTER PRACTICE LABORATORY – II

LIST OF EXPERIMENTS

1. UNIX COMMANDS

Study of Unix OS - Basic Shell Commands - Unix Editor

2. SHELL PROGRAMMING

Simple Shell program - Conditional Statements - Testing and Loops

3. C PROGRAMMING ON UNIX

Dynamic Storage Allocation-Pointers-Functions-File Handling

HARDWARE / SOFTWARE REQUIREMENTS FOR A BATCH OF 30 STUDENTS

Hardware

- 1 UNIX Clone Server
- 33 Nodes (thin client or PCs)
- Printer – 3 Nos.

Software

- OS – UNIX Clone (33 user license or License free Linux)
- Compiler - C

COMMON TO ALL BRANCHES

PHYSICS LABORATORY (Any Ten Experiments)

1. Determination of Young's modulus of the material – non uniform bending.
2. Determination of Young's modulus of the material – uniform bending .
3. Determination of viscosity of liquid – Poiseuille's method.
4. Torsional pendulum – Determination of rigidity modulus.
5. Determination of the thermal conductivity of a bad conductor – Lee's Disc method.
6. Determination of the thickness of a thin wire – Air Wedge method.
7. (a) Particle size determination using Diode Laser.
(b) Determination of Laser Parameters – Wave length, and angle of divergence.
(c) Determination of acceptance angle in an optical fiber.
8. Spectrometer dispersive power of a prism.
9. Determination of Wave length of mercury spectrum –Spectrometer grating.
10. Determination of Band Gap of a Semiconductor diode.
11. Determination of velocity of sound and compressibility of liquid- Ultrasonic Interferometer.
12. Determination of Hysteresis loss in a ferromagnetic material

- **A minimum of FIVE experiments shall be offered in Each Semester.**
- **Laboratory classes on alternate weeks for physics and chemistry.**
- **The lab examinations will be held only in the second Semester.**

CHEMISTRY LABORATORY – II

LIST OF EXPERIMENTS

1. Conduct metric titration (Simple acid base)
 2. Conduct metric titration (Mixture of weak and strong acids Vs base)
 3. Conduct metric titration using BaCl_2 Vs Na_2SO_4
 4. Potentiometric Titration ($\text{Fe}^{2+}/\text{KMnO}_4$ or $\text{K}_2\text{Cr}_2\text{O}_7$)
 5. PH titration (acid & base)
 6. Determination of water of crystallization of a crystalline salt (Copper sulphate)
 7. Estimation of Ferric iron by spectrophotometry.
 8. Estimation of sodium and potassium by flame photometry.
- Any five experiments.

212CDP03 CIRCUITS AND DEVICES LABORATORY

1. Verification of KVL and KCL
2. Verification of Thevenin and Norton Theorems.
3. Verification of superposition Theorem.
4. Verification of Maximum power transfer and reciprocity theorems.
5. Frequency response of series and parallel resonance circuits.
6. Characteristics of PN and Zener diode
7. Characteristics of CE configuration
8. Characteristics of CB configuration
9. Characteristics of UJT and SCR
10. Characteristics of JFET and MOSFET
11. Characteristics of Diac and Triac.
12. Characteristics of Photodiode and Phototransistor.

SEMESTER – III
312MAT01 - TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS
(Common to all branches)

OBJECTIVES

The course objective is to develop the skills of the students in the areas of Transforms and Partial Differential Equations. This will be necessary for their effective studies in a large number of engineering subjects like heat conduction, communication systems, electro-optics and electromagnetic theory. The course will also serve as a prerequisite for post graduate and specialized studies and research.

1. FOURIER SERIES

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier Series – Parseval's identity – Harmonic Analysis.

2. FOURIER TRANSFORMS

Fourier integral theorem (without proof) – Fourier transform pair – Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.

3. PARTIAL DIFFERENTIAL EQUATIONS

Formation of partial differential equations – Lagrange's linear equation – Solutions of standard types of first order partial differential equations - Linear partial differential equations of second and higher order with constant coefficients.

4. APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS

Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two-dimensional equation of heat conduction (Insulated edges excluded) – Fourier series solutions in cartesian coordinates.

5. Z -TRANSFORMS AND DIFFERENCE EQUATIONS

Z-transforms - Elementary properties – Inverse Z-transform – Convolution theorem - Formation of difference equations – Solution of difference equations using Z-transform.

TEXT BOOKS

1. Grewal, B.S, "*Higher Engineering Mathematic*", 40th Edition, Khanna publishers, Delhi, (2007)

REFERENCES

1. Bali.N.P and Manish Goyal, "*A Textbook of Engineering Mathematic*", 7th Edition, Laxmi Publications(P) Ltd. (2007)
2. Ramana.B.V., "*Higher Engineering Mathematics*", Tata Mc-GrawHill Publishing Company limited, New Delhi (2007).
3. Glyn James, "*Advanced Modern Engineering Mathematics*", 3rd Edition, Pearson Education (2007).
4. Erwin Kreyszig, "*Advanced Engineering Mathematics*", 8th edition, Wiley India (2007).

AIM

To expose the students to the concepts of various types of electrical machines and transmission and distribution of electrical power .

OBJECTIVES

- To impart knowledge on
- Constructional details, principle of operation, performance, starters and testing of D.C. machines.
- Constructional details, principle of operation and performance of transformers.
- Constructional details, principle of operation and performance of induction motors.
- Constructional details and principle of operation of alternators and special machines.
- Power System transmission and distribution.

UNIT I D.C. MACHINES

Constructional details – emf equation – Methods of excitation – Self and separately excited generators – Characteristics of series, shunt and compound generators – Principle of operation of D.C. motor – Back emf and torque equation – Characteristics of series, shunt and compound motors - Starting of D.C. motors – Types of starters - Testing, brake test and Swinburne's test – Speed control of D.C. shunt motors.

UNIT II TRANSFORMERS

Constructional details – Principle of operation – emf equation – Transformation ratio – Transformer on no load – Parameters referred to HV/LV windings – Equivalent circuit – Transformer on load – Regulation - Testing – Load test, open circuit and short circuit tests.

UNIT III INDUCTION MOTORS

Construction – Types – Principle of operation of three-phase induction motors – Equivalent circuit – Performance calculation – Starting and speed control – Single-phase induction motors (only qualitative treatment).

UNIT IV SYNCHRONOUS AND SPECIAL MACHINES

Construction of synchronous machines-types – Induced emf – Voltage regulation; emf and mmf methods – Brushless alternators – Reluctance motor – Hysteresis motor – Stepper motor.

UNIT V TRANSMISSION AND DISTRIBUTION

Structure of electric power systems – Generation, transmission and distribution systems - EHVAC and EHVDC transmission systems – Substation layout – Insulators – cables.

TEXT BOOKS

1. D.P.Kothari and I.J.Nagrath, 'Basic Electrical Engineering', Tata McGraw Hill publishing company ltd, second edition, 2007 (Reprint).
2. C.L. Wadhwa, 'Electrical Power Systems', New Age International, fourth edition, 2007.

REFERENCE BOOKS

1. S.K.Bhattacharya, 'Electrical Machines', Tata McGraw Hill Publishing company ltd, second edition, 2007.
2. V.K.Mehta and Rohit Mehta, 'Principles of Power System', S.Chand and Company Ltd, second edition, 2006.

312ECT03 - DATA STRUCTURES AND OBJECT ORIENTED PROGRAMMING IN C++

AIM

To provide an in-depth knowledge in problem solving techniques and data structures.

OBJECTIVES

- To learn the systematic way of solving problems
- To understand the different methods of organizing large amounts of data
- To learn to program in C++
- To efficiently implement the different data structures
- To efficiently implement solutions for specific problems

UNIT – I PRINCIPLES OF OBJECT ORIENTED PROGRAMMING

Introduction- Tokens-Expressions-contour Structures –Functions in C++, classes and objects, constructors and destructors ,operators overloading and type conversions .

UNIT – II ADVANCED OBJECT ORIENTED PROGRAMMING

Inheritance, Extending classes, Pointers, Virtual functions and polymorphism, File Handling Templates ,Exception handling, Manipulating strings.

UNIT – III DATA STRUCTURES & ALGORITHMS

Algorithm, Analysis, Lists, Stacks and queues, Priority queues-Binary Heap-Application, Heaps–hashing-hash tables without linked lists

UNIT – IV NONLINEAR DATA STRUCTURES

Trees-Binary trees, search tree ADT, AVL trees, Graph Algorithms-Topological sort, shortest path algorithm network flow problems-minimum spanning tree - Introduction to NP - completeness.

UNIT – V SORTING AND SEARCHING

Sorting – Insertion sort, Shell sort, Heap sort, Merge sort, Quick sort, Indirect sorting, Bucket sort, Introduction to Algorithm Design Techniques –Greedy algorithm (Minimum Spanning Tree), Divide and Conquer (Merge Sort), Dynamic Programming (All pairs Shortest Path Problem).

TEXT BOOKS:

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 3rd ed, Pearson Education Asia, 2007.
2. E. Balagurusamy, " Object Oriented Programming with C++", McGraw Hill Company Ltd., 2007.

REFERENCES:

1. Michael T. Goodrich, "Data Structures and Algorithm Analysis in C++", Wiley student edition, 2007.
2. Sahni, "Data Structures Using C++", The McGraw-Hill, 2006.
3. Seymour, "Data Structures", The McGraw-Hill, 2007.
4. Jean – Paul Tremblay & Paul G.Sorenson, An Introduction to data structures with applications, Tata McGraw Hill edition, II Edition, 2002.
5. John R.Hubbard, Schaum's outline of theory and problem of data structure with C++, McGraw-Hill, New Delhi, 2000.
6. Bjarne Stroustrup, The C++ Programming Language, Addison Wesley, 2000
7. Robert Lafore, Object oriented programming in C++, Galgotia Publication

AIM

To learn the basic methods for the design of digital circuits and provide the fundamental concepts used in the design of digital systems.

OBJECTIVES

- To introduce basic postulates of Boolean algebra and shows the correlation between Boolean expressions
- To introduce the methods for simplifying Boolean expressions
- To outline the formal procedures for the analysis and design of combinational circuits and sequential circuits
- To introduce the concept of memories and programmable logic devices.
- To illustrate the concept of synchronous and asynchronous sequential circuits
-

UNIT I MINIMIZATION TECHNIQUES AND LOGIC GATES

Minimization Techniques: Boolean postulates and laws – De-Morgan's Theorem - Principle of Duality - Boolean expression - Minimization of Boolean expressions -- Minterm – Maxterm - Sum of Products (SOP) – Product of Sums (POS) – Karnaugh map Minimization – Don't care conditions - Quine-McCluskey method of minimization.

Logic Gates: AND, OR, NOT, NAND, NOR, Exclusive-OR and Exclusive-NOR- Implementations of Logic Functions using gates, NAND-NOR implementations – Multi level gate implementations- Multi output gate implementations. TTL and CMOS Logic and their characteristics – Tristate gates.

UNIT II COMBINATIONAL CIRCUITS

Design procedure – Half adder – Full Adder – Half subtractor – Full subtractor - Parallel binary adder, parallel binary Subtractor – Fast Adder - Carry Look Ahead adder – Serial Adder/Subtractor - BCD adder – Binary Multiplier – Binary Divider - Multiplexer/ Demultiplexer – decoder - encoder – parity checker – parity generators - code converters - Magnitude Comparator.

UNIT III SEQUENTIAL CIRCUITS

Latches, Flip-flops - SR, JK, D, T, and Master-Slave – Characteristic table and equation – Application table – Edge triggering – Level Triggering – Realization of one flip flop using other flip flops – serial adder/subtractor- Asynchronous Ripple or serial counter –Asynchronous Up/Down counter - Synchronous counters – Synchronous Up/Down counters – Programmable counters – Design of Synchronous counters: state diagram- State table –State minimization – State assignment - Excitation table and maps-Circuit implementation - Modulo-n counter, Registers – shift registers - Universal shift registers – Shift register counters – Ring counter – Shift counters - Sequence generators.

UNIT IV MEMORY DEVICES

Classification of memories – ROM - ROM organization - PROM – EPROM – EEPROM – EAPROM, RAM – RAM organization – Write operation – Read operation – Memory cycle - Timing wave forms – Memory decoding – memory expansion – Static RAM Cell-Bipolar RAM cell – MOSFET RAM cell – Dynamic RAM cell –Programmable Logic Devices – Programmable Logic Array (PLA) - Programmable Array Logic (PAL) - Field Programmable Gate Arrays (FPGA) - Implementation of combinational logic circuits using ROM, PLA, PAL

UNIT V SYNCHRONOUS AND ASYNCHRONOUS SEQUENTIAL CIRCUITS

Synchronous Sequential Circuits: General Model – Classification – Design – Use of Algorithmic State Machine – Analysis of Synchronous Sequential Circuits

Asynchronous Sequential Circuits: Design of fundamental mode and pulse mode circuits – Incompletely specified State Machines – Problems in Asynchronous Circuits – Design of Hazard Free Switching circuits. Design of Combinational and Sequential circuits using VERILOG

TEXT BOOKS

1. M. Morris Mano, Digital Design, 3rd Edition, Prentice Hall of India Pvt. Ltd., 2003 / Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003.
2. S. Salivahanan and S. Arivazhagan, Digital Circuits and Design, 3rd Edition., Vikas Publishing House Pvt. Ltd, New Delhi, 2006

REFERENCES

1. John F.Wakerly, Digital Design, Fourth Edition, Pearson/PHI, 2006
2. John.M Yarbrough, Digital Logic Applications and Design, Thomson Learning, 2002.
3. Charles H.Roth. Fundamentals of Logic Design, Thomson Learning, 2003.
4. Donald P.Leach and Albert Paul Malvino, Digital Principles and Applications, 6th Edition, TMH, 2003.
5. William H. Gothmann, Digital Electronics, 2nd Edition, PHI, 1982.
6. Thomas L. Floyd, Digital Fundamentals, 8th Edition, Pearson Education Inc, New Delhi, 2003
7. Donald D.Givone, Digital Principles and Design, TMH, 2003.

312ECT05 - SIGNALS AND SYSTEMS

AIM

To study and analyse characteristics of continuous, discrete signals and systems.

OBJECTIVES

- To study the properties and representation of discrete and continuous signals.
- To study the sampling process and analysis of discrete systems using z-transforms.
- To study the analysis and synthesis of discrete time systems.

1. CLASSIFICATION OF SIGNALS AND SYSTEMS

Continuous time signals (CT signals), discrete time signals (DT signals) - Step, Ramp, Pulse, Impulse, Exponential, Classification of CT and DT signals - periodic and aperiodic, random signals, CT systems and DT systems, Basic properties of systems - Linear Time invariant Systems and properties.

2. ANALYSIS OF CONTINUOUS TIME SIGNALS

Fourier series analysis, Spectrum of C.T. signals, Fourier Transform and Laplace Transform in Signal Analysis.

3. LINEAR TIME INVARIANT –CONTINUOUS TIME SYSTEMS

Differential equation, Block diagram representation, Impulse response, Convolution integral, frequency response, Fourier and Laplace transforms in analysis, State variable equations and matrix representation of systems

4. ANALYSIS OF DISCRETE TIME SIGNALS

Sampling of CT signals and aliasing, DTFT and properties, Z-transform and properties of Z-transform.

5. LINEAR TIME INVARIANT - DISCRETE TIME SYSTEMS

Difference equations, Block diagram representation, Impulse response, Convolution sum, LTI systems analysis using DTFT and Z-transforms, State variable equations and matrix representation of systems.

TEXT BOOK:

1. Allan V. Oppenheim, S. Willsky and S.H. Nawab, Signals and Systems, Pearson Education, 2007.
2. Edward W. Kamen & Bonnie's Heck, "Fundamentals of Signals and Systems", Pearson Education, 2007.

REFERENCES:

1. H. P. Hsu, Rakesh Ranjan "Signals and Systems", Schaum's Outlines, Tata McGraw Hill, Indian Reprint, 2007
2. S. Salivahanan, A. Vallavaraj, C. Gnanapriya, Digital Signal Processing, McGraw Hill International/TMH, 2007.
3. Simon Haykins and Barry Van Veen, Signals and Systems John Wiley & sons, Inc, 2004.
4. Robert A. Gabel and Richard A. Roberts, Signals & Linear Systems, John Wiley, III edition, 1987.
5. Rodger E. Ziemer, William H. Tranter, D. Ronald Fannin. Signals & systems, Fourth Edition, Pearson Education, 2002.

AIM

The aim of this course is to familiarize the student with the analysis and design of basic transistor Amplifier circuits and power supplies.

OBJECTIVE

On completion of this course the student will understand

- The methods of biasing transistors
- Design of simple amplifier circuits
- Midband analysis of amplifier circuits using small - signal equivalent circuits to determine gain input impedance and output impedance
- Method of calculating cutoff frequencies and to determine bandwidth
- Design of power amplifiers
- Analysis and design of power supplies.

UNIT I TRANSISTOR BIAS STABILITY

BJT – Need for biasing – Stability factor - Fixed bias circuit, Load line and quiescent point. Variation of quiescent point due to h_{FE} variation within manufacturers tolerance - Stability factors - Different types of biasing circuits - Method of stabilizing the Q point - Advantage of Self bias (voltage divider bias) over other types of biasing, Bias compensation – Diode, Thermistor and Sensistor compensations, Biasing the FET and MOSFET.

UNIT II MIDBAND ANALYSIS OF SMALL SIGNAL AMPLIFIERS

CE, CB and CC amplifiers - Method of drawing small-signal equivalent circuit - Midband analysis of various types of single stage amplifiers to obtain gain, input impedance and output impedance - Miller's theorem - Comparison of CB, CE and CC amplifiers and their uses - Methods of increasing input impedance using Darlington connection and bootstrapping - CS, CG and CD (FET) amplifiers - Multistage amplifiers. Basic emitter coupled differential amplifier circuit - Bisection theorem. Differential gain – CMRR - Use of constant current circuit to improve CMRR - Derivation of transfer characteristic.

UNIT III FREQUENCY RESPONSE OF AMPLIFIERS

General shape of frequency response of amplifiers - Definition of cutoff frequencies and bandwidth - Low frequency analysis of amplifiers to obtain lower cutoff frequency Hybrid – π equivalent circuit of BJTs - High frequency analysis of BJT amplifiers to obtain upper cutoff frequency – Gain Bandwidth Product - High frequency equivalent circuit of FETs - High frequency analysis of FET amplifiers - Gain-bandwidth product of FETs - General expression for frequency response of multistage amplifiers - Calculation of overall upper and lower cutoff frequencies of multistage amplifiers - Amplifier rise time and sag and their relation to cutoff frequencies.

UNIT IV LARGE SIGNAL AMPLIFIERS

Classification of amplifiers, Class A large signal amplifiers, second harmonic distortion, higher order harmonic distortion, transformer-coupled class A audio power amplifier – efficiency of Class A amplifiers. Class B amplifier – efficiency - push-pull amplifier - distortion in amplifiers - complementary-symmetry (Class B) push-pull amplifier, Class C, Class D amplifier – Class S amplifier – MOSFET power amplifier, Thermal stability and heat sink.

UNIT V RECTIFIERS AND POWER SUPPLIES

Classification of power supplies, Rectifiers - Half-wave, full-wave and bridge rectifiers with resistive load. Analysis for V_{dc} and ripple voltage with C, L, LC and CLC filters. Voltage multipliers, Voltage regulators - Zener diode regulator, principles of obtaining a regulated power supply, regulator with current limiting, Over voltage protection, Switched mode power supply (SMPS), Power control using SCR.

TEXT BOOKS

1. Millman J and Halkias .C., Integrated Electronics, TMH, 2007.
2. S. Salivahanan, N. Suresh Kumar and A. Vallavaraj, Electronic Devices and Circuits, 2nd Edition, TMH, 2007.

REFERENCES

1. Robert L. Boylestad and Louis Nashelsky, Electronic Devices and Circuit Theory, 9th Edition, Pearson Education / PHI, 2007.
2. David A. Bell, Electronic Devices & Circuits, 4th Edition, PHI, 2007
3. Floyd, Electronic Devices, Sixth Edition, Pearson Education, 2002.
4. I.J. Nagrath, Electronic Devices and Circuits, PHI, 2007.
5. Anwar A. Khan and Kanchan K. Dey, A First Course on Electronics, PHI, 2006.
6. B.P. Singh and Rekha Singh, Electronic Devices and Integrated Circuits, Pearson Education, 2006.
7. Rashid M, Microelectronics Circuits, Thomson Learning, 2007.

312ECP01 - DIGITAL ELECTRONICS LAB

1. Design and implementation of Adder and Subtractor using logic gates.
2. Design and implementation of code converters using logic gates
 - (i) BCD to excess-3 code and vice versa
 - (ii) Binary to gray and vice-versa
3. Design and implementation of 4 bit binary Adder/ subtractor and BCD adder using IC 7483
4. Design and implementation of 2 bit Magnitude Comparator using logic gates 8 Bit Magnitude Comparator using IC 7485
5. Design and implementation of 16 bit odd/even parity checker generator using IC74180.
6. Design and implementation of Multiplexer and De-multiplexer using logic gates and study of IC74150 and IC 74154
7. Design and implementation of encoder and decoder using logic gates and study of IC7445 and IC74147
8. Construction and verification of 4 bit ripple counter and Mod-10 / Mod-12 Ripple counters
9. Design and implementation of 3-bit synchronous up/down counter
10. Implementation of SISO, SIPO, PISO and PIPO shift registers using Flip- flops
11. Design of experiments 1, 6, 8 and 10 using Verilog Hardware Description Language

LIST OF EQUIPMENTS AND COMPONENTS FOR A BATCH OF 30 STUDENTS (2 per Batch)

S.No	Name of the equipments / Components	Quzntity Required	Remarks
1	Digital IC Tester	2 Nos	
2	Power Supply	10	5V DC
3	Multimeter	10	Digital
4	Computer with HDL software Installed	2	
Consumables (Minimum of 25 Nos. each)			
1	IC7400	25	
2	IC7404	25	
3	IC74682	25	
4	IC7402	25	
5	IC7408	25	
6	IC7411	25	
7	IC7432	25	
8	IC7483	25	
9	IC7485	25	
10	IC7486	25	
11	IC74150	25	
12	IC74151	25	
13	IC74147	25	
14	IC7445	25	
15	IC7474	25	
16	IC7476	25	
17	IC7491	25	
18	IC7494	25	
19	IC7447	25	
20	IC74180	25	
21	IC555	25	
22	Seven Segment Display	25	
23	LEDs	25	
24	Bread Board	25	
25	Wires		

**312ECP02 - ELECTRONIC CIRCUITS – I LAB
(Common to ECE & Bio Medical Engineering)**

Expt No.1 Fixed Bias amplifier circuit using BJT

1. Waveforms at input and output without bias.
2. Determination of bias resistance to locate Q-point at center of load line.
3. Measurement of gain.
4. Plot the frequency response & Determination of Gain Bandwidth Product

Expt No.2 Design and construct BJT Common Emitter Amplifier using voltage divider bias (self-bias) with and without bypassed emitter resistor.

1. Measurement of gain.
2. Plot the frequency response & Determination of Gain Bandwidth Product

Expt No.3 Design and construct BJT Common Collector Amplifier using voltage divider bias (self-bias).

1. Measurement of gain.
2. Plot the frequency response & Determination of Gain Bandwidth Product

Expt No.4 Darlington Amplifier using BJT.

1. Measurement of gain and input resistance.
2. Comparison with calculated values.
3. Plot the frequency response & Determination of Gain Bandwidth Product

Expt No.5 Source follower with Bootstrapped gate resistance

1. Measurement of gain, input resistance and output resistance with and without Bootstrapping.
2. Comparison with calculated values.

Expt No.6 Differential amplifier using BJT

1. Measurement of CMRR.

Expt No.7 Class A Power Amplifier

1. Observation of output waveform.
2. Measurement of maximum power output.
3. Determination of efficiency.
4. Comparison with calculated values.

Expt No.8 Class B Complementary symmetry power amplifier

1. Observation of the output waveform with crossover Distortion.
2. Modification of the circuit to avoid crossover distortion.
3. Measurement of maximum power output.
4. Determination of efficiency.
5. Comparison with calculated values.

Expt No.9 Power Supply circuit - Half wave rectifier with simple capacitor filter.

1. Measurement of DC voltage under load and ripple factor, Comparison with calculated values.
2. Plot the Load regulation characteristics using Zener diode.

Expt No.10 Power Supply circuit - Full wave rectifier with simple capacitor filter

1. Measurement of DC voltage under load and ripple factor, Comparison with calculated values.
2. Measurement of load regulation characteristics. Comparison with calculated values.

LIST OF EQUIPMENTS AND COMPONENTS FOR A BATCH OF 30 STUDENTS (3 per Batch)

S.No	Name of the equipments / Components	Quantity Required	Remarks
1	Variable DC Power Supply	8	(0-30V)
2	CRO	10	30MHz
4	Multimeter	6	Digital
6	Function Generator	8	1 MHz
7	DC Ammeter	10	
8	DC Voltmeter	10	
Consumables (Minimum of 25 Nos. each)			
9	BC107, BC147, BC 108, BC 148, BC547, BC 548, SL 100, SK100 or Equivalent transistors.		
10	Resistors 1/4 Watt Assorted		
11	Capacitors		
12	Inductors		
13	Diodes, Zener Diodes		
14	Bread Boards		
15	Transformers	4	

312ECP03 - DATA STRUCTURES AND OBJECT ORIENTED PROGRAMMING LAB

1. Basic Programs for C++ Concepts
2. Array implementation of List Abstract Data Type (ADT)
3. Linked list implementation of List ADT
4. Cursor implementation of List ADT
5. Stack ADT - Array and linked list implementations

The next two exercises are to be done by implementing the following source files

- Program source files for Stack Application 1
- Array implementation of Stack ADT
- Linked list implementation of Stack ADT
- Program source files for Stack Application 2

An appropriate header file for the Stack ADT should be #included in (a) and (d)

6. Implement any Stack Application using array implementation of Stack ADT (by implementing files (a) and (b) given above) and then using linked list implementation of Stack ADT (by using files (a) and implementing file (c))
7. Queue ADT – Array and linked list implementations
8. Search Tree ADT - Binary Search Tree
9. Heap Sort
10. Quick Sort

LIST OF EQUIPMENTS AND COMPONENTS FOR A BATCH OF 30 STUDENTS (1 per Batch)

S.No	Name of the equipments / Components	Quzntity Required	Remarks
1	P IV Computer Variable DC Power Supply	30 Nos	
2	C and C++ Compiler	30 Users	
Consumables (Minimum of 25 Nos. each)			
	Nil		

SEMESTER IV
412ECT01 - PROBABILITY AND RANDOM PROCESSES (CREDIT = 3)
(Common to ECE & Bio Medical Engineering)

AIM

This course aims at providing the necessary basic concepts in random processes. Knowledge of fundamentals and applications of random phenomena will greatly help in the understanding of topics such as signals & systems, pattern recognition, voice and image processing and filtering theory.

OBJECTIVES

At the end of the course, the students would

- Have a fundamental knowledge of the basic probability concepts.
- Have a well-founded knowledge of standard distributions which can describe real life phenomena.
- Acquire skills in handling situations involving more than one random variable and functions of random variables.
- Understand and characterize phenomena which evolve with respect to time in probabilistic manner.
- Be able to analyze the response of random inputs to linear time invariant systems.

UNIT I RANDOM VARIABLES

Discrete and continuous random variables – Moments - Moment generating functions and their properties. Binomial, Poisson, Geometric, Uniform, Exponential, Gamma and normal distributions – Function of Random Variable.

UNIT II TWO DIMENSIONAL RANDOM VARIABLES

Joint distributions - Marginal and conditional distributions – Covariance - Correlation and Regression - Transformation of random variables - Central limit theorem (for iid random variables)

UNIT III CLASSIFICATION OF RANDOM PROCESSES

Definition and examples - first order, second order, strictly stationary, wide-sense stationary and ergodic processes - Markov process - Binomial, Poisson and Normal processes - Sine wave process – Random telegraph process.

UNIT IV CORRELATION AND SPECTRAL DENSITIES

Auto correlation - Cross correlation - Properties – Power spectral density – Cross spectral density - Properties – Wiener-Khinchine relation – Relationship between cross power spectrum and cross correlation function

UNIT V LINEAR SYSTEMS WITH RANDOM INPUTS

Linear time invariant system - System transfer function – Linear systems with random inputs – Auto correlation and cross correlation functions of input and output – white noise.

TEXT BOOKS

1. Oliver C. Ibe, "Fundamentals of Applied probability and Random processes", Elsevier, First Indian Reprint (2007) (For units 1 and 2)
2. Peebles Jr. P.Z., "Probability Random Variables and Random Signal Principles", Tata McGraw-Hill Publishers, Fourth Edition, New Delhi, 2002. (For units 3, 4 and 5).

REFERENCES

1. Miller, S.L and Childers, S.L, "Probability and Random Processes with applications to Signal Processing and Communications", Elsevier Inc., First Indian Reprint 2007.
2. H. Stark and J.W. Woods, "Probability and Random Processes with Applications to Signal Processing", Pearson Education (Asia), 3rd Edition, 2002.
3. Hwei Hsu, "Schaum's Outline of Theory and Problems of Probability, Random Variables and Random Processes", Tata McGraw-Hill edition, New Delhi, 2004.
4. Leon-Garcia, A, "Probability and Random Processes for Electrical Engineering", Pearson Education Asia, Second Edition, 2007.
5. Yates and D.J. Goodman, "Probability and Stochastic Processes", John Wiley and Sons, Second edition, 2005.

AIM

The aim of this course is to familiarize the student with the analysis and design of feed back amplifiers, oscillators, tuned amplifiers, wave shaping circuits, multivibrators and blocking oscillators.

OBJECTIVES

On completion of this course the student will understand

- The advantages and method of analysis of feedback amplifiers
- Analysis and design of LC and RC oscillators, tuned amplifiers, wave shaping circuits, multivibrators, blocking oscillators and time base generators.

UNIT 1 FEEDBACK AMPLIFIERS

Block diagram, Loop gain, Gain with feedback, Effects of negative feedback – Sensitivity and desensitivity of gain, Cut-off frequencies, distortion, noise, input impedance and output impedance with feedback, Four types of negative feedback connections – voltage series feedback, voltage shunt feedback, current series feedback and current shunt feedback, Method of identifying feedback topology and feedback factor, Nyquist criterion for stability of feedback amplifiers.

UNIT II OSCILLATORS

Classification, Barkhausen Criterion - Mechanism for start of oscillation and stabilization of amplitude, General form of an Oscillator, Analysis of LC oscillators - Hartley, Colpitts, Clapp, Franklin, Armstrong, Tuned collector oscillators, RC oscillators - phase shift – Wienbridge - Twin-T Oscillators, Frequency range of RC and LC Oscillators, Quartz Crystal Construction, Electrical equivalent circuit of Crystal, Miller and Pierce Crystal oscillators, frequency stability of oscillators.

UNIT III TUNED AMPLIFIERS

Coil losses, unloaded and loaded Q of tank circuits, small signal tuned amplifiers - Analysis of capacitor coupled single tuned amplifier – double tuned amplifier - effect of cascading single tuned and double tuned amplifiers on bandwidth – Stagger tuned amplifiers – large signal tuned amplifiers – Class C tuned amplifier – Efficiency and applications of Class C tuned amplifier - Stability of tuned amplifiers – Neutralization - Hazeltine neutralization method.

UNIT IV WAVE SHAPING AND MULTIVIBRATOR CIRCUITS

RC & RL Integrator and Differentiator circuits – Storage, Delay and Calculation of Transistor Switching Times – Speed-up Capacitor - Diode clippers, Diode comparator - Clampers. Collector coupled and Emitter coupled Astable multivibrator - Monostable multivibrator - Bistable multivibrators - Triggering methods for Bistable multivibrators - Schmitt trigger circuit.

UNIT V BLOCKING OSCILLATORS AND TIMEBASE GENERATORS

UJT sawtooth waveform generator, Pulse transformers – equivalent circuit – response - applications, Blocking Oscillator – Free running blocking oscillator - Astable Blocking Oscillators with base timing – Push-pull Astable blocking oscillator with emitter timing, Frequency control using core saturation, Triggered blocking oscillator – Monostable blocking oscillator with base timing – Monostable blocking oscillator with emitter timing, Time base circuits - Voltage-Time base circuit, Current-Time base circuit - Linearization through adjustment of driving waveform.

TEXT BOOKS

1. Sedra / Smith, Micro Electronic Circuits Oxford University Press, 2004.
2. S. Salivahanan, N. Suresh Kumar and A. Vallavaraj, Electronic Devices and Circuits, 2nd Edition, TMH, 2007.

REFERENCES

1. Millman J. and Taub H., Pulse Digital and Switching Waveforms, TMH, 2000.
2. Schilling and Belove, Electronic Circuits, 3rd Edition, TMH, 2002.
3. Robert L. Boylestad and Louis Nasheresky, Electronic Devices and Circuit Theory, 9th Edition, Pearson Education / PHI, 2002.
4. David A. Bell, Solid State Pulse Circuits, Prentice Hall of India, 1992.
5. Millman and Halkias. C., Integrated Electronics, TMH, 1991.

412ECT03 - COMMUNICATION THEORY

AIM

To study the various analog communication fundamentals viz., Amplitude modulation and demodulation, angle modulation and demodulation. Noise performance of various receivers and information theory with source coding theorem are also dealt.

OBJECTIVE

- To provide various Amplitude modulation and demodulation systems.
- To provide various Angle modulation and demodulation systems.
- To provide some depth analysis in noise performance of various receiver.
- To study some basic information theory with some channel coding theorem.

1. AMPLITUDE MODULATION SYSTEMS

Review of Spectral Characteristics of Periodic and Non-periodic signals; Generation and Demodulation of AM, DSBSC, SSB and VSB Signals; Comparison of Amplitude Modulation Systems; Frequency Translation; FDM; Non – Linear Distortion.

2. ANGLE MODULATION SYSTEMS

Phase and Frequency Modulation; Single tone, Narrow Band and Wideband FM; Transmission Bandwidth; Generation and Demodulation of FM Signal.

3. NOISE THEORY

Review of Probability, Random Variables and Random Process; Guassian Process; Noise – Shot noise, Thermal noise and white noise; Narrow band noise, Noise temperature; Noise Figure.

4. PERFORMANCE OF CW MODULATION SYSTEMS

Superheterodyne Radio receiver and its characteristic; SNR; Noise in DSBSC systems using coherent detection; Noise in AM system using envelope detection and its FM system; FM threshold effect; Pre-emphasis and De-emphasis in FM; Comparison of performances.

5. INFORMATION THEORY

Discrete Messages and Information Content, Concept of Amount of Information, Average information, Entropy, Information rate, Source coding to increase average information per bit, Shannon-Fano coding, Huffman coding, Lempel-Ziv (LZ) coding, Shannon's Theorem, Channel Capacity, Bandwidth- S/N trade-off, Mutual information and channel capacity, rate distortion theory, Lossy Source coding.

TEXT BOOKS

1. Dennis Roddy & John Coolen - Electronic Communication (IV Ed.), Prentice Hall of India.
2. Herbert Taub & Donald L Schilling – Principles of Communication Systems (3rd Edition) – Tata McGraw Hill, 2008.

REFERENCE:

1. Simon Haykin, Communication Systems, John Wiley & sons, NY, 4th Edition, 2001.
2. Bruce Carlson - Communication Systems. (III Ed.), Mc Graw Hill.
3. B.P.Lathi, Modern Digital and Analog Communication Systems, Third Edition, Oxford Press, 2007.
4. R.P Singh and S.D.Sapre, "Communication Systems – Analog and Digital", Tata McGraw Hill, 2nd Edition, 2007.
5. John G. Proakis, Masoud Salehi, Fundamentals of Communication Systems, Pearson Education, 2006.

412ECT04 - ELECTROMAGNETIC FIELDS

AIM

To familiarize the student to the concepts, calculations and pertaining to electric, magnetic and electromagnetic fields so that an in depth understanding of antennas, electronic devices, Waveguides is possible.

OBJECTIVES

- To analyze fields and potentials due to static charges
- To evaluate static magnetic fields
- To understand how materials affect electric and magnetic fields
- To understand the relation between the fields under time varying situations
- To understand principles of propagation of uniform plane waves.

UNIT I STATIC ELECTRIC FIELDS

Introduction to Co-ordinate System – Rectangular – Cylindrical and Spherical Co-ordinate System – Introduction to line, Surface and Volume Integrals – Definition of Curl, Divergence and Gradient – Meaning of Stokes theorem and Divergence theorem

Coulomb's Law in Vector Form – Definition of Electric Field Intensity – Principle of Superposition – Electric Field due to discrete charges – Electric field due to continuous charge distribution - Electric Field due to charges distributed uniformly on an infinite and finite line – Electric Field on the axis of a uniformly charged circular disc – Electric Field due to an infinite uniformly charged sheet.

Electric Scalar Potential – Relationship between potential and electric field - Potential due to infinite uniformly charged line – Potential due to electrical dipole - Electric Flux Density – Gauss Law – Proof of Gauss Law – Applications.

UNIT II STATIC MAGNETIC FIELD

The Biot-Savart Law in vector form – Magnetic Field intensity due to a finite and infinite wire carrying a current I – Magnetic field intensity on the axis of a circular and rectangular loop carrying a current I – Ampere's circuital law and simple applications.

Magnetic flux density – The Lorentz force equation for a moving charge and applications – Force on a wire carrying a current I placed in a magnetic field – Torque on a loop carrying a current I – Magnetic moment – Magnetic Vector Potential.

UNIT III ELECTRIC AND MAGNETIC FIELDS IN MATERIALS

Poisson's and Laplace's equation – Electric Polarization-Nature of dielectric materials- Definition of Capacitance – Capacitance of various geometries using Laplace's equation – Electrostatic energy and energy density – Boundary conditions for electric fields – Electric current – Current density – point form of ohm's law – continuity equation for current.

Definition of Inductance – Inductance of loops and solenoids – Definition of mutual inductance – simple examples. Energy density in magnetic fields – Nature of magnetic materials – magnetization and permeability - magnetic boundary conditions.

UNIT IV TIME VARYING ELECTRIC AND MAGNETIC FIELDS

Faraday's law – Maxwell's Second Equation in integral form from Faraday's Law – Equation expressed in point form.

Displacement current – Ampere's circuital law in integral form – Modified form of Ampere's circuital law as Maxwell's first equation in integral form – Equation expressed in point form.

Maxwell's four equations in integral form and differential form.

Poynting Vector and the flow of power – Power flow in a co-axial cable – Instantaneous Average and Complex Poynting Vector.

UNIT V ELECTROMAGNETIC WAVES

Derivation of Wave Equation – Uniform Plane Waves – Maxwell's equation in Phasor form – Wave equation in Phasor form – Plane waves in free space and in a homogenous material.

Wave equation for a conducting medium – Plane waves in lossy dielectrics – Propagation in good conductors – Skin effect.

Linear, Elliptical and circular polarization – Reflection of Plane Wave from a conductor – normal incidence – Reflection of Plane Waves by a perfect dielectric – normal and oblique incidence.

Dependence on Polarization. Brewster angle.

TEXTBOOKS

1. W H.Hayt & J A Buck : "Engineering Electromagnetics" TATA McGraw-Hill, 7th Edition 2007 (Unit I,II,III).
2. E.C. Jordan & K.G. Balmain "Electromagnetic Waves and Radiating Systems." Pearson Education/PHI 4nd edition 2006. (Unit IV, V).

REFERENCES

1. Matthew N.O.Sadiku: "Elements of Engineering Electromagnetics" Oxford University Press, 4th edition, 2007
2. Narayana Rao, N : "Elements of Engineering Electromagnetics" 6th edition, Pearson Education, New Delhi, 2006.
3. Ramo, Whinnery and Van Duzer: "Fields and Waves in Communications Electronics" John Wiley & Sons ,3rd edition 2003.
4. David K.Cheng: "Field and Wave Electromagnetics - Second Edition-Pearson Edition, 2004.
5. G.S.N. Raju, Electromagnetic Field Theory & Transmission Lines, Pearson Education, 2006

AIM:

To teach the basic concepts in the design of electronic circuits using linear integrated circuits and their applications in the processing of analog signals.

OBJECTIVES

- To introduce the basic building blocks of linear integrated circuits.
- To teach the linear and non-linear applications of operational amplifiers.
- To introduce the theory and applications of analog multipliers and PLL.
- To teach the theory of ADC and DAC
- To introduce the concepts of waveform generation and introduce some special function ICs.

UNIT - I IC FABRICATION AND CIRCUIT CONFIGURATION FOR LINEAR ICs

Advantages of ICs over discrete components – Manufacturing process of monolithic ICs – Construction of monolithic bipolar transistor – Monolithic diodes – Integrated Resistors – Monolithic Capacitors – Inductors. Current mirror and current sources, Current sources as active loads, Voltage sources, Voltage References, BJT Differential amplifier with active loads, General operational amplifier stages -and internal circuit diagrams of IC 741, DC and AC performance characteristics, slew rate, Open and closed loop configurations.

UNIT - II APPLICATIONS OF OPERATIONAL AMPLIFIERS

Sign Changer, Scale Changer, Phase Shift Circuits, Voltage Follower, V-to-I and I-to-V converters, adder, subtractor, Instrumentation amplifier, Integrator, Differentiator, Logarithmic amplifier, Antilogarithmic amplifier, Comparators, Schmitt trigger, Precision rectifier, peak detector, clipper and clamper, Low-pass, high-pass and band-pass Butterworth filters.

UNIT - III ANALOG MULTIPLIER AND PLL

Analog Multiplier using Emitter Coupled Transistor Pair - Gilbert Multiplier cell - Variable transconductance technique, analog multiplier ICs and their applications, Operation of the basic PLL, Closed loop analysis, Voltage controlled oscillator, Monolithic PLL IC 565, application of PLL for AM detection, FM detection, FSK modulation and demodulation and Frequency synthesizing.

UNIT - IV ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTERS

Analog and Digital Data Conversions, D/A converter – specifications - weighted resistor type, R-2R Ladder type, Voltage Mode and Current-Mode $R-2R$ Ladder types - switches for D/A converters, high speed sample-and-hold circuits, A/D Converters – specifications - Flash type - Successive Approximation type - Single Slope type - Dual Slope type - A/D Converter using Voltage-to-Time Conversion - Over-sampling A/D Converters.

UNIT - V WAVEFORM GENERATORS AND SPECIAL FUNCTION ICs

Sine-wave generators, Multivibrators and Triangular wave generator, Saw-tooth wave generator, ICL8038 function generator, Timer IC 555, IC Voltage regulators - Three terminal fixed and adjustable voltage regulators - IC 723 general purpose regulator - Monolithic switching regulator, Switched capacitor filter IC MF10, Frequency to Voltage and Voltage to Frequency converters, Audio Power amplifier, Video Amplifier, Isolation Amplifier, Opto-couplers and fibre optic IC.

TEXT BOOKS:

1. Sergio Franco, Design with operational amplifiers and analog integrated circuits, 3rd Edition, Tata McGraw-Hill, 2007.
2. D.Roy Choudhry, Shail Jain, Linear Integrated Circuits, New Age International Pvt. Ltd., 2000.

REFERENCES:

1. B.S.Sonde, System design using Integrated Circuits , New Age Pub, 2nd Edition, 2001
2. Gray and Meyer, Analysis and Design of Analog Integrated Circuits, Wiley International, 2005.
3. Ramakant A.Gayakwad, OP-AMP and Linear ICs, Prentice Hall / Pearson Education, 4th Edition, 2001.
4. J.Michael Jacob, Applications and Design with Analog Integrated Circuits, Prentice Hall of India, 1996.
5. William D.Stanley, Operational Amplifiers with Linear Integrated Circuits, Pearson Education, 2004.
6. K Lal Kishore, Operational Amplifier and Linear Integrated Circuits, Pearson Education, 2006.
7. S.Salivahanan & V.S. Kanchana Bhaskaran, Linear Integrated Circuits, TMH, 2008.

412ECT06 - CONTROL SYSTEMS

AIM

To familiarize the students with concepts related to the operation analysis and stabilization of control systems

OBJECTIVES

- To understand the open loop and closed loop (feedback) systems
- To understand time domain and frequency domain analysis of control systems required for stability analysis.
- To understand the compensation technique that can be used to stabilize control systems

1. CONTROL SYSTEM MODELING

Basic Elements of Control System – Open loop and Closed loop systems - Differential equation - Transfer function, Modeling of Electric systems, Translational and rotational mechanical systems - Block diagram reduction Techniques - Signal flow graph

2. TIME RESPONSE ANALYSIS

Time response analysis - First Order Systems - Impulse and Step Response analysis of second order systems - Steady state errors – P, PI, PD and PID Compensation, Analysis using MATLAB

3. FREQUENCY RESPONSE ANALYSIS

Frequency Response - Bode Plot, Polar Plot, Nyquist Plot - Frequency Domain specifications from the plots - Constant M and N Circles - Nichol's Chart - Use of Nichol's Chart in Control System Analysis. Series, Parallel, series-parallel Compensators - Lead, Lag, and Lead Lag Compensators, Analysis using MATLAB.

4. STABILITY ANALYSIS

Stability, Routh-Hurwitz Criterion, Root Locus Technique, Construction of Root Locus, Stability, Dominant Poles, Application of Root Locus Diagram - Nyquist Stability Criterion - Relative Stability, Analysis using MATLAB

5. STATE VARIABLE ANALYSIS & DIGITAL CONTROL SYSTEMS

State space representation of Continuous Time systems – State equations – Transfer function from State Variable Representation – Solutions of the state equations - Concepts of Controllability and Observability – State space representation for Discrete time systems. Sampled Data control systems – Sampling Theorem – Sample & Hold – Open loop & Closed loop sampled data systems.

TEXTBOOK:

1. J.Nagrath and M.Gopal, " Control System Engineering", New Age International Publishers, 5th Edition, 2007.
2. M.Gopal, "Control System – Principles and Design", Tata McGraw Hill, 2nd Edition, 2002.

REFERENCES:

1. Benjamin.C.Kuo, "Automatic control systems", Prentice Hall of India, 7th Edition,1995.
2. M.Gopal, Digital Control and State Variable Methods, 2nd Edition, TMH, 2007.
3. Schaum's Outline Series, 'Feedback and Control Systems' Tata McGraw-Hill, 2007.
4. John J.D'azzo & Constantine H.Houpis, 'Linear control system analysis and design', Tata McGraw-Hill, Inc., 1995.
5. Richard C. Dorf & Robert H. Bishop, " Modern Control Systems", Addison – Wesley, 1999.

412ECP01 - ELECTRONICS CIRCUITS II AND SIMULATION LAB

Design of following circuits

1. Series and Shunt feedback amplifiers:
2. Frequency response, Input and output impedance calculation
3. RC Phase shift oscillator, Wien Bridge Oscillator
4. Hartley Oscillator, Colpitts Oscillator
5. Tuned Class C Amplifier
6. Integrators, Differentiators, Clippers and Clampers
7. Astable, Monostable and Bistable multivibrators

SIMULATION USING PSPICE:

1. Differential amplifier
2. Active filters : Butterworth 2nd order LPF, HPF (Magnitude & Phase Response)
3. Astable, Monostable and Bistable multivibrator - Transistor bias
4. D/A and A/D converters (Successive approximation)
5. Analog multiplier
6. CMOS Inverter, NAND and NOR

LIST OF EQUIPMENTS AND COMPONENTS FOR A BATCH OF 30 STUDENTS (3 per Batch)

S.No	Name of the equipments / Components	Quantity Required	Remarks
1	Variable DC Power Supply	8	(0-30V)
2	Fixed Power Supply	4	+ / - 12V
3	CRO	6	30MHz
4	Multimeter	6	Digital
5	Multimeter	2	Analog
6	Function Generator	6	1 MHz
7	Digital LCR Meter	1	
8	PC with SPICE Simulation Software	6	
Consumables (Minimum of 25 Nos. each)			
9	BC107, BF195, 2N2222, BC147		
10	Resistors 1/4 Watt Assorted		
11	Capacitors		
12	Inductors		
13	Diodes, Zener Diodes		
14	Bread Boards		

412ECP02 - LINEAR INTEGRATED CIRCUITS LAB

Design and testing of

1. Inverting, Non inverting and Differential amplifiers.
2. Integrator and Differentiator.
3. Instrumentation amplifier
4. Active lowpass, Highpass and bandpass filters.
5. Astable & Monostable multivibrators and Schmitt Trigger using op-amp.
6. Phase shift and Wien bridge oscillators using op-amp.
7. Astable and monostable multivibrators using NE555 Timer.
8. PLL characteristics and its use as Frequency Multiplier.
9. DC power supply using LM317 and LM723.
10. Study of SMPS.
11. Simulation of Experiments 3, 4, 5, 6 and 7 using PSpice netlists.

Note: Op-Amps uA741, LM 301, LM311, LM 324 & AD 633 may be used

LIST OF EQUIPMENTS AND COMPONENTS FOR A BATCH OF 30 STUDENTS (3 per Batch)

S.No	Name of the equipments / Components	Quantity Required	Remarks
1	Dual ,(0-30V) variable Power Supply	10	-
2	CRO	9	30MHz
3	Digital Multimeter	10	Digital
4	Function Generator	8	1 MHz
5	IC Tester (Analog)	2	
6	Bread board	10	
7	Computer (PSPIICE installed)	1	
Consumables (Minimum of 25 Nos. each)			
1	IC 741	25	
2	IC NE555	25	
3	LED	25	
4	LM317	25	
5	LM723	25	
6	ICSG3524 / SG3525	25	
7	Transistor - 2N3391	25	
8	Diodes,	25	IN4001,BY126
9	Zener diodes	25	
10	Potentiometer		
11	Step-down transformer	1	230V/12-0-12V
12	Capacitor		
13	Resistors 1/4 Watt Assorted	25	
14	Single Strand Wire		

AIM

1. To expose the students to the basic operation of electrical machines and help them to develop experimental skills.
2. To study the concepts, performance characteristics, time and frequency response of linear systems.
3. To study the effects of controllers.
4. Open circuit and load characteristics of separately excited and self excited D.C. generator.
5. Load test on D.C. shunt motor.
6. Swinburne’s test and speed control of D.C. shunt motor.
7. Load test on single phase transformer and open circuit and short circuit test on single phase transformer
8. Regulation of three phase alternator by EMF and MMF methods.
9. Load test on three phase induction motor.
- 10.No load and blocked rotor tests on three phase induction motor (Determination of equivalent circuit parameters)
11. Study of D.C. motor and induction motor starters.
12. Digital simulation of linear systems.
13. Stability Analysis of Linear system using Mat lab.
14. Study the effect of P, PI, PID controllers using Mat lab.
15. Design of Lead and Lag compensator.
16. Transfer Function of separately excited D.C.Generator.
17. Transfer Function of armature and Field Controller D.C.Motor.

1. Open circuit and load characteristics of separately excited and self excited D.C. generator.

Sl. No.	Apparatus	Range	Quantity
1	Motor Generator set	-	1
2	Rheostat	200Ω, 5A 175Ω, 1.5A	1 2
3	Voltmeter DC	300V 30V	1 1
4	Ammeter DC	30A 2A	1 2
5	DPST switch		2
6	Three point starter		1
7	Tachometer		1

2. Load test on D.C. shunt motor.

Sl. No.	Apparatus	Range	Quantity
1	DC Motor	-	1
2	Rheostat	175Ω, 1.5A	1
3	Voltmeter DC	300V	1
4	Ammeter DC	30A	1
5	DPST switch		1
6	Three point starter		1
7	Tachometer		1

3. Swinburne's test and speed control of D.C. shunt motor

Sl. No.	Apparatus	Range	Quantity
1	DC Motor	-	1
2	Rheostat	100Ω, 5A 175Ω, 1.5A	1 1
3	Voltmeter DC	300V	1
4	Ammeter DC	5A 2A	1 1
5	DPST switch		1
6	Tachometer		1

4. Load test on single-phase transformer and open circuit and short circuit test on single-phase transformer.

Sl. No.	Apparatus	Range	Quantity
1	Single phase Transformer	-	1
2	Wattmeter	300V, 5A,UPF 300V, 5A,LPF	1 1
3	Voltmeter AC	300V	2
4	Ammeter AC	5A 30A	1 1
5	Single phase auto-transformer		1
6	Resistive load		1

5. Regulation of three-phase alternator by EMF and MMF method.

Sl. No.	Apparatus	Range	Quantity
1	Motor Alternator set	-	1
2	Rheostat	200Ω, 5A 175Ω, 1.5A	1 1
3	Voltmeter DC Voltmeter AC	300V 600V	1 1
4	Ammeter DC Ammeter AC	2A 30A	1 1
5	DPST switch TPST switch		1 1
6	Tachometer		1

6. Load test on three phase Induction motor.

Sl. No.	Apparatus	Range	Quantity
1	Three Phase Induction Motor	-	1
2	Wattmeter	600V, 10A,UPF	2
3	Voltmeter AC	600V	1
4	Ammeter AC	10A	1
5	Brake drum arrangement		
6	Star delta starter		1
7	Tachometer		1

7. No load and blocked rotor test on three-phase induction motor (Determination of equivalent circuit parameters)

Sl. No.	Apparatus	Range	Quantity
1	Three Phase Induction Motor	-	1
2	Wattmeter	600V, 10A,UPF 600V, 5A,LPF	2 2
3	Voltmeter AC	600V 150V	1 1
4	Ammeter AC	10A 5A	1 1
5	Brake drum arrangement		
6	Three phase auto-transformer		1

8. Study of D.C. motor and Induction motor starters.

Sl. No.	Apparatus	Quantity
1	Three point starter	1
2	Four point starter	1
3	Star-delta starter	1
4	DOL starter	1
5	Three phase auto-transformer	1

9. Digital simulation of linear systems.

Simulink software for minimum 3 users license

10. Stability analysis of linear system using Mat lab.

Matlab software for minimum 3 users license

11. Study of effect of P, PI, PID controllers using Mat lab.

Matlab software for minimum 3 users license

12. Design of lead and lag compensator.

Sl. No.	Apparatus
1	Resistor
2	Capacitor
3	Function generator
4	Bread Board

13. Transfer function of separately excited D.C. generator.

Sl. No.	Apparatus	Range	Quantity
1	Motor Generator set	-	1
2	Rheostat	200 Ω , 5A 175 Ω , 1.5A	1 2
3	Voltmeter DC	300V 30V	1 1
4	Ammeter DC	30A 2A	1 2
5	DPST switch		2
6	Three point starter		1
7	Tachometer		1

14. Transfer function of armature and field controller D.C. motor.

Sl. No.	Apparatus	Range	Quantity
1	DC Motor	-	1
2	Rheostat	175 Ω , 1.5A	1
3	Voltmeter DC	300V	1
4	Ammeter DC	30A	1
5	DPST switch		1
6	Three point starter		1
7	Tachometer		1

FIFTH SEMESTER
512ECT01 - DIGITAL COMMUNICATION

UNIT I DIGITAL COMMUNICATION SYSTEM

Introduction to Analog Pulse Communication Systems – Digital Communication Systems – Functional description, Channel classification, Performance Measure; Geometric representation of Signals, Bandwidth , Mathematical Models of Communication Channel.

UNIT II BASEBAND FORMATTING TECHNIQUES

Sampling – Impulse sampling, Natural Sampling, Sampler Implementation; Quantisation – Uniform and Non-uniform; Encoding Techniques for Analog Sources- Temporal waveform encoding, Spectral waveform encoding, Model-based encoding, Comparison of speech encoding methods.

UNIT III BASEBAND CODING TECHNIQUES

Error Control Codes - Block Codes , Convolutional Codes, Concept of Error Free Communication; Classification of line codes, desirable characteristics and power spectra of line codes.

UNIT IV BASEBAND RECEPTION TECHNIQUES

Noise in Communication Systems; Receiving Filter – Correlator type, Matched Filter type; Equalising Filter - Signal and system design for ISI elimination, Implementation, Eye Pattern analysis; Synchronisation; Detector – Maximum Likelihood Detector, Error Probability, Figure-of-Merit for Digital Detection.

UNIT V BANDPASS SIGNAL TRANSMISSION AND RECEPTION

Memory less modulation methods - Representation and Spectral characteristics, ASK, PSK, QAM, QPSK, FSK; Bandpass receiving filter, Error performance – Coherent and Non-coherent detection systems.

TEXT BOOKS:

1. Amitabha Bhattacharya, "Digital Communications", Tata McGraw Hill, 2006.
2. Simon Haykin, "Digital Communications", John Wiley, 2006.

REFERENCES:

1. John.G. Proakis, "Fundamentals of Communication Systems", Pearson Education, 2006.
2. Michael. B. Purrsley, "Introduction to Digital Communication", Pearson Education, 2006.
3. Bernard Sklar, Digital Communication, 2nd Edition, Paerson Education, 2006
4. Herbert Taub & Donald L Schilling – Principles of Communication Systems (3rd Edition) – Tata McGraw Hill, 2008.
5. Leon W. Couch, Digital and Analog Communication Systems, 6th Edition, Pearson Education, 2001.

UNIT I DISCRETE FOURIER TRANSFORM

DFT and its properties, Relation between DTFT and DFT, FFT computations using Decimation in time and Decimation in frequency algorithms, Overlap-add and save methods.

UNIT II INFINITE IMPULSE RESPONSE DIGITAL FILTERS:

Review of design of analogue Butterworth and Chebyshev Filters, Frequency transformation in analogue domain – Design of IIR digital filters using impulse invariance technique – Design of digital filters using bilinear transform – pre warping – Realization using direct, cascade and parallel forms.

UNIT III FINITE IMPULSE RESPONSE DIGITAL FILTERS

Symmetric and Antisymmetric FIR filters – Linear phase FIR filters – Design using Hamming, Hanning and Blackmann Windows – Frequency sampling method – Realization of FIR filters – Transversal, Linear phase and Polyphase structures.

UNIT IV FINITE WORD LENGTH EFFECTS

Fixed point and floating point number representations – Comparison – Truncation and Rounding errors - Quantization noise – derivation for quantization noise power – coefficient quantization error – Product quantization error - Overflow error – Roundoff noise power - limit cycle oscillations due to product roundoff and overflow errors – signal scaling.

UNIT V MULTIRATE SIGNAL PROCESSING

Introduction to Multirate signal processing-Decimation-Interpolation-Polyphase implementation of FIR filters for interpolator and decimator -Multistage implementation of sampling rate conversion- Design of narrow band filters - Applications of Multirate signal processing.

TEXT BOOKS:

1. John G Proakis and Manolakis, " Digital Signal Processing Principles, Algorithms and Applications", Pearson, Fourth Edition, 2007.
2. S.Salivahanan, A. Vallavaraj, C. Gnanapriya, Digital Signal Processing, TMH/McGraw Hill International, 2007

REFERENCES:

1. E.C. Ifeachor and B.W. Jervis, " Digital signal processing – A practical approach", Second edition, Pearson, 2002.
2. S.K. Mitra, Digital Signal Processing, A Computer Based approach, Tata McGraw Hill, 1998.
3. P.P.Vaidyanathan, Multirate Systems & Filter Banks, Prentice Hall, Englewood cliffs, NJ, 1993.
4. Johny R. Johnson, Introduction to Digital Signal Processing, PHI, 2006.

UNIT I INTRODUCTION

Computing and Computers, Evolution of Computers, VLSI Era, System Design- Register Level, Processor - Level, CPU Organization, Data Representation, Fixed - Point Numbers, Floating Point Numbers, Instruction Formats, Instruction Types. Addressing modes.

UNIT II DATA PATH DESIGN

Fixed Point Arithmetic, Addition, Subtraction, Multiplication and Division, Combinational and Sequential ALUs, Carry look ahead adder, Robertson algorithm, booth's algorithm, non-restoring division algorithm, Floating Point Arithmetic, Coprocessor, Pipeline Processing, Pipeline Design, Modified booth's Algorithm.

UNIT III CONTROL DESIGN

Hardwired Control, Microprogrammed Control, Multiplier Control Unit, CPU Control Unit, Pipeline Control, Instruction Pipelines, Pipeline Performance, Superscalar Processing, Nano Programming.

UNIT IV MEMORY ORGANIZATION

Random Access Memories, Serial - Access Memories, RAM Interfaces, Magnetic Surface Recording, Optical Memories, multilevel memories, Cache & Virtual Memory, Memory Allocation, Associative Memory.

UNIT V SYSTEM ORGANIZATION

Communication methods, Buses, Bus Control, Bus Interfacing, Bus arbitration, IO and system control, IO interface circuits, Handshaking, DMA and interrupts, vectored interrupts, PCI interrupts, pipeline interrupts, IOP organization, operation systems, multiprocessors, fault tolerance, RISC and CISC processors, Superscalar and vector processor.

TEXTBOOKS:

1. John P.Hayes, 'Computer architecture and Organisation', Tata McGraw-Hill, Third edition, 1998.
2. V.Carl Hamacher, Zvonko G. Varanescic and Safat G. Zaky, " Computer Organisation", V edition, McGraw-Hill Inc, 1996.

REFERENCES:

1. Morris Mano, "Computer System Architecture", Prentice-Hall of India, 2000.
2. Paraami, "Computer Architecture", BEH R002, Oxford Press.
3. P.Pal Chaudhuri, , "Computer organization and design", 2nd Ed., Prentice Hall of India, 2007.
4. G.Kane & J.Heinrich, ' MIPS RISC Architecture ', Englewood cliffs, New Jersey, Prentice Hall, 1992.

512ECT04 - TRANSMISSION LINES AND WAVE GUIDES

UNIT I FILTERS

The neper - the decibel - Characteristic impedance of Symmetrical Networks - Current and voltage ratios - Propagation constant, - Properties of Symmetrical Networks - Filter fundamentals - Pass and Stop bands. Behaviour of the Characteristic impedance. Constant K Filters - Low pass, High pass band, pass band elimination filters - m - derived sections - Filter circuit design - Filter performance - Crystal Filters.

UNIT II TRANSMISSION LINE PARAMETERS

A line of cascaded T sections - Transmission lines - General Solution, Physical Significance of the equations, the infinite line, wavelength, velocity, propagation, Distortion line, the telephone cable, Reflection on a line not terminated in Z_0 , Reflection Coefficient, Open and short circuited lines, Insertion loss.

UNIT III THE LINE AT RADIO FREQUENCY

Parameters of open wire line and Coaxial cable at RF - Line constants for dissipation - voltages and currents on the dissipation less line - standing waves - nodes - standing wave ratio - input impedance of open and short circuited lines - power and impedance measurement on lines - Γ / 4 line, Impedance matching - single and double-stub matching circle diagram, smith chart and its applications - Problem solving using Smith chart.

UNIT IV GUIDED WAVES BETWEEN PARALLEL PLANES

Application of the restrictions to Maxwell's equations - transmission of TM waves between Parallel planes - Transmission of TE waves between Parallel planes. Transmission of TEM waves between Parallel planes - Manner of wave travel. Velocities of the waves - characteristic impedance - Attenuators

UNIT V WAVEGUIDES

Application of Maxwell's equations to the rectangular waveguide. TM waves in Rectangular guide. TE waves in Rectangular waveguide - Cylindrical waveguides. The TEM wave in coaxial lines. Excitation of wave guides. Guide termination and resonant cavities.

TEXT BOOK:

1. John D.Ryder, "Networks, lines and fields", Prentice Hall of India, 2nd Edition, 2006.

REFERENCES:

1. E.C.Jordan, K.G. Balmain: "E.M.Waves & Radiating Systems", Pearson Education, 2006.
2. Joseph Edminister, Schaum's Series, Electromagnetics, TMH, 2007.
3. G S N Raju, Electromagnetic Field Theory and Transmission Lines, Pearson Education, 2006.

512ECT05 - ENVIRONMENTAL SCIENCE AND ENGINEERING

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY

Definition, scope and importance of environment – need for public awareness – concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and exsitu conservation of biodiversity. Field study of common plants, insects, birds Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II ENVIRONMENTAL POLLUTION

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – soil waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides. Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III NATURAL RESOURCES

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles. Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies – role of nongovernmental organization- environmental ethics: Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – wasteland reclamation – consumerism and waste products – environment production act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – enforcement machinery involved in environmental legislation- central and state pollution control boards- Public awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare – role of information technology in environment and human health – Case studies.

TEXT BOOKS:

1. Gilbert M.Masters, "Introduction to Environmental Engineering and Science", 2nd Edition, Pearson Education ,2004.
2. Benny Joseph, "Environmental Science and Engineering", Tata McGraw-Hill, New Delhi, 2006.

REFERENCES:

1. R.K. Trivedi, "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol. I and II, Enviro Media.
2. Cunningham, W.P. Cooper, T.H. Gorhani, "Environmental Encyclopedia", Jaico Publ., House, Mumbai, 2001.
3. Dharmendra S. Sengar, "Environmental law", Prentice hall of India PVT LTD, New Delhi, 2007.
4. Rajagopalan, R, "Environmental Studies-From Crisis to Cure", Oxford University Press (2005)

UNIT I INTRODUCTION TO 8 BIT AND 16 BIT MICROPROCESSORS – H/W ARCHITECTURE

Introduction to microprocessor, computer and its organization, Programming system, Address bus, data bus and control bus, Tristate bus, clock generation, Connecting Microprocessor to I/O devices , Data transfer schemes, Architectural advancements of microprocessors. Introductory System design using microprocessors, 8086 – Hardware Architecture, External memory addressing, Bus cycles, some important Companion Chips, Maximum mode bus cycle, 8086 system configuration, Memory Interfacing, Minimum mode system configuration, Maximum mode system configuration, Interrupt processing, Direct memory access.

UNIT II 16 BIT MICROPROCESSOR INSTRUCTION SET AND ASSEMBLY LANGUAGE PROGRAMMING

Programmer's model of 8086, operand types, operand addressing, assembler directives, instruction set - Data transfer group, Arithmetic group, logical group, control transfer group, miscellaneous instruction groups, programming.

UNIT III MICROPROCESSOR PERIPHERAL INTERFACING

Introduction, Generation of I/O Ports, Programmable Peripheral Interface (PPI)-Intel 8255, Sample-and-Hold Circuit and Multiplexer, Keyboard and Display Interface, Keyboard and Display Controller (8279), Programmable Interval timers (Intel 8253, 8254), D-to-A converter, A-to-D converter, CRT Terminal Interface, Printer Interface.

UNIT IV 8 BIT MICROCONTROLLER- H/W ARCHITECTURE, INSTRUCTION SET AND PROGRAMMING

Introduction to 8051 Micro-controller, Architecture, Memory organization, Special function registers, Port Operation, Memory Interfacing, I/O Interfacing, Programming 8051 resources, interrupts, Programmer's model of 8051, Operand types, Operand addressing, Data transfer instructions, Arithmetic instructions, Logic instructions, Control transfer instructions, Programming.

UNIT V SYSTEM DESIGN USING MICRO PROCESSOR & MICROCONTROLLER

Case studies – Traffic light control, washing machine control, RTC Interfacing using I2C Standard- Motor Control- Relay, PWM, DC & Stepper Motor.

TEXT BOOKS:

1. Krishna Kant, "MICROPROCESSORS AND MICROCONTROLLERS Architecture, programming and system design using 8085, 8086, 8051 and 8096". PHI 2007.
2. Douglas V Hall, "MICROPROCESSORS AND INTERFACING, PROGRAMMING AND HARDWARE" TMH, 2006.

REFERENCES:

1. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D.MCKinlay The 8051 Microcontroller and Embedded Systems, Second Edition, Pearson Education 2008.
2. Kenneth J. Ayala, "The 8086 Microprocessor: Programming & Interfacing The PC", Delmar Publishers, 2007.
3. A K Ray, K M Bhurchandi, Advanced Microprocessors and Peripherals, TMH, 2007.

512ECP01 - DIGITAL SIGNAL PROCESSING LAB

USING TMS320C5X/TMS320C 67XX/ADSP 218X/219X/BS531/532/561

1. Study of various addressing modes of DSP using simple programming examples
2. Implementation of Linear and Circular Convolution
3. Sampling of input signal and display
4. Waveform generation
5. Implementation of FIR filter

USING MATLAB

1. Generation of Signals
2. Linear and circular convolution of two sequences
3. Sampling and effect of aliasing
4. Design of FIR filters
5. Design of IIR filters
6. Calculation of FFT of a signal
7. Decimation by polyphase decomposition.

Requirement for a batch of 30 students

S. No.	Description of Equipment	Quantity required
1.	PCs with Fixed / Floating point DSP Processors (Kit / Add-on Cards)	15 Units (2 students per system)
2.	List of software required: MATLAB with Simulink and Processing Tool Box	10 Users license
3.	Function Generators (1MHz)	15
4.	CRO (20MHz)	15

512ECP02 - COMMUNICATION SYSTEMS LAB

1. Amplitude modulation and Demodulation.
2. Frequency Modulation and Demodulation
3. Pulse Modulation – PAM / PWM / PPM
4. Pulse Code Modulation
5. Delta Modulation, Adaptive Delta Modulation.
6. Digital Modulation & Demodulation – ASK, PSK, QPSK, FSK (Hardware & MATLAB)
7. Designing, Assembling and Testing of Pre-Emphasis / De-emphasis Circuits.
8. PLL and Frequency Synthesizer
9. Line Coding
10. Error Control Coding using MATLAB.
11. Sampling & Time Division Multiplexing.
12. Frequency Division Multiplexing,

Requirement for a batch of 30 students

S. No.	Description of Equipment	Quantity required
1.	CRO – 20 MHz	15
2.	Function Generator (1 MHz)	15
3.	Power Supply (0 - 30 Volts Variable) (IC Power supply)	15
4.	Bread Board	10
5.	AM Transceiver Kit	2
6.	FM Transceiver Kit	2
7.	PAM,PPM,PWM Trainer Kits	2
8.	PCM /DM/ ADM Trainer Kit	2
9.	Line Coding & Decoding Kit	2
10.	ASK,PSK,FSK,QPSK Trainer Kits	2
11.	Sampling & TDM trainer kit	2
12.	Mat lab (Communication tool box)	5 user license
Consumables		
13.	IC 565,566,567,741	Minimum of 50 No. each
14.	BC 107	
15.	BFW10	
16.	OA79	
17.	Resistors (Various ranges)	
18.	Capacitors (Various ranges)	
19.	Decade Inductance box	

512ECP03 - MICROPROCESSOR AND MICROCONTROLLER LAB

1. Programs for 16 bit Arithmetic operations (Using 8086).
2. Programs for Sorting and Searching (Using 8086).
3. Programs for String manipulation operations (Using 8086).
4. Programs for Digital clock and Stop watch (Using 8086).
5. Interfacing ADC and DAC.
6. Parallel Communication between two MP Kits using Mode 1 and Mode 2 of 8255.
7. Interfacing and Programming 8279, 8259, and 8253.
8. Serial Communication between two MP Kits using 8251.
9. Interfacing and Programming of Stepper Motor and DC Motor Speed control.
10. Programming using Arithmetic, Logical and Bit Manipulation instructions of 8051 microcontroller.
11. Programming and verifying Timer, Interrupts and UART operations in 8051 microcontroller.
12. Communication between 8051 Microcontroller kit and PC.

Requirement for a batch of 30 students

S.No.	Description of Equipment	Quantity required
1.	8086 Trainer	15 Nos.
2.	8051 Trainer	15 Nos.
3.	8255 Interfacing Card	3 Nos.
4.	8279 Interfacing Card	3 Nos.
5.	8259 Interfacing card	3 Nos.
6.	8251 Interfacing Card	3 Nos.
7.	ADC Interfacing card	3 Nos.
8.	DAC Interfacing Card	3 Nos.
9.	Stepper motor Interfacing card	3 Nos.
10.	DC motor Interfacing card 3	3 Nos.

SIXTH SEMESTER

612ECT01 - PRINCIPLES OF MANAGEMENT

UNIT I OVERVIEW OF MANAGEMENT

Definition - Management - Role of managers - Evolution of Management thought - Organization and the environmental factors – Trends and Challenges of Management in Global Scenario.

UNIT II PLANNING

Nature and purpose of planning - Planning process - Types of plans – Objectives - Managing by objective (MBO) Strategies - Types of strategies - Policies – Decision Making - Types of decision - Decision Making Process - Rational Decision Making Process - Decision Making under different conditions.

UNIT III ORGANIZING

Nature and purpose of organizing - Organization structure - Formal and informal groups / organization - Line and Staff authority - Departmentation - Span of control - Centralization and Decentralization - Delegation of authority - Staffing - Selection and Recruitment - Orientation - Career Development - Career stages – Training - Performance Appraisal.

UNIT IV DIRECTING

Creativity and Innovation - Motivation and Satisfaction - Motivation Theories - Leadership Styles - Leadership theories - Communication - Barriers to effective communication - Organization Culture - Elements and types of culture – Managing cultural diversity.

UNIT V CONTROLLING

Process of controlling - Types of control - Budgetary and non-budgetary control techniques - Managing Productivity - Cost Control - Purchase Control – Maintenance Control - Quality Control - Planning operations.

TEXT BOOKS:

1. Stephen P. Robbins and Mary Coulter, 'Management', Prentice Hall of India, 8th edition.
2. Charles W L Hill, Steven L McShane, 'Principles of Management', Mcgraw Hill Education, Special Indian Edition, 2007.

REFERENCES:

1. Hellriegel, Slocum & Jackson, ' Management - A Competency Based Approach', Thomson South Western, 10th edition, 2007.
2. Harold Koontz, Heinz Weihrich and Mark V Cannice, 'Management - A global & Entrepreneurial Perspective', Tata Mcgraw Hill, 12th edition, 2007.
3. Andrew J. Dubrin, 'Essentials of Management', Thomson Southwestern, 7th edition, 2007.

612ECT02 - MEASUREMENTS AND INSTRUMENTATION

UNIT I BASIC MEASUREMENT CONCEPTS

Measurement systems – Static and dynamic characteristics – units and standards of measurements – error :- accuracy and precision, types, statistical analysis – moving coil, moving iron meters – multimeters – Bridge measurements : – Maxwell, Hay, Schering, Anderson and Wien bridge.

UNIT II BASIC ELECTRONIC MEASUREMENTS

Electronic multimeters – Cathode ray oscilloscopes – block schematic – applications – special oscilloscopes :- delayed time base oscilloscopes, analog and digital storage oscilloscope, sampling oscilloscope – Q meters – Vector meters – RF voltage and power measurements – True RMS meters.

UNIT III SIGNAL GENERATORS AND ANALYZERS

Function generators – pulse and square wave generators, RF signal generators – Sweep generators – Frequency synthesizer – wave analyzer – Harmonic distortion analyzer – spectrum analyzer :- digital spectrum analyzer, Vector Network Analyzer – Digital L,C,R measurements, Digital RLC meters.

UNIT IV DIGITAL INSTRUMENTS

Comparison of analog and digital techniques – digital voltmeter – multimeters – frequency counters – measurement of frequency and time interval – extension of frequency range – Automation in digital instruments, Automatic polarity indication, automatic ranging, automatic zeroing, fully automatic digital instruments, Computer controlled test systems, Virtual instruments.

UNIT V DATA ACQUISITION SYSTEMS AND FIBER OPTIC MEASUREMENTS

Elements of a digital data acquisition system – interfacing of transducers – multiplexing – data loggers –computer controlled instrumentation – IEEE 488 bus – fiber optic measurements for power and system loss – optical time domains reflectometer.

TEXT BOOKS:

1. Albert D.Helfrick and William D.Cooper – Modern Electronic Instrumentation and Measurement Techniques, Pearson / Prentice Hall of India, 2007.
2. Ernest O. Doebelin, Measurement Systems- Application and Design, TMH, 2007.

REFERENCES:

1. Joseph J.Carr, Elements of Electronics Instrumentation and Measurement, Pearson Education, 2003.
2. Alan. S. Morris, Principles of Measurements and Instrumentation, 2nd Edition, Prentice Hall of India, 2003.
3. David A. Bell, Electronic Instrumentation and measurements, Prentice Hall of India Pvt Ltd, 2003.
4. B.C. Nakra and K.K. Choudhry, Instrumentation, Measurement and Analysis, 2nd Edition, TMH, 2004.
5. James W. Dally, William F. Riley, Kenneth G. McConnell, Instrumentation for Engineering Measurements, 2nd Edition, John Wiley, 2003.

UNIT I PHYSICAL LAYER

Data Communications – Networks - Networks models – OSI model – Layers in OSI model – TCP / IP protocol suite – Addressing – Guided and Unguided Transmission media Switching: Circuit switched networks – Data gram Networks – Virtual circuit networks Cable networks for Data transmission: Dialup modems – DSL – Cable TV – Cable TV for Data transfer.

UNIT II DATA LINK LAYER

Data link control: Framing – Flow and error control –Protocols for Noiseless and Noisy Channels – HDLC Multiple access: Random access – Controlled access Wired LANS : Ethernet – IEEE standards – standard Ethernet – changes in the standard – Fast Ethernet – Gigabit Ethernet. Wireless LANS : IEEE 802.11–Bluetooth. Connecting LANS: Connecting devices - Backbone networks - Virtual LANS Virtual circuit networks: Architecture and Layers of Frame Relay and ATM.

UNIT III NETWORK LAYER

Logical addressing: IPv4, IPv6 addresses Internet Protocol: Internetworking – IPv4, IPv6 - Address mapping – ARP, RARP, BOOTP, DHCP, ICMP, IGMP, Delivery - Forwarding - Routing – Unicast, Multicast routing protocols.

UNIT IV TRANSPORT LAYER

Process-to-Process delivery - User Datagram Protocol (UDP) – Transmission Control Protocol (TCP) – Congestion Control – Quality of services (QoS) – Techniques to improve QoS.

UNIT V APPLICATION LAYER

Domain Name System (DNS) – E-mail – FTP – WWW – HTTP – Multimedia Network Security: Cryptography – Symmetric key and Public Key algorithms - Digital signature – Management of Public keys – Communication Security – Authentication Protocols.

TEXT BOOKS

1. Behrouz A. Foruzan, "Data communication and Networking", Tata McGraw-Hill, 2006: Unit I-IV
2. Andrew S. Tannenbaum, "Computer Networks", Pearson Education, Fourth Edition, 2003: Unit V

REFERENCES

1. Wayne Tomasi, "Introduction to Data Communication and Networking", 1/e, Pearson Education.
2. James .F. Kurose & W. Rouse, "Computer Networking: A Topdown Approach Featuring", 3/e, Pearson Education.
3. C.Sivaram Murthy, B.S.Manoj, "Ad hoc Wireless Networks – Architecture and Protocols", Second Edition, Pearson Education.
4. Greg Tomshon, Ed Tittel, David Johnson. "Guide to Networking Essentials", fifth edition, Thomson India Learning, 2007.
5. William Stallings, "Data and Computer Communication", Eighth Edition, Pearson Education, 2000.

612ECT04 - ANTENNA AND WAVE PROPAGATION

UNIT I ELECTROMAGNETIC RADIATION AND ANTENNA FUNDAMENTALS

Review of electromagnetic theory: Vector potential, Solution of wave equation, retarded case, Hertzian dipole. Antenna characteristics: Radiation pattern, Beam solid angle, Directivity, Gain, Input impedance, Polarization, Bandwidth, Reciprocity, Equivalence of Radiation patterns, Equivalence of Impedances, Effective aperture, Vector effective length, Antenna temperature.

UNIT II WIRE ANTENNAS AND ANTENNA ARRAYS

Wire antennas: Short dipole, Radiation resistance and Directivity, Half wave Dipole, Monopole, Small loop antennas. Antenna Arrays: Linear Array and Pattern Multiplication, Two-element Array, Uniform Array, Polynomial representation, Array with non-uniform Excitation-Binomial Array.

UNIT III APERTURE ANTENNAS

Aperture Antennas: Magnetic Current and its fields, Uniqueness theorem, Field equivalence principle, Duality principle, Method of Images, Pattern properties, Slot antenna, Horn Antenna, Pyramidal Horn Antenna, Reflector Antenna-Flat reflector, Corner Reflector, Common curved reflector shapes, Lens Antenna.

UNIT IV SPECIAL ANTENNAS AND ANTENNA MEASUREMENTS

Special Antennas: Long wire, V and Rhombic Antenna, Yagi-Uda Antenna, Turnstile Antenna, Helical Antenna- Axial mode helix, Normal mode helix, Biconical Antenna, Log periodic Dipole Array, Spiral Antenna, Microstrip Patch Antennas. Antenna Measurements: Radiation Pattern measurement, Gain and Directivity Measurements, Anechoic Chamber measurement.

UNIT V RADIO WAVE PROPAGATION

Calculation of Great Circle Distance between any two points on earth, Ground Wave Propagation, Free-space Propagation, Ground Reflection, Surface waves, Diffraction, Wave propagation in complex Environments, Tropospheric Propagation, Tropospheric Scatter. Ionospheric propagation: Structure of ionosphere, Sky waves, skip distance, Virtual height, Critical frequency, MUF, Electrical properties of ionosphere, Effects of earth's magnetic fields, Faraday rotation, Whistlers.

TEXTBOOKS

1. E.C.Jordan and Balmain, "Electromagnetic waves and Radiating Systems", Pearson Education / PHI, 2006
2. A.R.Harish, M.Sachidanada, "Antennas and Wave propagation", Oxford University Press, 2007.

REFERENCES

1. John D.Kraus, Ronald J Marhefka and Ahmad S Khan, "Antennas for all Applications", Tata McGraw-Hill Book Company, 3 ed, 2007.
2. G.S.N.Raju, Antenna Wave Propagation, Pearson Education, 2004.
3. Constantine A. Balanis, Antenna Theory Analysis and Design, John Wiley, 2nd Edition, 2007.
4. R.E.Collins, "Antenna and Radiowave propagation",
5. W.L Stutzman and G.A. Thiele, "Antenna analysis and design", John Wiley, 2000.

612ECT05 - VLSI DESIGN

UNIT I CMOS TECHNOLOGY

A brief History-MOS transistor, Ideal I-V characteristics, C-V characteristics, Non ideal IV effects, DC transfer characteristics - CMOS technologies, Layout design Rules, CMOS process enhancements, Technology related CAD issues, Manufacturing issues.

UNIT II CIRCUIT CHARACTERIZATION AND SIMULATION

Delay estimation, Logical effort and Transistor sizing, Power dissipation, Interconnect, Design margin, Reliability, Scaling- SPICE tutorial, Device models, Device characterization, Circuit characterization, Interconnect simulation.

UNIT III COMBINATIONAL AND SEQUENTIAL CIRCUIT DESIGN

Circuit families -Low power logic design - comparison of circuit families - Sequencing static circuits, circuit design of latches and flip flops, Static sequencing element methodology-sequencing dynamic circuits - synchronizers.

UNIT IV CMOS TESTING

Need for testing- Testers, Text fixtures and test programs- Logic verification- Silicon debug principles- Manufacturing test - Design for testability - Boundary scan.

UNIT V SPECIFICATION USING VERILOG HDL

Basic concepts- identifiers- gate primitives, gate delays, operators, timing controls, procedural assignments conditional statements, Data flow and RTL, structural gate level switch level modeling, Design hierarchies, Behavioral and RTL modeling, Test benches, Structural gate level description of decoder, equality detector, comparator, priority encoder, half adder, full adder, Ripple carry adder, D latch and D flip flop.

TEXTBOOKS:

1. Weste and Harris: CMOS VLSI DESIGN (Third edition) Pearson Education, 2005
2. Uyemura J.P: Introduction to VLSI circuits and systems, Wiley 2002.

REFERENCES:

1. D.A Pucknell & K.Eshraghian Basic VLSI Design, Third edition, PHI, 2003.
2. Wayne Wolf, Modern VLSI design, Pearson Education, 2003.
3. M.J.S.Smith: Application specific integrated circuits, Pearson Education, 1997.
4. J.Bhasker: Verilog HDL primer, BS publication,2001.
5. Ciletti Advanced Digital Design with the Verilog HDL, Prentice Hall of India, 2003.

ELECTIVE I

612ECT06 - DIGITAL IMAGE PROCESSING

UNIT I DIGITAL IMAGE FUNDAMENTALS

Elements of digital image processing systems, Vidicon and Digital Camera working principles, Elements of visual perception, brightness, contrast, hue, saturation, mach band effect, Color image fundamentals - RGB, HSI models, Image sampling, Quantization, dither, Two-dimensional mathematical preliminaries, 2D transforms - DFT, DCT, KLT, SVD.

UNIT II IMAGE ENHANCEMENT

Histogram equalization and specification techniques, Noise distributions, Spatial averaging, Directional Smoothing, Median, Geometric mean, Harmonic mean, Contraharmonic mean filters, Homomorphic filtering, Color image enhancement.

UNIT III IMAGE RESTORATION

Image Restoration - degradation model, Unconstrained restoration – Lagrange multiplier and Constrained restoration, Inverse filtering-removal of blur caused by uniform linear motion, Wiener filtering, Geometric transformations-spatial transformations.

UNIT IV IMAGE SEGMENTATION

Edge detection, Edge linking via Hough transform – Thresholding - Region based segmentation – Region growing – Region splitting and Merging – Segmentation by morphological watersheds – basic concepts – Dam construction – Watershed segmentation algorithm.

UNIT V IMAGE COMPRESSION

Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, Vector Quantization, Transform coding, JPEG standard, MPEG.

TEXTBOOKS:

1. Rafael C. Gonzalez, Richard E. Woods, , Digital Image Processing', Pearson , Second Edition, 2004.
2. Anil K. Jain, , Fundamentals of Digital Image Processing', Pearson 2002.

REFERENCES:

1. Kenneth R. Castleman, Digital Image Processing, Pearson, 2006.
2. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins,' Digital Image Processing using MATLAB', Pearson Education, Inc., 2004.
3. D,E. Dudgeon and RM. Mersereau, , Multidimensional Digital Signal Processing', Prentice Hall Professional Technical Reference, 1990.
4. William K. Pratt, , Digital Image Processing' , John Wiley, New York, 2002
5. Milan Sonka et al, 'IMAGE PROCESSING, ANALYSIS AND MACHINE VISION', Brookes/Cole, Vikas Publishing House, 2nd edition, 1999,

UNIT I ELECTRO-PHYSIOLOGY AND BIO-POTENTIAL RECORDING

The origin of Bio-potentials; biopotential electrodes, biological amplifiers, ECG, EEG, EMG, PCG, EOG, lead systems and recording methods, typical waveforms and signal characteristics.

UNIT II BIO-CHEMICAL AND NON ELECTRICAL PARAMETER MEASUREMENT

PH, PO₂, PCO₂, PHCO₃, Electrophoresis, colorimeter, photometer, Auto analyzer, Blood flow meter, cardiac output, respiratory measurement, Blood pressure, temperature, pulse, Blood cell counters.

UNIT III ASSIST DEVICES AND BIO-TELEMETRY

Cardiac pacemakers, DC Defibrillator, Telemetry principles, frequency selection, Biotelemetry, radio-pill and tele-stimulation.

UNIT IV RADIOLOGICAL EQUIPMENTS

Ionising radiation, Diagnostic x-ray equipments, use of Radio Isotope in diagnosis, Radiation Therapy.

UNIT V RECENT TRENDS IN MEDICAL INSTRUMENTATION

Thermograph, endoscopy unit, Laser in medicine, Diathermy units, Electrical safety in medical equipment.

TEXTBOOKS

1. Leislle Cromwell, "Biomedical instrumentation and measurement", Prentice Hall of India, New Delhi, 2007.

REFERENCES

1. Khandpur, R.S., "Handbook of Biomedical Instrumentation", TATA McGraw-Hill, New Delhi, 2003.
2. Joseph J.Carr and John M.Brown, "Introduction to Biomedical equipment Technology", John Wiley and Sons, New York, 2004.

612ECT08 - OPERATING SYSTEMS

UNIT I OPERATING SYSTEM OVERVIEW

Introduction – Multiprogramming – Time sharing – Multi-user Operating systems – System Call – Structure of Operating Systems

UNIT II PROCESS MANAGEMENT

Concept of Processes – Interprocess Communication – Racing – Synchronisation – Mutual Exclusion – Scheduling – Implementation Issues – IPC in Multiprocessor System – Threads.

UNIT III MEMORY MANAGEMENT

Partition – paging – segmentation – virtual memory concepts – relocation algorithms – buddy systems – Free space management – Case study.

UNIT IV DEVICE MANAGEMENT AND FILE SYSTEMS

File concept – access methods – directory structure – File system mounting – file sharing – protection – file system implementation – I/O Hardware – Application I/O Interface – Kernel I/O subsystem – Transforming I/O to Hardware Operations – Streams – Disk Structure – Disk Scheduling Management – RAID structure.

UNIT V MODERN OPERATING SYSTEMS

Concepts of distributed operating systems – Real time operating system – Case studies: UNIX, LINUX and Windows 2000.

TEXT BOOKS

1. Abraham Silberschatz, Peter Galvin and Gagne, 'Operating System Concepts', Seventh Edition, John Wiley, 2007.
2. William Stallings, 'Operating Systems – Internals and Design Principles', Fifth Edition, Prentice Hall India, 2005.

REFERENCES

1. Andrew Tanenbaum, 'Modern Operating Systems', 2nd Edition, Prentice Hall, 2003.
2. Deital.H.M, "Operating Systems - A Modern Perspective", Second Edition, Addison Wesley, 2004.
3. Mukesh Singhal, Niranjana G.Shivaratri, "Advanced Concepts in Operating Systems", Tata McGraw Hill, 2001.
4. D.M.Dhamdhare, "Operating Systems – A Concept based Approach", Second Edition, Tata McGraw Hill, 2006.
5. Crowley.C, "Operating Systems: A Design – Oriented Approach", Tata McGraw Hill, 1999.
6. Ellen Siever, Aaron Weber, Stephen Figgins, 'LINUX in a Nutshell', Fourth Edition, O'reilly, 2004.

612ECT09 - SOLID STATE ELECTRONIC DEVICES

UNIT I CRYSTAL PROPERTIES AND GROWTH OF SEMICONDUCTORS

Semiconductor materials - Periodic Structures - Crystal Lattices - Cubic lattices - Planes and Directions - Diamond lattice - Bulk Crystal Growth - Starting Materials - Growth of Single Crystal Ingots - Wafers - Doping - Epitaxial Growth - Lattice Matching in Epitaxial Growth - Vapor - Phase Epitaxy - Atoms and Electrons - Introduction to Physical Models - Experimental Observations - Photoelectric Effect - Atomic spectra - Bohr model - Quantum Mechanics - Probability and Uncertainty Principle - Schrodinger Wave Equation - Potential Well Equation - Potential well Problem - Tunneling.

UNIT II ENERGY BANDS AND CHARGE CARRIERS IN SEMICONDUCTORS AND JUNCTIONS

Energy bands in Solids, Energy Bands in Metals, Semiconductors, and Insulators - Direct and Indirect Semiconductors - Variation of Energy Bands with Alloy Composition - Charge Carriers in Semiconductors - Electrons and Holes - Electrons and Holes in Quantum Wells - Carrier Concentrations - Fermi Level - Electron and Hole Concentrations at Equilibrium - Temperature Dependence of Carrier Concentrations - Compensation and Space Charge Neutrality - Drift of Carrier in Electric and Magnetic Fields conductivity and Mobility - Drift and Resistance - Effects of Temperature and Doping on Mobility - High field effects - Hall Effect - invariance of Fermi level at equilibrium - Fabrication of p-n junctions, Metal semiconductor junctions.

UNIT III METAL OXIDE SEMICONDUCTOR FET

GaAs MESFET - High Electron Mobility Transistor - Short channel Effects - Metal Insulator Semiconductor FET - Basic Operation and Fabrication - Effects of Real Surfaces - Threshold Voltage - MOS capacitance Measurements - current - Voltage Characteristics of MOS Gate Oxides - MOS Field Effect Transistor - Output characteristics - Transfer characteristics - Short channel MOSFET V-I characteristics - Control of Threshold Voltage - Substrate Bias Effects - Sub threshold characteristics - Equivalent Circuit for MOSFET - MOSFET Scaling and Hot Electron Effects - Drain - Induced Barrier Lowering - short channel and Narrow Width Effect - Gate Induced Drain Leakage.

UNIT IV OPTOELECTRONIC DEVICES

Photodiodes - Current and Voltage in illuminated Junction - Solar Cells - Photo detectors - Noise and Bandwidth of Photo detectors - Light Emitting Diodes - Light Emitting Materials - Fiber Optic Communications Multilayer Heterojunctions for LEDs - Lasers - Semiconductor lasers - Population Inversion at a Junction Emission Spectra for p-n junction - Basic Semiconductor lasers - Materials for Semiconductor lasers.

UNIT V HIGH FREQUENCY AND HIGH POWER DEVICES

Tunnel Diodes, IMPATT Diode, operation of TRAPATT and BARITT Diodes, Gunn Diode - transferred - electron mechanism, formation and drift of space charge domains, p-n-p-n Diode, Semiconductor Controlled Rectifier, Insulated Gate Bipolar Transistor.

TEXT BOOK

1. Ben. G. Streetman & Sanjan Banerjee, Solid State Electronic Devices, 5th Edition, PHI, 2003.

REFERENCES

1. Donald A. Neaman, Semiconductor Physics and Devices, 3rd Edition, TMH, 2002.
2. Yannis Tsvividis, Operation & Mode line of MOS Transistor, 2nd Edition, Oxford University Press, 1999.
3. Nandita Das Gupta & Aamitava Das Gupta, Semiconductor Devices Modeling a Technology, PHI, 2004.
4. D.K. Bhattacharya & Rajinish Sharma, Solid State Electronic Devices, Oxford University Press, 2007.

612ECT10 - SPEECH PROCESSING

UNIT I MECHANICS OF SPEECH

Speech production: Mechanism of speech production, Acoustic phonetics – Digital models for speech signals - Representations of speech waveform: Sampling speech signals, basics of quantization, delta modulation, and Differential PCM – Auditory perception: psycho acoustics.

UNIT II TIME DOMAIN METHODS FOR SPEECH PROCESSING

Time domain parameters of Speech signal – Methods for extracting the parameters Energy, Average Magnitude, Zero crossing Rate – Silence Discrimination using ZCR and energy – Short Time Auto Correlation Function – Pitch period estimation using Auto Correlation Function.

UNIT III FREQUENCY DOMAIN METHOD FOR SPEECH PROCESSING

Short Time Fourier analysis: Fourier transform and linear filtering interpretations, Sampling rates - Spectrographic displays - Pitch and formant extraction - Analysis by Synthesis - Analysis synthesis systems: Phase vocoder, Channel Vocoder - Homomorphic speech analysis: Cepstral analysis of Speech, Formant and Pitch Estimation, Homomorphic Vocoders.

UNIT IV LINEAR PREDICTIVE ANALYSIS OF SPEECH

Basic Principles of linear predictive analysis – Auto correlation method – Covariance method – Solution of LPC equations – Cholesky method – Durbin's Recursive algorithm, – Application of LPC parameters – Pitch detection using LPC parameters – Formant analysis – VELP – CELP.

UNIT V APPLICATION OF SPEECH & AUDIO SIGNAL PROCESSING

Algorithms: Dynamic time warping, K-means clustering and Vector quantization, Gaussian mixture modeling, hidden Markov modeling - Automatic Speech Recognition: Feature Extraction for ASR, Deterministic sequence recognition, Statistical Sequence recognition, Language models - Speaker identification and verification – Voice response system – Speech synthesis: basics of articulatory, source-filter, and concatenative synthesis – VOIP.

TEXT BOOK:

1. Thomas F, Quatieri, Discrete-Time Speech Signal Processing, Prentice Hall / Pearson Education, 2004.

REFERENCES:

1. Ben Gold and Nelson Morgan, Speech and Audio Signal Processing, John Wiley and Sons Inc., Singapore, 2004
2. L.R. Rabiner and R.W. Schaffer – Digital Processing of Speech signals – Prentice Hall -1979
3. L.R. Rabiner and B. H. Juang, Fundamentals of Speech Recognition, Prentice Hall, 1993.
4. J.R. Deller, J.H.L. Hansen and J.G. Proakis, Discrete Time Processing of Speech Signals, John Wiley, IEEE Press, 1999.

612ECT11 - NUMERICAL METHODS

UNIT I SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS

Solution of equation –Fixed point iteration: $x=g(x)$ method - Newton's method – Solution of linear system by Gaussian elimination and Gauss-Jordan method– Iterative method - Gauss-Seidel method - Inverse of a matrix by Gauss Jordan method – Eigen value of a matrix by power method and by Jacobi method for symmetric matrix.

UNIT II INTERPOLATION AND APPROXIMATION

Lagrangian Polynomials – Divided differences – Interpolating with a cubic spline – Newton's forward and backward difference formulas.

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION

Differentiation using interpolation formulae –Numerical integration by trapezoidal and Simpson's 1/3 and 3/8 rules – Romberg's method – Two and Three point Gaussian quadrature formulae – Double integrals using trapezoidal and Simpsons's rules.

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS

Single step methods: Taylor series method – Euler method for first order equation – Fourth order Runge – Kutta method for solving first and second order equations – Multistep methods: Milne's and Adam's predictor and corrector methods.

UNIT V BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS

Finite difference solution of second order ordinary differential equation – Finite difference solution of one dimensional heat equation by explicit and implicit methods – One dimensional wave equation and two dimensional Laplace and Poisson equations.

TEXT BOOKS

1. Veerarjan, T and Ramachandran, T. 'Numerical methods with programming in 'C' Second Edition, Tata McGraw-Hill Publishing.Co.Ltd. (2007).
2. Sankara Rao K, 'Numerical Methods for Scientists and Engineers' – 3rd edition Printice Hall of India Private Ltd, New Delhi, (2007).

REFERENCES

1. Chapra, S. C and Canale, R. P. "Numerical Methods for Engineers", 5th Edition, Tata McGraw-Hill, New Delhi, 2007.
2. Gerald, C. F. and Wheatley, P.O., "Applied Numerical Analysis", 6th Edition, Pearson Education Asia, New Delhi, 2006.
3. Grewal, B.S. and Grewal, J.S., " Numerical methods in Engineering and Science", 6th Edition, Khanna Publishers, New Delhi, 2004

612ECT12 - MULTICORE PROGRAMMING

UNIT I INTRODUCTION TO MULTIPROCESSORS AND SCALABILITY ISSUES

Scalable design principles – Principles of processor design – Instruction Level Parallelism, Thread level parallelism. Parallel computer models -- Symmetric and distributed shared memory architectures – Performance Issues – Multi-core Architectures - Software and hardware multithreading – SMT and CMP architectures – Design issues – Case studies – Intel Multi-core architecture – SUN CMP architecture.

UNIT II PARALLEL PROGRAMMING

Fundamental concepts – Designing for threads – scheduling - Threading and parallel programming constructs – Synchronization – Critical sections – Deadlock. Threading APIs.

UNIT III OPENMP PROGRAMMING

OpenMP – Threading a loop – Thread overheads – Performance issues – Library functions. Solutions to parallel programming problems – Data races, deadlocks and livelocks – Non-blocking algorithms – Memory and cache related issues.

UNIT IV MPI PROGRAMMING

MPI Model – collective communication – data decomposition – communicators and topologies – point-to-point communication – MPI Library.

UNIT V MULTITHREADED APPLICATION DEVELOPMENT

Algorithms, program development and performance tuning.

TEXT BOOK

1. Shameem Akhter and Jason Roberts, "Multi-core Programming", Intel Press, 2006.
2. Michael J Quinn, Parallel programming in C with MPI and OpenMP, Tata Mcgraw Hill, 2003.

REFERENCES

1. John L. Hennessey and David A. Patterson, " Computer architecture – A quantitative approach", Morgan Kaufmann/Elsevier Publishers, 4th. edition, 2007.
2. David E. Culler, Jaswinder Pal Singh, "Parallel computing architecture : A hardware/ software approach" , Morgan Kaufmann/Elsevier Publishers, 1999.

612ECP01 - COMPUTER NETWORKS LAB

1. PC to PC Communication
Parallel Communication using 8 bit parallel cable Serial communication using RS 232C
2. Ethernet LAN protocol
To create scenario and study the performance of CSMA/CD protocol through simulation
3. Token bus and token ring protocols
To create scenario and study the performance of token bus and token ring protocols through simulation
4. Wireless LAN protocols
To create scenario and study the performance of network with CSMA / CA protocol and compare with CSMA/CD protocols.
5. Implementation and study of stop and wait protocol
6. Implementation and study of Goback-N and selective repeat protocols
7. Implementation of distance vector routing algorithm
8. Implementation of Link state routing algorithm
9. Implementation of Data encryption and decryption
10. Transfer of files from PC to PC using Windows / Unix socket processing

Requirement for a batch of 30 students

S. No.	Description of Equipments	Quantity required
1.	PC (with recent specification)	30 Nos.
2.	Ethernet LAN trainer	2
3.	Wireless LAN trainer	2
4.	Network Simulator Software	20 Nos.
5.	C. Compiler	All the 30 Systems
6.	Java	All the 30 Systems

612ECP02 - VLSI DESIGN LAB

1. Design Entry and simulation of combinational logic circuits (8 bit adders, 4 bit multipliers, address decoders, multiplexers), Test bench creation, functional verification, and concepts of concurrent and sequential execution to be highlighted.
2. Design Entry and simulation of sequential logic circuits (counters, PRBS generators, accumulators). Test bench creation, functional verification, and concepts of concurrent and sequential execution to be highlighted.
3. Synthesis, P&R and Post P&R simulation for all the blocks/codes developed in Expt. No. 1 and No. 2 given above. Concepts of FPGA floor plan, critical path, design gate count, I/O configuration and pin assignment to be taught in this experiment.
4. Generation of configuration/fuse files for all the blocks/codes developed as part of Expt.1. and Expt. 2. FPGA devices must be configured and hardware tested for the blocks/codes developed as part of Expt. 1. and Expt. 2. The correctness of the inputs and outputs for each of the blocks must be demonstrated atleast on oscilloscopes (logic analyzer preferred).
5. Schematic Entry and SPICE simulation of MOS differential amplifier. Determination of gain, bandwidth, output impedance and CMRR.
6. Layout of a simple CMOS inverter, parasitic extraction and simulation.
7. Design of a 10 bit number controlled oscillator using standard cell approach, simulation followed by study of synthesis reports.
8. Automatic layout generation followed by post layout extraction and simulation of the circuit studied in Expt. No.7

Note 1. For Expt. 1 To 4 can be carried out using Altera (Quartus) / Xilinx (Alliance) / ACTEL (Libero) tools.

Note 2. For expt. 5-8 introduce the student to basics of IC design. These have to be carried out using atleast 0.5u CMOS technology libraries. The S/W tools needed Cadence / MAGMA / Tanner.

SEVENTH SEMESTER

712ECT01 - WIRELESS COMMUNICATION

UNIT I SERVICES AND TECHNICAL CHALLENGES

Types of Services, Requirements for the services, Multipath propagation, Spectrum Limitations, Noise and Interference limited systems, Principles of Cellular networks, Multiple Access Schemes.

UNIT II WIRELESS PROPAGATION CHANNELS

Propagation Mechanisms (Qualitative treatment), Propagation effects with mobile radio, Channel Classification, Link calculations, Narrowband and Wideband models.

UNIT III WIRELESS TRANSCEIVERS

Structure of a wireless communication link, Modulation and demodulation – Quadrature Phase Shift Keying, $\pi/4$ -Differential Quadrature Phase Shift Keying, Offset-Quadrature Phase Shift Keying, Binary Frequency Shift Keying, Minimum Shift Keying, Gaussian Minimum Shift Keying, Power spectrum and Error performance in fading channels.

UNIT IV SIGNAL PROCESSING IN WIRELESS SYSTEMS

Principle of Diversity, Macrodiversity, Microdiversity, Signal Combining Techniques, Transmit diversity, Equalisers- Linear and Decision Feedback equalisers, Review of Channel coding and Speech coding techniques.

UNIT V ADVANCED TRANSCEIVER SCHEMES

Spread Spectrum Systems- Cellular Code Division Multiple Access Systems- Principle, Power control, Effects of multipath propagation on Code Division Multiple Access, Orthogonal Frequency Division Multiplexing – Principle, Cyclic Prefix, Transceiver implementation, Second Generation(GSM, IS-95) and Third Generation Wireless Networks and Standards.

TEXT BOOKS:

1. Andreas.F. Molisch, "Wireless Communications", John Wiley – India, 2006.
2. Simon Haykin & Michael Moher, "Modern Wireless Communications", Pearson Education, 2007.

REFERENCES:

1. Rappaport. T.S., "Wireless communications", Pearson Education, 2003.
2. Gordon L. Stuber, "Principles of Mobile Communication", Springer International Ltd., 2001.
3. Andrea Goldsmith, Wireless Communications, Cambridge University Press, 2007.

712ECT02 - OPTICAL COMMUNICATION AND NETWORKING

UNIT I INTRODUCTION

Introduction, Ray theory transmission- Total internal reflection-Acceptance angle – Numerical aperture – Skew rays – Electromagnetic mode theory of optical propagation – EM waves – modes in Planar guide – phase and group velocity – cylindrical fibers – SM fibers.

UNIT II TRANSMISSION CHARACTERISTICS OF OPTICAL FIBERS

Attenuation – Material absorption losses in silica glass fibers – Linear and Non linear Scattering losses - Fiber Bend losses – Midband and farband infra red transmission – Intra and inter Modal Dispersion – Over all Fiber Dispersion – Polarization- non linear Phenomena. Optical fiber connectors, Fiber alignment and Joint Losses – Fiber Splices – Fiber connectors – Expanded Beam Connectors – Fiber Couplers.

UNIT III SOURCES AND DETECTORS

Optical sources: Light Emitting Diodes - LED structures - surface and edge emitters, mono and hetero structures - internal - quantum efficiency, injection laser diode structures - comparison of LED and ILD Optical Detectors: PIN Photo detectors, Avalanche photo diodes, construction, characteristics and properties, Comparison of performance, Photo detector noise –Noise sources , Signal to Noise ratio , Detector response time.

UNIT IV FIBER OPTIC RECEIVER AND MEASUREMENTS

Fundamental receiver operation, Pre amplifiers, Error sources – Receiver Configuration – Probability of Error – Quantum limit. Fiber Attenuation measurements- Dispersion measurements – Fiber Refractive index profile measurements – Fiber cut- off Wave length Measurements – Fiber Numerical Aperture Measurements – Fiber diameter measurements.

UNIT V OPTICAL NETWORKS

Basic Networks – SONET / SDH – Broadcast – and –select WDM Networks – Wavelength Routed Networks – Non linear effects on Network performance – Performance of WDM + EDFA system – Solitons – Optical CDMA – Ultra High Capacity Networks.

TEXT BOOKS:

1. Optical Fiber Communication – John M. Senior – Pearson Education – Second Edition. 2007
2. Optical Fiber Communication – Gerd Keiser – Mc Graw Hill – Third Edition. 2000

REFERENCES:

1. J. Gower, "Optical Communication System", Prentice Hall of India, 2001
2. Rajiv Ramaswami, "Optical Networks ", Second Edition, Elsevier , 2004.
3. Govind P. Agrawal, " Fiber-optic communication systems", third edition, John Wiley & sons, 2004.
4. R.P. Khare, "Fiber Optics and Optoelectronics", Oxford University Press, 2007.

712ECT03 - RF AND MICROWAVE ENGINEERING

UNIT I TWO PORT RF NETWORKS-CIRCUIT REPRESENTATION

Low frequency parameters-impedance ,admittance, hybrid and ABCD. High frequency parameters-Formulation of S parameters, properties of S parameters-Reciprocal and lossless networks, transmission matrix, Introduction to component basics, wire, resistor, capacitor and inductor, applications of RF.

UNIT II RF TRANSISTOR AMPLIFIER DESIGN AND MATCHING NETWORKS

Amplifier power relation, stability considerations, gain considerations noise figure, impedance matching networks, frequency response, T and Π matching networks, microstripline matching networks

UNIT III MICROWAVE PASSIVE COMPONENTS

Microwave frequency range, significance of microwave frequency range - applications of microwaves. Scattering matrix -Concept of N port scattering matrix representation- Properties of S matrix- S matrix formulation of two-port junction. Microwave junctions - Tee junctions - Magic Tee - Rat race - Corners - bends and twists - Directional couplers - two hole directional couplers- Ferrites - important microwave properties and applications - Termination - Gyrator- Isolator-Circulator - Attenuator - Phase changer - S Matrix for microwave components - Cylindrical cavity resonators.

UNIT IV MICROWAVE SEMICONDUCTOR DEVICES

Microwave semiconductor devices- operation - characteristics and application of BJTs and FETs -Principles of tunnel diodes - Varactor and Step recovery diodes - Transferred Electron Devices -Gunn diode- Avalanche Transit time devices- IMPATT and TRAPATT devices. Parametric devices -Principles of operation - applications of parametric amplifier. Microwave monolithic integrated circuit (MMIC) - Materials and fabrication techniques.

UNIT V MICROWAVE TUBES AND MEASUREMENTS

Microwave tubes- High frequency limitations - Principle of operation of Multicavity Klystron, Reflex Klystron, Traveling Wave Tube, Magnetron. Microwave measurements: Measurement of power, wavelength, impedance, SWR, attenuation, Q and Phase shift.

TEXT BOOK:

1. Samuel Y Liao, "Microwave Devices & Circuits" , Prentice Hall of India, 2006.
2. Reinhold.Ludwig and Pavel Bretshko 'RF Circuit Design", Pearson Education, Inc., 2006.

REFERENCES:

1. Robert. E.Collin-Foundation of Microwave Engg -Mc Graw Hill.
2. Annapurna Das and Sisir K Das, "Microwave Engineering", Tata Mc Graw Hill Inc., 2004.
3. M.M.Radmanesh , RF & Microwave Electronics Illustrated, Pearson Education, 2007.
4. Robert E.Colin, 2ed "Foundations for Microwave Engineering", McGraw Hill, 2001
5. D.M.Pozar, "Microwave Engineering.", John Wiley & sons, Inc., 2006.

ELECTIVE II, III & IV

712ECT04 - ADVANCED DIGITAL SIGNAL PROCESSING

UNIT I DISCRETE RANDOM PROCESS

Discrete random process – Ensemble averages, Stationary and ergodic processes, Autocorrelation and Autocovariance properties and matrices, White noise, Power Spectral Density, Spectral Factorization, Innovations Representation and Process, Filtering random processes, ARMA, AR and MA processes.

UNIT II SPECTRAL ESTIMATION

Bias and Consistency, Periodogram, Modified periodogram, Blackman-Tukey method, Welch method, Parametric methods of spectral estimation, Levinson-Durbin recursion.

UNIT III LINEAR ESTIMATION AND PREDICTION

Forward and Backward linear prediction, Filtering - FIR Wiener filter- Filtering and linear prediction, non-causal and causal IIR Wiener filters, Discrete Kalman filter.

UNIT IV ADAPTIVE FILTERS

Principles of adaptive filter – FIR adaptive filter – Newton's Steepest descent algorithm – Derivation of first order adaptive filter – LMS adaptation algorithms – Adaptive noise cancellation, Adaptive equalizer, Adaptive echo cancellors.

UNIT V ADVANCED TRANSFORM TECHNIQUES

2-D Discrete Fourier transform and properties– Applications to image smoothing and sharpening – Continuous and Discrete wavelet transforms – Multiresolution Analysis – Application to signal compression.

TEXT BOOKS:

1. Monson H Hayes, " Statistical Digital Signal processing and Modeling", Wiley Student Edition, John Wiley and Sons, 2004.
2. R.C. Gonzalez and R.E. Woods, " Digital Image Processing", Pearson, Second Edition, 2004.

REFERENCES:

1. John G Proakis and Manolakis, " Digital Signal Processing Principles, Algorithms and Applications", Pearson, Fourth Edition, 2007.
2. Sophocles J. Orfanidis, Optimum Signal Processing, An Introduction, McGraw Hill, 1990.

712ECT05 - TOTAL QUALITY MANAGEMENT

UNIT I INTRODUCTION

Introduction - Need for quality - Evolution of quality - Definition of quality - Dimensions of manufacturing and service quality - Basic concepts of TQM - Definition of TQM - TQM Framework - Contributions of Deming, Juran and Crosby - Barriers to TQM.

UNIT II TQM PRINCIPLES

Leadership - Strategic quality planning, Quality statements - Customer focus - Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Employee involvement - Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement - PDSA cycle, 5s, Kaizen - Supplier partnership - Partnering, Supplier selection, Supplier Rating.

UNIT III TQM TOOLS & TECHNIQUES I

The seven traditional tools of quality - New management tools - Six-sigma: Concepts, methodology, applications to manufacturing, service sector including IT - Bench marking - Reason to bench mark, Bench marking process - FMEA - Stages, Types.

UNIT IV TQM TOOLS & TECHNIQUES II

Quality circles - Quality Function Deployment (QFD) - Taguchi quality loss function - TPM - Concepts, improvement needs - Cost of Quality - Performance measures.

UNIT V QUALITY SYSTEMS

Need for ISO 9000- ISO 9000-2000 Quality System - Elements, Documentation, Quality auditing- QS 9000 - ISO 14000 - Concepts, Requirements and Benefits - Case studies of TQM implementation in manufacturing and service sectors including IT.

TEXT BOOK

1. Dale H. Besterfield, et al., "Total Quality Management", Pearson Education Asia, 3rd Edition, Indian Reprint (2006).

REFERENCES

1. James R. Evans and William M. Lindsay, "The Management and Control of Quality", 6th Edition, South-Western (Thomson Learning), 2005.
2. Oakland, J.S., "TQM - Text with Cases", Butterworth - Heinemann Ltd., Oxford, 3rd Edition, 2003.
3. Suganthi, L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2006.
4. Janakiraman, B and Gopal, R.K, "Total Quality Management - Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.

712ECT06 - CRYPTOGRAPHY AND NETWORK SECURITY

UNIT I INTRODUCTION

OSI Security Architecture - Classical Encryption techniques – Cipher Principles – Data Encryption Standard – Block Cipher Design Principles and Modes of Operation - Evaluation criteria for AES – AES Cipher – Triple DES – Placement of Encryption Function – Traffic Confidentiality.

UNIT II PUBLIC KEY CRYPTOGRAPHY

Key Management - Diffie-Hellman key Exchange – Elliptic Curve Architecture and Cryptography - Introduction to Number Theory – Confidentiality using Symmetric Encryption – Public Key Cryptography and RSA.

UNIT III AUTHENTICATION AND HASH FUNCTION

Authentication requirements – Authentication functions – Message Authentication Codes – Hash Functions – Security of Hash Functions and MACs – MD5 message Digest algorithm – Secure Hash Algorithm – RIPEMD – HMAC Digital Signatures – Authentication Protocols – Digital Signature Standard

UNIT IV NETWORK SECURITY

Authentication Applications: Kerberos – X.509 Authentication Service – Electronic Mail Security – PGP – S/MIME - IP Security – Web Security.

UNIT V SYSTEM LEVEL SECURITY

Intrusion detection – password management – Viruses and related Threats – Virus Counter measures – Firewall Design Principles – Trusted Systems.

TEXT BOOKS

1. William Stallings, "Cryptography And Network Security – Principles and Practices", Pearson Education, Third Edition, 2003.
2. Behrouz A. Foruzan, "Cryptography and Network Security", Tata McGraw-Hill, 2007.

REFERENCES

1. Bruce Schneier, "Applied Cryptography", John Wiley & Sons Inc, 2001.
2. Charles B. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", Third Edition, Pearson Education, 2003
3. Wade Trappe and Lawrence C. Washington , " Introduction to Cryptography with coding theory" , Pearson Education, 2007.
4. Wenbo Mao, " Modern Cryptography Theory and Practice" , Pearson Education , 2007.
5. Thomas Calabrese, "Information Security Intelligence : Cryptographic Principles and Applications", Thomson Delmar Learning,2006.
6. Atul Kahate, "Cryptography and Network Security", Tata McGraw-Hill, 2003.

712ECT07 - INFORMATION THEORY

UNIT I QUANTITATIVE STUDY OF INFORMATION

Basic inequalities, Entropy, Kullback-Leibler distance, Mutual information, Bounds on entropy, Fisher information, Cramer Rao inequality, Second law of thermodynamics, Sufficient statistic, Entropy rates of a Stochastic process

UNIT II CAPACITY OF NOISELESS CHANNEL

Fundamental theorem for a noiseless channel, Data compression, Kraft inequality, Shannon-Fano codes, Huffman codes, Asymptotic equipartition, Rate distortion theory.

UNIT III CHANNEL CAPACITY

Properties of channel capacity, Jointly typical sequences, Channel Coding Theorem, converse to channel coding theorem, Joint source channel coding theorem,

UNIT IV DIFFERENTIAL ENTROPY AND GAUSSIAN CHANNEL

AEP for continuous random variables, relationship between continuous and discrete entropy, properties of differential entropy, Gaussian channel definitions, converse to coding theorem for Gaussian channel, channels with colored noise, Gaussian channels with feedback.

UNIT V NETWORK INFORMATION THEORY

Gaussian multiple user channels, Multiple access channel, Encoding of correlated sources, Broadcast channel, Relay channel, Source coding and rate distortion with side information, General multi-terminal networks.

TEXTBOOK

1. Elements of Information theory – Thomas Cover, Joy Thomas : Wiley 1999

REFERENCE

1. Information theory, inference & learning algorithms – David Mackay year?

712ECT08 - INTELLECTUAL PROPERTY RIGHTS (IPR)

UNIT I

Introduction – Invention and Creativity – Intellectual Property (IP) – Importance – Protection of IPR – Basic types of property (i). Movable Property – Immovable Property and - Intellectual Property.

UNIT II

IP – Patents – Copyrights and related rights – Trade Marks and rights arising from Trademark registration – Definitions – Industrial Designs and Integrated circuits – Protection of Geographical Indications at national and International levels – Application Procedures..

UNIT III

International convention relating to Intellectual Property – Establishment of WIPO – Mission and Activities – History – General Agreement on Trade and Tariff (GATT) – TRIPS Agreement.

UNIT IV

Indian Position Vs WTO and Strategies – Indian IPR legislations – commitments to WTO-Patent Ordinance and the Bill – Draft of a national Intellectual Property Policy – Present against unfair competition.

UNIT V

Case Studies on – Patents (Basumati rice, turmeric, Neem, etc.) – Copyright and related rights – Trade Marks – Industrial design and Integrated circuits – Geographic indications – Protection against unfair competition.

TEXT BOOKS:

1. Subbaram N.R. "Handbook of Indian Patent Law and Practice ", S. Viswanathan Printers and Publishers Pvt. Ltd., 1998.

REFERENCES:

1. Eli Whitney, United States Patent Number: 72X, Cotton Gin, March 14, 1794.
2. Intellectual Property Today: Volume 8, No. 5, May 2001, [www.iptoday.com].
3. Using the Internet for non-patent prior art searches, Derwent IP Matters, July 2000.

www.ipmatters.net/features/000707_gibbs.html.

712ECT09 - PROFESSIONAL ETHICS IN ENGINEERING

UNIT I ENGINEERING ETHICS

Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Professions and Professionalism – Professional Ideals and Virtues – Uses of Ethical Theories.

UNIT II ENGINEERING AS SOCIAL EXPERIMENTATION

Engineering as Experimentation – Engineers as responsible Experimenters – Research Ethics - Codes of Ethics – Industrial Standards - A Balanced Outlook on Law – The Challenger Case Study.

UNIT III ENGINEER'S RESPONSIBILITY FOR SAFETY

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis – Reducing Risk – The Government Regulator's Approach to Risk - Chernobyl Case Studies and Bhopal.

UNIT IV RESPONSIBILITIES AND RIGHTS

Collegiality and Loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.

UNIT V GLOBAL ISSUES

Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct.

TEXT BOOKS:

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw Hill, New York, 2005.
2. Charles E Harris, Michael S Pritchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Thompson Learning, 2000.

REFERENCES:

1. Charles D Fleddermann, "Engineering Ethics", Prentice Hall, New Mexico, 1999.
2. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, 2003
3. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, 2001.
4. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, "Business Ethics – An Indian Perspective", Biztantra, New Delhi, 2004.
5. David Ermann and Michele S Shauf, "Computers, Ethics and Society", Oxford University Press, (2003)

712ECT10 - ADVANCED MICROPROCESSORS

UNIT I 80186, 80286, 80386 AND 80486 MICROPROCESSORS

80186 Architecture, Enhancements of 80186 – 80286 Architecture – Real and Virtual Addressing Modes – 80386 Architecture – Special Registers – Memory Management – Memory Paging Mechanism – 80486 Architecture – Enhancements – Cache Memory Techniques – Exception Handling – Comparison of Microprocessors (8086 – 80186 – 80286 – 80386 – 80486).

UNIT II PENTIUM MICROPROCESSORS

Pentium Microprocessor Architecture – Special Pentium Registers – Pentium Memory Management – New Pentium Instructions – Pentium Pro Microprocessor Architecture – Special features – Pentium II Microprocessor Architecture – Pentium III Microprocessor Architecture – Pentium III Architecture – Pentium IV Architecture – Comparison of Pentium Processors.

UNIT III RISC PROCESSORS I

PowerPC620 – Instruction fetching – Branch Prediction – Fetching – Speculation, Instruction dispatching – dispatch stalls – Instruction Execution – Issue stalls- Execution Parallelism – Instruction completion – Basics of P6 micro architecture – Pipelining – our of- order core pipeline – Memory subsystem.

UNIT IV RISC PROCESSORS II (Superscalar Processors)

Intel i960 – Intel IA32- MIPS R8000 – MIPS R10000 – Motorola 88110 – Ultra SPARC processor- SPARC version 8 – SPARC version 9.

UNIT V PC HARDWARE OVERVIEW

Functional Units & Interconnection, New Generation Mother Boards 286 to Pentium 4 Bus Interface- ISA- EISA- VESA- PCI- PCIX. Peripheral Interfaces and Controller, Memory and I/O Port Addresses.

TEXTBOOKS:

1. B.B.Brey The Intel Microprocessor 8086/8088 /80186/80188, 80286, 80386, 80486 PENTIUM, PENTIUM Pro, PII, PIII & IV Archietecture, Programming & Interfacing, Pearson Education , 2004.
2. John Paul Shen, Mikko H.Lipasti, "Modern Processor Design", Tata Mcgraw Hill, 2006.

REFERENCES

1. Douglas V.Hall, "Microprocessors and Interfacing", Tata McGraw Hill, II Edition 2006.
2. Mohamed Rafiquzzaman, "Microprocessors and Microcomputer Based System Design", II Edition, CRC Press, 2007.

712ECT11 - INTERNET AND JAVA

UNIT I INTERNETWORKING WITH TCP / IP

Review of network technologies, Internet addressing, Address resolution protocols (ARP / RARP), Routing IP datagrams, Reliable stream transport service (TCP) TCP / IP over ATM networks, Internet applications - E-mail, Telnet, FTP, NFS, Internet traffic management.

UNIT II INTERNET ROUTING

Concepts of graph theory, Routing protocols, Distance vector protocols (RIP), Link state protocol (OSPP), Path vector protocols (BGP and IDRP), Routing for high speed multimedia traffic, Multicasting, Resource reservation (RSVP), IP switching.

UNIT III WORLD WIDE WEB

HTTP protocol, Web browsers netscape, Internet explorer, Web site and Web page design, HTML, Dynamic HTML, CGI, Java script.

UNIT IV INTRODUCTION TO JAVA

The java programming environment, Fundamental Programming structures, Objects and Classes, Inheritance, Event handling, Exceptions and Debugging, Multithreading, RMI.

UNIT V JAVA PROGRAMMING

Networking with Java, Swing: Applets and Applications, Menu's & Tool Bars, Java and XML – Creating packages, Interfaces, JAR files & Annotations, Javabeans, JDBC.

TEXTBOOKS

1. Douglas E.Comer, "Internetworking with TCP/IP", Vol. I: 5th edition, Pearson Education, 2007 (Unit – I &II)
2. Robert W.Sebesta, "Programming the worldwide web", 3/e, Pearson Education. (Unit-III), 2007.
3. Steven Holzner et. al, "Java 2 Programming" , Black Book, Dreamtech Press, 2006. (Unit –IV & V)

REFERENCES

1. Cay S.Hortsmann, Gary Cornwell, "Core Java 2", Vol I, Pearson Education, 7/e, 2005.
2. W. Richard Stevens, " TCP/IP Illustrated, The Protocol" , Vol I , Pearson Education, 1st Edition, 2006.
3. Behrouz A. Farouzon , "TCP/IP Protocol Suite, 3rd edition , Tata McGraw Hill, 2007
4. Chris Bates, " Web Programming Building Internet Applications", Wiley Publications.
5. Kogent Solutions Inc., " Java Server Programming", Black Book, Dreamtech Press, 2007 Platinum edition.

712ECT12 - HIGH SPEED NETWORKS

UNIT I HIGH SPEED NETWORKS

Frame Relay Networks – Asynchronous transfer mode – ATM Protocol Architecture, ATM logical Connection, ATM Cell – ATM Service Categories – AAL, High Speed LANs: Fast Ethernet, Gigabit Ethernet, Fiber Channel – Wireless LANs: applications, requirements – Architecture of 802.11

UNIT II CONGESTION AND TRAFFIC MANAGEMENT

Queuing Analysis- Queuing Models – Single Server Queues – Effects of Congestion – Congestion Control – Traffic Management – Congestion Control in Packet Switching Networks – Frame Relay Congestion Control.

UNIT III TCP AND ATM CONGESTION CONTROL

TCP Flow control – TCP Congestion Control – Retransmission – Timer Management – Exponential RTO backoff – KARN's Algorithm – Window management – Performance of TCP over ATM. Traffic and Congestion control in ATM – Requirements – Attributes – Traffic Management Frame work, Traffic Control – ABR traffic Management – ABR rate control, RM cell formats, ABR Capacity allocations – GFR traffic management.

UNIT IV INTEGRATED AND DIFFERENTIATED SERVICES

Integrated Services Architecture – Approach, Components, Services- Queuing Discipline, FQ, PS, BRFQ, GPS, WFQ – Random Early Detection, Differentiated Services.

UNIT V PROTOCOLS FOR QOS SUPPORT

RSVP – Goals & Characteristics, Data Flow, RSVP operations, Protocol Mechanisms – Multiprotocol Label Switching – Operations, Label Stacking, Protocol details – RTP – Protocol Architecture, Data Transfer Protocol, RTCP.

TEXT BOOK

1. William Stallings, "HIGH SPEED NETWORKS AND INTERNET", Pearson Education, Second Edition, 2002.

REFERENCES

1. Warland, Pravin Varaiya, "High performance communication networks", Second Edition, Jean Harcourt Asia Pvt. Ltd., , 2001.
2. Irvan Pepelnjk, Jim Guichard, Jeff Apcar, "MPLS and VPN architecture", Cisco Press, Volume 1 and 2, 2003.
3. Abhijit S. Pandya, Ercan Sea, "ATM Technology for Broad Band Telecommunication Networks", CRC Press, New York, 2004.

712ECT13 - SOFT COMPUTING

UNIT I FUZZY SET THEORY

Introduction to Neuro – Fuzzy and Soft Computing – Fuzzy Sets – Basic Definition and Terminology – Set-theoretic Operations – Member Function Formulation and Parameterization – Fuzzy Rules and Fuzzy Reasoning – Extension Principle and Fuzzy Relations – Fuzzy If-Then Rules – Fuzzy Reasoning – Fuzzy Inference Systems – Mamdani Fuzzy Models – Sugeno Fuzzy Models – Tsukamoto Fuzzy Models – Input Space Partitioning and Fuzzy Modeling.

UNIT II OPTIMIZATION

Derivative-based Optimization – Descent Methods – The Method of Steepest Descent – Classical Newton's Method – Step Size Determination – Derivative-free Optimization – Genetic Algorithms – Simulated Annealing – Random Search – Downhill Simplex Search.

UNIT III ARTIFICIAL INTELLIGENCE

Introduction, Knowledge Representation – Reasoning, Issues and Acquisition: Propositional and Predicate Calculus Rule Based knowledge Representation Symbolic Reasoning Under Uncertainty Basic knowledge Representation Issues Knowledge acquisition – Heuristic Search: Techniques for Heuristic search Heuristic Classification - State Space Search: Strategies Implementation of Graph Search Search based on Recursion Patent-directed Search Production System and Learning.

UNIT IV NEURO FUZZY MODELING

Adaptive Neuro-Fuzzy Inference Systems – Architecture – Hybrid Learning Algorithm – Learning Methods that Cross-fertilize ANFIS and RBFN – Coactive Neuro Fuzzy Modeling – Framework Neuron Functions for Adaptive Networks – Neuro Fuzzy Spectrum.

UNIT V APPLICATIONS OF COMPUTATIONAL INTELLIGENCE

Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency Prediction – Soft Computing for Color Recipe Prediction.

TEXT BOOKS:

1. J.S.R.Jang, C.T.Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", PHI, 2004, Pearson Education 2004.
2. N.P.Padhy, "Artificial Intelligence and Intelligent Systems", Oxford University Press, 2006.

REFERENCES:

1. Elaine Rich & Kevin Knight, Artificial Intelligence, Second Edition, Tata Mcgraw Hill Publishing Comp., 2006, New Delhi.
2. Timothy J.Ross, "Fuzzy Logic with Engineering Applications", McGraw-Hill, 1997.
3. Davis E.Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley, N.Y., 1989.
4. S. Rajasekaran and G.A.V.Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 2003.
5. R.Eberhart, P.Simpson and R.Dobbins, "Computational Intelligence - PC Tools", AP Professional, Boston, 1996.
6. Amit Konar, "Artificial Intelligence and Soft Computing Behaviour and Cognitive model of the human brain", CRC Press, 2008.

712ECT14 - MULTIMEDIA COMPRESSION AND COMMUNICATION

UNIT I MULTIMEDIA COMPONENTS

Introduction - Multimedia skills - Multimedia components and their characteristics - Text, sound, images, graphics, animation, video, hardware.

UNIT II AUDIO AND VIDEO COMPRESSION

Audio compression-DPCM-Adaptive PCM -adaptive predictive coding-linear Predictive coding-code excited LPC-perpetual coding Video compression -principles-H.261-H.263- MPEG 1, 2, 4.

UNIT III TEXT AND IMAGE COMPRESSION

Compression principles-source encoders and destination encoders-lossless and lossy compression-entropy encoding -source encoding -text compression -static Huffman coding dynamic coding -arithmetic coding -Lempel ziv-welsh Compression-image compression.

UNIT IV VoIP TECHNOLOGY

Basics of IP transport, VoIP challenges, H.323/ SIP -Network Architecture, Protocols, Call establishment and release, VoIP and SS7, Quality of Service- CODEC Methods- VOIP applicability.

UNIT V MULTIMEDIA NETWORKING

Multimedia networking -Applications-streamed stored and audio-making the best Effort service-protocols for real time interactive Applications-distributing multimedia-beyond best effort service-secluding and policing Mechanisms-integrated services-differentiated Services-RSVP.

TEXT BOOKS

1. Fred Halsall "Multimedia communication - applications, networks, protocols and standards", Pearson education, 2007.
2. Tay Vaughan, "Multideai: making it work", 7/e, TMH 2007.
3. Kurose and W.Ross" Computer Networking "a Top down approach, Pearson Education.

REFERENCES

1. Marcus gonzalves "Voice over IP Networks", Mcgaraw hill.
2. KR. Rao,Z S Bojkovic, D A Milovanovic, "Multimedia Communication Systems: Techniques, Standards, and Networks", Pearson Education 2007.
3. R. Steimnetz, K. Nahrstedt, "Multimedia Computing, Communications and Applications", Pearson Education.
4. Ranjan Parekh, "Principles of Multimedia", TMH 2006.

712ECT15 - PARALLEL AND DISTRIBUTED PROCESSING

UNIT I INTRODUCTION TO PARALLEL PROCESSING AND PARALLEL ARCHITECTURES

Need and definition of parallel processing, shared memory multiprocessing, Distributed memory, using parallelism, tools and languages, Parallelism in sequential machines, Multiprocessor architecture, Pipelining, Array processors.

UNIT II SHARED MEMORY PROGRAMMING AND THREAD BASED IMPLEMENTATION

Shared Memory Programming and its general model, Process model under UNIX, Thread management, Example with threads, Attributes of Threads, Mutual Exclusion with threads and Thread implementation..

UNIT III DISTRIBUTED COMPUTING – MESSAGE PASSING AND RPC MODEL

Message-passing model, General model, programming model, PVM, Remote procedure calls (RPC), Parameter passing, JAVA Remote Method Invocation, Distributed computing environment(DCE), Developing Applications in DCE.

UNIT IV DEBUGGING PARALLEL PROGRAMS AND OTHER PARALLELISM PARADIGMS

Debugging Techniques, Debugging Message passing parallel programs and shared memory parallel programs, Dataflow computing, systolic architectures, functional and logic paradigms, distributed shared memory.

UNIT V DISTRIBUTED DATABASES AND DISTRIBUTED OPERATING SYSTEMS

Reasons for and objectives of distributed databases, issues and systems, distribution options, concurrency control, DDBMS structure. Need for Distributed operating systems, network operating systems, distributed OS, Goals of DOS and Design issues.

TEXT BOOKS

1. M.Sasikumar, D.Shikhare and P. Ravi Prakash, "Introduction to Parallel processing". PHI 2006.
2. V. Rajaraman, C. Siva Ram Murthy, "Parallel computers: Architecture and programming", PHI 2006.

REFERENCES

1. Harry F. Jordan, Gita Alaghband, "Fundamentals of parallel processing", PHI 2006.
2. Quinn, M.J., "Designing Efficient Algorithms for Parallel Computers", McGraw -Hill, 1995.
3. Culler, D.E., "Parallel Computer Architecture", A Hardware – Software approach, Harcourt Asia Pte. Ltd., 1999.

712ECT17 - ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY

UNIT I BASIC CONCEPTS

Definition of EMI and EMC with examples, Classification of EMI/EMC - CE, RE, CS, RS, Units of Parameters, Sources of EMI, EMI coupling modes - CM and DM, ESD Phenomena and effects, Transient phenomena and suppression.

UNIT II EMI MEASUREMENTS

Basic principles of RE, CE, RS and CS measurements, EMI measuring instruments- Antennas, LISN, Feed through capacitor, current probe, EMC analyzer and detection technique open area site, shielded anechoic chamber, TEM cell.

UNIT III EMC STANDARD AND REGULATIONS

National and International standardizing organizations- FCC, CISPR, ANSI, DOD, IEC, CENELEC, FCC CE and RE standards, CISPR, CE and RE Standards, IEC/EN, CS standards, Frequency assignment - spectrum conversation.

UNIT IV EMI CONTROL METHODS AND FIXES

Shielding, Grounding, Bonding, Filtering, EMI gasket, Isolation transformer, opto isolator.

UNIT V EMC DESIGN AND INTERCONNECTION TECHNIQUES

Cable routing and connection, Component selection and mounting, PCB design- Trace routing, Impedance control, decoupling, Zoning and grounding

TEXT BOOKS

1. Prasad Kodali.V – Engineering Electromagnetic Compatibility – S.Chand&Co – New Delhi – 2000
2. Clayton R.Paul – Introduction to Electromagnetic compatibility – John Wiley & Sons – 1992

REFERENCES

1. Keiser – Principles of Electromagnetic Compatibility – Artech House – 3rd Edition – 1994.
2. Donwhite Consultant Incorporate – Handbook of EMI / EMC – Vol I - 1985

712ECT18 - POWER ELECTRONICS

UNIT I POWER ELECTRONICS DEVICES

Characteristics of power devices – characteristics of SCR, diac, triac, SCS, GTO, PUJT – power transistors – power FETs – LASCR – two transistor model of SCR – Protection of thyristors against over voltage – over current, dv/dt and di/dt .

UNIT II TRIGGERING TECHNIQUES

Turn on circuits for SCR – triggering with single pulse and train of pulses – synchronizing with supply – triggering with microprocessor – forced commutation – different techniques – series and parallel operations of SCRs.

UNIT III CONTROLLED RECTIFIERS

Converters – single phase – three phase – half controlled and fully controlled rectifiers – Waveforms of load voltage and line current under constant load current – effect of transformer leakage inductance – dual converter.

UNIT IV INVERTERS

Voltage and current source inverters, resonant, Series inverter, PWM inverter. AC and DC choppers – DC to DC converters – Buck, boost and buck – boost.

UNIT V INDUSTRIAL APPLICATIONS

DC motor drives – Induction and synchronous motor drives – switched reluctance and brushless motor drives – Battery charger – SMPS – UPS – induction and dielectric heating.

TEXT BOOKS

1. Muhamed H.Rashid : Power Electronics Circuits, Devices and Applications, 3rd Edition. 2004 PHI.
2. M.D. Singh and K.B. Kanchandani, Power Electronics, 2nd Edition, TMH, 2007.

REFERENCES

1. Sen: Power Electronics, TMH, 1987.
2. Dubey: Thyristorised Power Controllers, Wiley Eastern 1986.
3. Vithayathil: Power Electronics – Principles and Applications, McGraw-Hill, 1995.
4. Lander: Power Electronics, 3rd Edition, McGraw-Hill, 1994.
5. Jacob, Power Electronics, Thomson Learning, 2002.
6. V.R. Moorthy, Power Electronics, Oxford University Press, 2005.

712ECT19 - TELEVISION AND VIDEO ENGINEERING

UNIT I FUNDAMENTALS OF TELEVISION

Aspect ratio-Image continuity-Number of scanning lines-Interlaced scanning-Picture resolution-Camera tubes-Image Orthicon-Vidicon- Plumbicon- Silicon Diode Array Vidicon-Solid-state Image scanners- Monochrome picture tubes- Composite video signal- video signal dimension-horizontal sync. Composition-vertical sync. Detailsfunctions of vertical pulse train-Scanning sequence details. Picture signal transmissionpositive and negative modulation- VSB transmission- Sound signal transmission- Standard channel bandwidth.

UNIT II MONOCHROME TELEVISION TRANSMITTER AND RECEIVER

TV transmitter-TV signal Propagation- Interference- TV Transmission Antennas- Monochrome TV receiver- RF tuner- UHF, VHF tuner-Digital tuning techniques-AFT-IF subsystems-AGC Noise cancellation-Video and Sound inter-carrier detection-Vision IF subsystem- DC re-insertion-Video amplifier circuits-Sync operation- typical sync processing circuits-Deflection current waveforms, Deflection oscillators- Frame deflection circuits- requirements- Line deflection circuits-EHT generation-Receiver antennas.

UNIT III ESSENTIALS OF COLOUR TELEVISION

Compatibility- Colour perception-Three colour theory- Luminance, Hue and saturation- Colour television cameras-Values of luminance and colour difference signals-Colour television display tubes-Delta-gun Precision-in-line and Trinitron colour picture tubes- Purity and convergence-Purity and static and Dynamic convergence adjustments- Pincushion-correction techniques-Automatic degaussing circuit- Gray scale tracking colour signal transmission- Bandwidth-Modulation of colour difference signals-Weighting factors-Formation of chrominance signal.

UNIT IV COLOUR TELEVISION SYSTEMS

NTSC colour TV systems-SECAM system- PAL colour TV systems- Cancellation of phase errors-PAL-D Colour system-PAL coder-PAL-Decoder receiver-Chromo signal amplifier-separation of U and V signals-colour burst separation-Burst phase Discriminator-ACC amplifier-Reference Oscillator-Ident and colour killer circuits-U and V demodulators- Colour signal matrixing. Sound in TV.

UNIT V ADVANCED TELEVISION SYSTEMS

Satellite TV technology-Geo Stationary Satellites-Satellite Electronics-Domestic Broadcast System-Cable TV-Cable Signal Sources-Cable Signal Processing, Distribution & Scrambling-Video Recording-VCR Electronics-Video Home Formats- Video Disc recording and playback-DVD Players-Tele Text Signal coding and broadcast receiver- Digital television-Transmission and reception -Projection television-Flat panel display TV receivers-LCD and Plasma screen receivers-3DTV-EDTV.

TEXTBOOKS

1. R.R.Gulati, "Monochrome Television Practice, Principles, Technology and servicing." Third Edition 2006, New Age International (P) Publishers.
2. R.R.Gulati, Monochrome & Color Television, New Age International Publisher, 2003.

REFERENCES

1. A.M Dhake, "Television and Video Engineering", 2nd ed., TMH, 2003.
2. R.P.Bali, Color Television, Theory and Practice, Tata McGraw-Hill, 1994.

712ECT20 - NANO ELECTRONICS

UNIT I INTRODUCTION TO NANOTECHNOLOGY

Background to nanotechnology: Types of nanotechnology and nanomachines – periodic table – atomic structure – molecules and phases – energy – molecular and atomic size – surface and dimensional space – top down and bottom up; Molecular Nanotechnology: Electron microscope – scanning electron microscope – atomic force microscope – scanning tunnelling microscope – nanomanipulator – nanotweezers – atom manipulation – nanodots – self assembly – dip pen nanolithography. Nanomaterials: preparation – plasma arcing – chemical vapor deposition – sol-gels – electrodeposition – ball milling – applications of nanomaterials;

UNIT II FUNDAMENTALS OF NANOELECTRONICS

Fundamentals of logic devices:- Requirements – dynamic properties – threshold gates; physical limits to computations; concepts of logic devices:- classifications – two terminal devices – field effect devices – coulomb blockade devices – spintronics – quantum cellular automata – quantum computing – DNA computer; performance of information processing systems;- basic binary operations, measure of performance processing capability of biological neurons – performance estimation for the human brain. Ultimate computation:- power dissipation limit – dissipation in reversible computation – the ultimate computer.

UNIT III SILICON MOSFETs & QUANTUM TRANSPORT DEVICES

Silicon MOSFETS - Novel materials and alternate concepts:- fundamentals of MOSFET Devices- scaling rules – silicon-dioxide based gate dielectrics – metal gates – junctions & contacts – advanced MOSFET concepts. Quantum transport devices based on resonant tunneling:- Electron tunneling – resonant tunneling diodes – resonant tunneling devices; Single electron devices for logic applications:- Single electron devices – applications of single electron devices to logic circuits.

UNIT IV CARBON NANOTUBES

Carbon Nanotube: Fullerenes - types of nanotubes – formation of nanotubes – assemblies – purification of carbon nanotubes – electronic properties – synthesis of carbon nanotubes – carbon nanotube interconnects – carbon nanotube FETs – Nanotube for memory applications – prospects of an all carbon nanotube nanoelectronics.

UNIT V MOLECULAR ELECTRONICS

Electrodes & contacts – functions – molecular electronic devices – first test systems – simulation and circuit design – fabrication; Future applications: MEMS – robots – random access memory – mass storage devices.

TEXTBOOKS

1. Michael Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons and Burkhard Raguse, Nanotechnology: Basic Science and Emerging Technologies, Chapman & Hall / CRC, 2002
2. T. Pradeep, NANO: The Essentials – Understanding Nanoscience and Nanotechnology, TMH, 2007
3. Rainer Waser (Ed.), Nanoelectronics and Information Technology: Advanced Electronic Materials and Novel Devices, Wiley-VCH, 2003

712ECT21 – AVIONICS

UNIT I INTRODUCTION

Introduction to aircraft – Axes system – Parts, importance and role of Avionics – systems which interface directly with pilot – Aircraft state sensor systems – Navigation systems – External world sensor systems – task automation systems. Avionics architecture evolution. Avionics Data buses - MIL STD 1553, ARINC 429, ARINC 629.

UNIT II RADIO NAVIGATION

Types of Radio Navigation – ADF, DME, VOR, LORAN, DECCA, OMEGA. ILS, MLS

UNIT III INERTIAL AND SATELLITE NAVIGATION SYSTEMS

Inertial sensors – Gyroscopes, Accelerometers, Inertial navigation systems – Block diagram, Platform and strap down INS. Satellite Navigation - GPS

UNIT IV AIR DATA SYSTEMS AND AUTOPILOT

Air data quantities – Altitude, Airspeed, Mach no., Vertical speed, Total Air temperature, Stall warning, Altitude warning. Autopilot – basic principles – longitudinal and lateral Autopilot.

UNIT V AIRCRAFT DISPLAYS

Display technologies – LED, LCD, CRT, Flat Panel Display. Primary Flight parameter displays - Head Up Display, Helmet Mounted Display, Night vision goggles, Head Down Display, MFD, MFK, Virtual cockpit.

TEXTBOOKS:

1. Albert Helfrick. D, 'Principles of Avionics', Avionics communications Inc., 2004
2. Collinson, R.P.G, 'Introduction to Avionics', Chapman and Hall, 1996.

REFERENCES:

1. Middleton, D.H, 'Avionics Systems', Longman Scientific and Technical, Longman Group UK Ltd, England, 1989.
2. Spitzer, C.R. 'Digital Avionics Systems', Prentice Hall, Englewood Cliffs, N.J., USA 1993.
3. Spitzer, C.R, 'The Avionics Handbook', CRC Press, 2000.
4. Pallet, E.H.J, 'Aircraft Instruments and Integrated Systems', Longman Scientific

712ECP01 - ELECTRONICS SYSTEM DESIGN LAB

1. Design of a 4-20mA transmitter for a bridge type transducer. Design the Instrumentation amplifier with the bridge type transducer (Thermistor or any resistance variation transducers) and convert the amplified voltage from the instrumentation amplifier to 4 – 20 mA current using op-amp. Plot the variation of the temperature Vs output current.
2. Design of AC/DC voltage regulator using SCR Design a phase controlled voltage regulator using full wave rectifier and SCR, vary the conduction angle and plot the output voltage.
3. Design of process control timer
Design a sequential timer to switch on & off at least 3 relays in a particular sequence using timer IC.
4. Design of AM / FM modulator / demodulator
 - i. Design AM signal using multiplier IC for the given carrier frequency and modulation index and demodulate the AM signal using envelope detector.
 - ii. Design FM signal using VCO IC NE566 for the given carrier frequency and demodulate the same using PLL NE 565.
5. Design of Wireless data modem.
Design a FSK modulator using 555/XR 2206 and convert it to sine wave using filter and transmit the same using IR LED and demodulate the same PLL NE 565/XR 2212.
6. PCB layout design using CAD
Drawing the schematic of simple electronic circuit and design of PCB layout using CAD.
7. Microcontroller based systems design
Design of microcontroller based system for simple applications like security systems combination lock.
8. DSP based system design
Design a DSP based system for echo cancellation, using TMS/ADSP DSP kit.
9. Psuedo-random Sequence Generator
10. Arithmetic Logic Unit Design

Note: Kits should not be used. Instead each experiment may be given as mini project.

LIST OF EQUIPMENTS:

- 1) Dual Power supply $\pm 15V$
Ammeter (Multimeter)
Temperature Measurement Transducer
- 2) Power Supply (for IC 555)
Relays
Indicator LEDs
- 3) System with ARCAD Software
- 4) TMS320C5416 (with CCS) and system, speaker
- 5) 8051 based Trainer kit, and system with interfaces like ADC, DAC, Keyboard and display
- 6) CRO – 5
- 7) Function Generator – 5
- 8) Regulated Power supply – [0-30V]-10, 5V-2
- 9) Transistors and Diodes – 2N3055, BFW10, BC547, BT012, IN4007, CED, SL100
- 10) ICs – IC741, IC7414, IC555, IC7805, IC7474, IC7107
- 11) Resistors – 5.6K, 56K, 9K, 22K, 100K, 27 Ω
- 12) Capacitors – 0.1 μf , 100 μf , 50 μf , 10nf, 47nf
- 13) 8 Ω Speaker
- 14) TSOP.

712ECP02 - OPTICAL & MICROWAVE LAB

Microwave Experiments:

1. Reflex Klystron – Mode characteristics
2. Gunn Diode – Characteristics
3. VSWR, Frequency and Wave Length Measurement
4. Directional Coupler – Directivity and Coupling Coefficient – S – parameter measurement
5. Isolator and Circulator – S - parameter measurement
6. Attenuation and Power measurement
7. S - matrix Characterization of E-Plane T, H-Plane T and Magic T.
8. Radiation Pattern of Antennas.
9. Antenna Gain Measurement

Optical Experiments:

1. DC characteristics of LED and PIN Photo Diode.
2. Mode Characteristics of Fibers
3. Measurement of Connector and Bending Losses.
4. Fiber Optic Analog and Digital Link
5. Numerical Aperture Determination for Fibers
6. Attenuation Measurement in Fibers

Microwave Experiments:

LIST OF EQUIPMENTS:

- | | |
|--|-------------------------|
| 1) Klystron Power Supply | - 6 |
| 2) Reflex Klystron Oscillator | - 6 (X band) |
| 3) Gunn Power Supply | - 3 |
| 4) Gunn Oscillator | - 3 (X band) |
| 5) Isolator | - 9 |
| 6) Variable attenuator | - 9 (0.6 dB) |
| 7) PIN modulator | - 3 |
| 8) Slotted waveguide Section with Probe and Carriage | - 2 |
| 9) Frequency meter (direct reading type) | - 4 |
| 10) Directional coupler 3dB, 10dB | - 1 each |
| 11) Circulator | - 1 |
| 12) E Plane T, H Plane T, Magic T | - 2 each |
| 13) Horn antenna | - 2 (X band) compatible |
| 14) Turn table for antenna measurement | - 1 |
| 15) Waveguide stands | - 30 |
| 16) Detectors | - 10 |
| 17) Network analyzer (Scalar or Vector) | - 1 |
| 18) Power meter | |
| 19) BNC to BNC and BNC to TNC Cables | - Required numbers |
| 20) Bolts, nuts and Screws and Screw driver | - Required numbers |

Optical Experiments:

LIST OF EQUIPMENTS:

- | | |
|--|------------------|
| 1) 850 nm LED Module | - 3 Nos |
| 2) 850 nm PIN Photo Diode Module | - 2 Nos |
| 3) Glass / Plastic Fiber Patch Cords | - 1 meter length |
| 4) Optical Power meter | - 2 Nos |
| 5) Stabilized Current Source (0-100 mA) | - 3 Nos |
| 6) Variable Supply (0-30v) | - 2 Nos |
| 7) Digital Multimeter | - 2 Nos |
| 8) Fiber Spools of Varied length with Connectors | |
| 9) Numerical Aperture measurement kit | - 1No |
| 10) Fiber Optic Analog Transceiver kit/Module | - 1 No |
| 11) Fiber Optic Digital Transceiver kit/Module | - 1 No |
| 12) CRO (0-100MHZ) | - 2 Nos |

- 13) Signal Generator – 1 No
14) Pulse Generator – 1 No

EIGHTH SEMESTER

ELECTIVE V & VI

812ECT01 - EMBEDDED AND REAL TIME SYSTEMS

UNIT I INTRODUCTION TO EMBEDDED COMPUTING

Complex systems and microprocessors – Design example: Model train controller – Embedded system design process – Formalism for system design – Instruction sets Preliminaries – ARM Processor – CPU: Programming input and output – Supervisor mode, exception and traps – Coprocessor – Memory system mechanism – CPU performance – CPU power consumption.

UNIT II COMPUTING PLATFORM AND DESIGN ANALYSIS

CPU buses – Memory devices – I/O devices – Component interfacing – Design with microprocessors – Development and Debugging – Program design – Model of programs – Assembly and Linking – Basic compilation techniques – Analysis and optimization of execution time, power, energy, program size – Program validation and testing.

UNIT III PROCESS AND OPERATING SYSTEMS

Multiple tasks and multi processes – Processes – Context Switching – Operating Systems – Scheduling policies - Multiprocessor – Inter Process Communication mechanisms – Evaluating operating system performance – Power optimization strategies for processes.

UNIT IV HARDWARE ACCELERATES & NETWORKS

Accelerators – Accelerated system design – Distributed Embedded Architecture – Networks for Embedded Systems – Network based design – Internet enabled systems.

UNIT V CASE STUDY

Hardware and software co-design - Data Compressor - Software Modem – Personal Digital Assistants – Set-Top-Box. – System-on-Silicon – FOSS Tools for embedded system development.

TEXT BOOK:

- 1) Wayne Wolf, "Computers as Components - Principles of Embedded Computer System Design", Morgan Kaufmann Publisher, 2006.

REFERENCES:

- 1) David E-Simon, "An Embedded Software Primer", Pearson Education, 2007.
- 2) K.V.K.K.Prasad, "Embedded Real-Time Systems: Concepts, Design & Programming", dreamtech press, 2005.
- 3) Tim Wilmshurst, "An Introduction to the Design of Small Scale Embedded Systems", Pal grave Publisher, 2004.
- 4) Sriram V Iyer, Pankaj Gupta, "Embedded Real Time Systems Programming", Tata Mc-Graw Hill, 2004.
- 5) Tammy Noergaard, "Embedded Systems Architecture", Elsevier, 2006.

812ECT02 - ADVANCED ELECTRONIC SYSTEM DESIGN

UNIT I INTRODUCTION TO RF DESIGN

RF behaviour of passive components, Chip components and circuit board considerations, Review of transmission lines, Impedance and admittance transformation, Parallel and series connection of networks, ABCD and scattering parameters, Analysis of amplifier using scattering parameter. RF filter – Basic resonator and filter configurations – Butterworth and Chebyshev filters. Implementation of microstrip filter design. Band pass filter and cascading of band pass filter elements.

UNIT II RF TRANSISTOR AMPLIFIER DESIGN

Impedance matching using discrete components. Microstrip line matching networks. Amplifier classes of operation and biasing networks – Amplifier power gain, Unilateral design($S_{12} = 0$) – Simple input and output matching networks – Bilateral design – Stability circle and conditional stability, Simultaneous conjugate matching for unconditionally stable transistors. Broadband amplifiers, High power amplifiers and multistage amplifiers.

UNIT III DESIGN OF POWER SUPPLIES

DC power supply design using transistors and SCRs, Design of crowbar and foldback protection circuits, Switched mode power supplies, Forward, flyback, buck and boost converters, Design of transformers and control circuits for SMPS.

UNIT IV DESIGN OF DATA ACQUISITION SYSTEMS

Amplification of Low level signals, Grounding, Shielding and Guarding techniques, Dual slope, quad slope and high speed A/D converters, Microprocessors Compatible A/D converters, Multiplying A/D converters and Logarithmic A/D converters, Sample and Hold, Design of two and four wire transmitters.

UNIT V DESIGN OF PRINTED CIRCUIT BOARDS

Introduction to technology of printed circuit boards (PCB), General lay out and rules and parameters, PCB design rules for Digital, High Frequency, Analog, Power Electronics and Microwave circuits, Computer Aided design of PCBs.

TEXT BOOKS

1. Reinhold Luduig and Pavel Bretchko, RF Circuit Design – Theory and Applications, Pearson Education, 2000.
2. Sydney Soclof, Applications of Analog Integrated Circuits, Prentice Hall of India, 1990.
3. Walter C. Bosshart, Printed Circuit Boards – Design and Technology, TMH, 1983.

REFERENCES

1. Keith H. Billings, Handbook of Switched Mode Supplies, McGraw-Hill Publishing Co., 1989.
2. Michael Jacob, Applications and Design with Analog Integrated Circuits, Prentice Hall of India, 1991.
3. Otmar Kigenstein, Switched Mode Power Supplies in Practice, John Wiley and Sons, 1989.
4. Muhammad H. Rashid, Power Electronics – Circuits, Devices and Applications, Prentice Hall of India, 2004.

812ECT03 - OPTOELECTRONIC DEVICES

UNIT I ELEMENTS OF LIGHT AND SOLID STATE PHYSICS

Wave nature of light, Polarization, Interference, Diffraction, Light Source, review of Quantum Mechanical concept, Review of Solid State Physics, Review of Semiconductor Physics and Semiconductor Junction Device.

UNIT II DISPLAY DEVICES AND LASERS

Introduction, Photo Luminescence, Cathode Luminescence, Electro Luminescence, Injection Luminescence, LED, Plasma Display, Liquid Crystal Displays, Numeric Displays, Laser Emission, Absorption, Radiation, Population Inversion, Optical Feedback, Threshold condition, Laser Modes, Classes of Lasers, Mode Locking, laser applications.

UNIT III OPTICAL DETECTION DEVICES

Photo detector, Thermal detector, Photo Devices, Photo Conductors, Photo diodes, Detector Performance.

UNIT IV OPTOELECTRONIC MODULATOR

Introduction, Analog and Digital Modulation, Electro-optic modulators, Magneto Optic Devices, Acoustoptic devices, Optical, Switching and Logic Devices.

UNIT V OPTOELECTRONIC INTEGRATED CIRCUITS

Introduction, hybrid and Monolithic Integration, Application of Opto Electronic Integrated Circuits, Integrated transmitters and Receivers, Guided wave devices.

TEXTBOOKS

1. Pallab Bhattacharya "Semiconductor Opto Electronic Devices", Prentice Hall of India Pvt., Ltd., New Delhi, 2006.
2. Jasprit Singh, "Opto Electronics – As Introduction to materials and devices", McGraw-Hill International Edition, 1998

REFERENCES

1. S C Gupta, Opto Electronic Devices and Systems, Prentice Hal of India,2005.
2. J. Wilson and J.Haukes, "Opto Electronics – An Introduction", Prentice Hall, 1995.

812ECT04 - MOBILE ADHOC NETWORKS

UNIT I INTRODUCTION

Introduction to adhoc networks – definition, characteristics features, applications. Characteristics of Wireless channel, Adhoc Mobility Models:- Indoor and outdoor models.

UNIT II MEDIUM ACCESS PROTOCOLS

MAC Protocols: design issues, goals and classification. Contention based protocols- with reservation, scheduling algorithms, protocols using directional antennas. IEEE standards: 802.11a, 802.11b, 802.11g, 802.15. HIPERLAN.

UNIT III NETWORK PROTOCOLS

Routing Protocols: Design issues, goals and classification. Proactive Vs reactive routing, Unicast routing algorithms, Multicast routing algorithms, hybrid routing algorithm, Energy aware routing algorithm, Hierarchical Routing, QoS aware routing.

UNIT IV END-END DELIVERY AND SECURITY

Transport layer : Issues in designing- Transport layer classification, adhoc transport protocols. Security issues in adhoc networks: issues and challenges, network security attacks, secure routing protocols.

UNIT V CROSS LAYER DESIGN AND INTEGRATION OF ADHOC FOR 4G

Cross layer Design: Need for cross layer design, cross layer optimization, parameter optimization techniques, Cross layer cautionary perspective. Intergration of adhoc with Mobile IP networks.

TEXTBOOKS

1. C.Siva Ram Murthy and B.S.Manoj, Ad hoc Wireless Networks Architectures and protocols, 2nd edition, Pearson Education. 2007
2. Charles E. Perkins, Ad hoc Networking, Addison – Wesley, 2000

REFERENCES:

1. Stefano Basagni, Marco Conti, Silvia Giordano and Ivan stojmenovic, Mobile ad hoc networking, Wiley-IEEE press, 2004.
2. Mohammad Ilyas, The handbook of adhoc wireless networks, CRC press, 2002.
3. T. Camp, J. Boleng, and V. Davies "A Survey of Mobility Models for Ad Hoc Network Research," Wireless Commun. and Mobile Comp., Special Issue on Mobile Ad Hoc Networking Research, Trends and Applications, vol. 2, no. 5, 2002, pp. 483–502.
4. A survey of integrating IP mobility protocols and Mobile Ad hoc networks, Fekri M. Abduljalil and Shrikant K. Bodhe, IEEE communication Survey and tutorials, v 9.no.1 2007.
5. V.T.Raisinhani and S.Iyer "Cross layer design optimization in wireless protocol stacks"Comp. communication, vol 27 no. 8, 2004.
6. V.T.Raisinhani and S.Iyer, "ÉCLAIR; An Efficient Cross-Layer Architecture for wireless protocol stacks", World Wireless cong., San francisco, CA, May 2004.
7. V.Kawadia and P.P.Kumar, "A cautionary perspective on Cross-Layer design," IEEE Wireless commn., vol 12, no 1, 2005.

812ECT05 - WIRELESS SENSOR NETWORKS

UNIT I OVERVIEW OF WIRELESS SENSOR NETWORKS

Challenges for Wireless Sensor Networks, Enabling Technologies For Wireless Sensor Networks.

UNIT II ARCHITECTURES

Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes , Operating Systems and Execution Environments, Network Architecture - Sensor Network Scenarios, Optimization Goals and Figures of Merit, Gateway Concepts.

UNIT III NETWORKING SENSORS

Physical Layer and Transceiver Design Considerations, MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts - S-MAC , The Mediation Device Protocol, Wakeup Radio Concepts, Address and Name Management, Assignment of MAC Addresses, Routing Protocols- Energy-Efficient Routing, Geographic Routing.

UNIT IV INFRASTRUCTURE ESTABLISHMENT

Topology Control , Clustering, Time Synchronization, Localization and Positioning, Sensor Tasking and Control.

UNIT V SENSOR NETWORK PLATFORMS AND TOOLS

Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms, Node-level Simulators, State-centric programming.

TEXT BOOKS:

1. Holger Karl & Andreas Willig, " Protocols And Architectures for Wireless Sensor Networks" , John Wiley, 2005.
2. Feng Zhao & Leonidas J. Guibas, "Wireless Sensor Networks- An Information Processing Approach", Elsevier, 2007.

REFERENCES:

1. Kazem Sohraby, Daniel Minoli, & Taieb Znati, "Wireless Sensor Networks- Technology, Protocols, And Applications", John Wiley, 2007.
2. Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003.

812ECT06 - REMOTE SENSING

UNIT I REMOTE SENSING

Definition – Components of Remote Sensing – Energy, Sensor, Interacting Body – Active and Passive Remote Sensing – Platforms – Aerial and Space Platforms – Balloons, Helicopters, Aircraft and Satellites – Synoptivity and Repetivity – Electro Magnetic Radiation (EMR) – EMR spectrum – Visible, Infra Red (IR), Near IR, Middle IR, Thermal IR and Microwave – Black Body Radiation - Planck's law – Stefan-Boltzman law.

UNIT II EMR INTERACTION WITH ATMOSPHERE AND EARTH MATERIALS

Atmospheric characteristics – Scattering of EMR – Raleigh, Mie, Non-selective and Raman Scattering – EMR Interaction with Water vapour and ozone – Atmospheric Windows – Significance of Atmospheric windows – EMR interaction with Earth Surface Materials – Radiance, Irradiance, Incident, Reflected, Absorbed and Transmitted Energy – Reflectance – Specular and Diffuse Reflection Surfaces- Spectral Signature – Spectral Signature curves – EMR interaction with water, soil and Earth Surface:Imaging spectrometry and spectral characteristics.

UNIT III OPTICAL AND MICROWAVE REMOTE SENSING

Satellites - Classification – Based on Orbits and Purpose – Satellite Sensors - Resolution – Description of Multi Spectral Scanning – Along and Across Track Scanners – Description of Sensors in Landsat, SPOT, IRS series – Current Satellites - Radar – Speckle - Back Scattering – Side Looking Airborne Radar – Synthetic Aperture Radar – Radiometer – Geometrical characteristics ; Sonar remote sensing systems.

UNIT IV GEOGRAPHIC INFORMATION SYSTEM

GIS – Components of GIS – Hardware, Software and Organisational Context – Data – Spatial and Non-Spatial – Maps – Types of Maps – Projection – Types of Projection - Data Input – Digitizer, Scanner – Editing – Raster and Vector data structures – Comparison of Raster and Vector data structure – Analysis using Raster and Vector data – Retrieval, Reclassification, Overlaying, Buffering – Data Output – Printers and Plotters.

UNIT V MISCELLANEOUS TOPICS

Visual Interpretation of Satellite Images – Elements of Interpretation - Interpretation Keys Characteristics of Digital Satellite Image – Image enhancement – Filtering – Classification - Integration of GIS and Remote Sensing – Application of Remote Sensing and GIS – Urban Applications- Integration of GIS and Remote Sensing – Application of Remote Sensing and GIS – Water resources – Urban Analysis – Watershed Management – Resources Information Systems. Global positioning system – an introduction.

TEXT BOOKS

1. M.G. Srinivas(Edited by), Remote Sensing Applications, Narosa Publishing House, 2001. (Units 1 & 2).
2. Anji Reddy, Remote Sensing and Geographical Information Systems, BS Publications 2001 (Units 3, 4 & 5).

REFERENCES

1. Jensen, J.R., Remote sensing of the environment, Prentice Hall, 2000.
2. Kang-Tsung Chang, "Introduction to Geograhic Information Systems", TMH, 2002
3. Lillesand T.M. and Kiefer R.W., "Remote Sensing and Image Interpretation", John Wiley and Sons, Inc, New York, 1987.
4. Burrough P A, "Principle of GIS for land resource assessment", Oxford
5. Mischael Hord, "Remote Sensing Methods and Applications", John Wiley & Sons, New York, 1986.
6. Singal, "Remote Sensing", Tata McGraw-Hill, New Delhi, 1990.
7. Floyd F. Sabins, Remote sensing, "Principles and interpretation", W H Freeman

812ECT07 - ENGINEERING ACOUSTICS

UNIT I ACOUSTICS WAVES

Acoustics waves - Linear wave equation – sound in fluids – Harmonic plane waves – Energy density – Acoustics intensity – Specific acoustic impedance – spherical waves – Describer scales.

Reflection and Transmission: Transmission from one fluid to another normal and oblique incidence – method of images.

UNIT II RADIATION AND RECEPTION OF ACOUSTIC WAVES

Radiation from a pulsating sphere – Acoustic reciprocity – continuous line source - radiation impedance - Fundamental properties of transducers.

Absorption and attenuation of sound

Absorption from viscosity – complex sound speed and absorption – classical absorption coefficient.

UNIT III PIPES RESONATORS AND FILTERS

Resonance in pipes - standing wave pattern absorption of sound in pipes – long wavelength limit – Helmholtz resonator - acoustic impedance - reflection and transmission of waves in pipe - acoustic filters – low pass, high pass and band pass.

Noise, Signal detection, Hearing and speech

Noise, spectrum level and band level – combining band levels and tones – detecting signals in noise – detection threshold – the ear – fundamental properties of hearing – loudness level and loudness – pitch and frequency – voice.

UNIT IV ARCHITECTURAL ACOUSTICS:

Sound in endosure – A simple model for the growth of sound in a room – reverberation time - Sabine, sound absorption materials – measurement of the acoustic output of sound sources in live rooms – acoustics factor in architectural design.

Environmental Acoustics:

Weighted sound levels speech interference – highway noise – noise induced hearing loss – noise and architectural design specification and measurement of some isolation design of portions.

UNIT V TRANSDUCTION

Transducer as an electives network – canonical equation for the two simple transducers transmitters – moving coil loud speaker – loudspeaker cabinets – horn loud speaker, receivers – condenser – microphone – moving coil electrodynamics microphone piezoelectric microphone – calibration of receivers.

TEXT BOOK:

1. Lawrence E.Kinsler, Austin, R.Frey, Alan B.Coppens, James V.Sanders, Fundamentals of Acoustics, 4th edition, Wiley, 2000.

REFERENCE:

1. L.Beranek , “Acoustics” - Tata McGraw-Hill

812ECT08 - WIRELESS NETWORKS

UNIT I MULTIPLE RADIO ACCESS

Medium Access Alternatives: Fixed-Assignment for Voice Oriented Networks Random Access for Data Oriented Networks , Handoff and Roaming Support, Security and Privacy.

UNIT II WIRELESS WANS

First Generation Analog, Second Generation TDMA – GSM, Short Messaging Service in GSM, Second Generation CDMA – IS-95, GPRS - Third Generation Systems (WCDMA/CDMA 2000).

UNIT III WIRELESS LANS

Introduction to wireless LANs - IEEE 802.11 WLAN – Architecture and Services, Physical Layer-MAC sublayer- MAC Management Sublayer, Other IEEE 802.11 standards, HIPERLAN, WiMax standard.

UNIT IV ADHOC AND SENSOR NETWORKS

Characteristics of MANETs, Table-driven and Source-initiated On Demand routing protocols, Hybrid protocols, Wireless Sensor networks- Classification, MAC and Routing protocols.

UNIT V WIRELESS MANS AND PANS

Wireless MANs – Physical and MAC layer details, Wireless PANs – Architecture of Bluetooth Systems, Physical and MAC layer details, Standards.

TEXT BOOKS:

1. William Stallings, "Wireless Communications and networks" Pearson / Prentice Hall of India, 2nd Ed., 2007.
2. Dharma Prakash Agrawal & Qing-An Zeng, "Introduction to Wireless and Mobile Systems", Thomson India Edition, 2nd Ed., 2007.

REFERENCES:

1. Vijay. K. Garg, "Wireless Communication and Networking", Morgan Kaufmann Publishers, 2007.
2. Kaveth Pahlavan, Prashant Krishnamurthy, "Principles of Wireless Networks", Pearson Education Asia, 2002.
3. Gary. S. Rogers & John Edwards, "An Introduction to Wireless Technology", Pearson Education, 2007.
4. Clint Smith, P.E. & Daniel Collins, "3G Wireless Networks", Tata McGraw Hill, 2nd Ed., 2007.

812ECT09 - TELECOMMUNICATION SWITCHING AND NETWORKS

UNIT I MULTIPLEXING

Transmission Systems, FDM Multiplexing and modulation, Time Division Multiplexing, Digital Transmission and Multiplexing: Pulse Transmission, Line Coding, Binary N-Zero Substitution, Digital Biphase, Differential Encoding, Time Division Multiplexing, Time Division Multiplex Loops and Rings, SONET/SDH: SONET Multiplexing Overview, SONET Frame Formats, SONET Operations, Administration and Maintenance, Payload Framing and Frequency Justification, Virtual Tributaries, DS3 Payload Mapping, E4 Payload Mapping, SONET Optical Standards, SONET Networks. SONET Rings: Unidirectional Path-Switched Ring, Bidirectional Line-Switched Ring.

UNIT II DIGITAL SWITCHING

Switching Functions, Space Division Switching, Time Division Switching, twodimensional Switching: STS Switching, TST Switching, No.4 ESS Toll Switch, Digital Cross-Connect Systems, Digital Switching in an Analog Environment. Elements of SS7 signaling.

UNIT III NETWORK SYNCHRONIZATION CONTROL AND MANAGEMENT

Timing: Timing Recovery: Phase-Locked Loop, Clock Instability, Jitter Measurements, Systematic Jitter. Timing Inaccuracies: Slips, Asynchronous Multiplexing, Network Synchronization, U.S. Network Synchronization, Network Control, Network Management.

UNIT IV DIGITAL SUBSCRIBER ACCESS

ISDN: ISDN Basic Rate Access Architecture, ISDN U Interface, ISDN D Channel Protocol. High-Data-Rate Digital Subscriber Loops: Asymmetric Digital Subscriber Line, VDSL. Digital Loop Carrier Systems: Universal Digital Loop Carrier Systems, Integrated Digital Loop Carrier Systems, Next-Generation Digital Loop Carrier, Fiber in the Loop, Hybrid Fiber Coax Systems, Voice band Modems: PCM Modems, Local Microwave Distribution Service, Digital Satellite Services.

UNIT V TRAFFIC ANALYSIS

Traffic Characterization: Arrival Distributions, Holding Time Distributions, Loss Systems, Network Blocking Probabilities: End-to-End Blocking Probabilities, Overflow Traffic, Delay Systems: Exponential service Times, Constant Service Times, Finite Queues.

TEXTBOOKS:

1. J. Bellamy, "Digital Telephony", John Wiley, 2003, 3rd Edition.
2. JE Flood, "Telecommunications Switching, Traffic and Networks", Pearson.

REFERENCES:

1. R.A.Thomson, "Telephone switching Systems", Artech House Publishers, 2000.
2. W. Stallng, " Data and Computer Communications", Prentice Hall, 1993.
3. T.N.Saadawi, M.H.Ammar, A.E.Hakeem, "Fundamentals of Telecommunication Networks", Wiley Interscience, 1994.
4. W.D. Reeve, "Subscriber Loop Signaling and Transmission Hand book", IEEE Press(Telecomm Handbook Series), 1995.
5. Viswanathan. T., "Telecommunication Switching System and Networks", Prentice Hall of India Ltd., 1994.

812ECT10 - SATELLITE COMMUNICATION

UNIT I SATELLITE ORBITS

Kepler's Laws, Newton's law, orbital parameters, orbital perturbations, station keeping, geo stationary and non Geo-stationary orbits – Look Angle Determination- Limits of visibility – eclipse-Sub satellite point –Sun transit outage-Launching Procedures - launch vehicles and propulsion.

UNIT II SPACE SEGMENT AND SATELLITE LINK DESIGN

Spacecraft Technology- Structure, Primary power, Attitude and Orbit control, Thermal control and Propulsion, communication Payload and supporting subsystems, Telemetry, Tracking and command. Satellite uplink and downlink Analysis and Design, link budget, E/N calculation-performance impairments-system noise, inter modulation and interference, Propagation Characteristics and Frequency considerations- System reliability and design lifetime.

UNIT III SATELLITE ACCESS

Modulation and Multiplexing: Voice, Data, Video, Analog – digital transmission system, Digital video Broadcast, multiple access: FDMA, TDMA, CDMA, Assignment Methods, Spread Spectrum communication, compression – encryption

UNIT IV EARTH SEGMENT

Earth Station Technology-- Terrestrial Interface, Transmitter and Receiver, Antenna Systems TVRO, MATV, CATV, Test Equipment Measurements on G/T, C/No, EIRP, Antenna Gain.

UNIT V SATELLITE APPLICATIONS

INTELSAT Series, INSAT, VSAT, Mobile satellite services: GSM, GPS, INMARSAT, LEO, MEO, Satellite Navigational System. Direct Broadcast satellites (DBS)- Direct to home Broadcast (DTH), Digital audio broadcast (DAB)- Worldspace services, Business TV(BTV), GRAMSAT, Specialized services – E –mail, Video conferencing, Internet.

TEXT BOOKS:

1. Dennis Roddy, 'Satellite Communication', McGraw Hill International, 4th Edition, 2006.
2. Wilbur L. Pritchard, Hendri G. Suyderhoud, Robert A. Nelson, 'Satellite Communication Systems Engineering', Prentice Hall/Pearson, 2007.

REFERENCES:

1. N.Agarwal, 'Design of Geosynchronous Space Craft, Prentice Hall, 1986.
2. Bruce R. Elbert, 'The Satellite Communication Applications' Hand Book, Artech House Boston London, 1997.
3. Tri T. Ha, 'Digital Satellite Communication', II edition, 1990.
4. Emanuel Fthenakis, 'Manual of Satellite Communications', McGraw Hill Book Co., 1984.
5. Robert G. Winch, 'Telecommunication Trans Mission Systems', McGraw-Hill Book Co., 1983.
6. Brian Ackroyd, 'World Satellite Communication and earth station Design', BSP professional Books, 1990.
7. G.B.Bleazard, 'Introducing Satellite communications NCC Publication, 1985.
8. M.Richharia, 'Satellite Communication Systems-Design Principles', Macmillan 2003.

812ECT11 - TELECOMMUNICATION SYSTEM MODELING AND SIMULATION

UNIT I SIMULATION METHODOLOGY

Introduction, Aspects of methodology, Performance Estimation, Sampling frequency, Low pass equivalent models for bandpass signals, multicarrier signals, Non-linear and time varying systems, Post processing, Basic Graphical techniques and estimations

UNIT II SIMULATION OF RANDOM VARIABLES RANDOM PROCESS

Generation of random numbers and sequence, Gaussian and uniform random numbers Correlated random sequences, Testing of random numbers generators, Stationary and uncorrelated noise, Goodness of fit test.

UNIT III MODELING OF COMMUNICATION SYSTEMS

Radio frequency and optical sources, Analog and Digital signals, Communication channel and models, Free space channels, Multipath channel and discrete channel noise and interference.

UNIT IV ESTIMATION OF PERFORMANCE MEASURE FOR SIMULATION

Quality of estimator, Estimation of SNR, Probability density function and bit error rate, Monte Carlo method, Importance sampling method, Extreme value theory.

UNIT V SIMULATION AND MODELING METHODOLOGY

Simulation environment, Modeling considerations, Performance evaluation techniques, error source simulation, Validation.

TEXTBOOK

1. MC.Jeruchim, P.Balaban and Sam K Shanmugam, Simulation of communication Systems: Modeling, Methodology and Techniques, Plenum Press, New York, 2001.

REFERENCES

1. Averill.M.Law and W.David Kelton,Simulation Modeling and Analysis, McGraw-Hill Inc., 2000.
2. Geoffrey Gorden, System Simulation, 2nd Edition, Prentice Hall of India, 1992.
3. W.Turin, Performance Analysis of Digital Communication Systems, Computer Science Press, New York, 1990.
4. Jerry banks and John S.Carson, Discrete Event System Simulation, Prentice Hall of India, 1984.
5. William H. Tranter, K. Sam shanmugam, Theodore s. Rappaport, K.Kurt L.Kosbar, Principles of Communication Systems Simulation, Pearson Education (Singapore) Pvt Ltd, 2004.

812ECT12 - RADAR AND NAVIGATIONAL AIDS

UNIT I

Introduction to Radar

Basic Radar –The simple form of the Radar Equation- Radar Block Diagram- Radar Frequencies –Applications of Radar – The Origins of Radar

The Radar Equation

Introduction- Detection of Signals in Noise- Receiver Noise and the Signal-to-Noise Ratio- Probability Density Functions- Probabilities of Detection and False Alarm- Integration of Radar

Pulses- Radar Cross Section of Targets- Radar cross Section Fluctuations- Transmitter Power- Pulse Repetition Frequency- Antenna Parameters- System losses – Other Radar Equation Considerations.

UNIT II

MTI and Pulse Doppler Radar

Introduction to Doppler and MTI Radar- Delay –Line Cancelers- Staggered Pulse Repetition Frequencies –Doppler Filter Banks - Digital MTI Processing - Moving Target Detector - Limitations to MTI Performance - MTI from a Moving Platform (AMIT) – Pulse Doppler Radar – Other Doppler Radar Topics- Tracking with Radar –Monopulse Tracking –Conical Scan and Sequential Lobing - Limitations to Tracking Accuracy - Low-Angle Tracking - Tracking in Range - Other Tracking Radar Topics -Comparison of Trackers - Automatic Tracking with Surveillance Radars (ADT).

UNIT III

Detection of Signals in Noise –Introduction – Matched –Filter Receiver –Detection Criteria – Detectors –Automatic Detector - Integrators - Constant-False-Alarm Rate Receivers - The Radar operator - Signal Management - Propagation Radar Waves - Atmospheric Refraction - Standard propagation - Nonstandard Propagation - The Radar Antenna - Reflector Antennas - Electronically Steered Phased Array Antennas – Phase Shifters - Frequency-Scan Arrays.

Radar Transmitters- Introduction –Linear Beam Power Tubes - Solid State RF Power Sources - Magnetron - Crossed Field Amplifiers - Other RF Power Sources – Other aspects of Radar Transmitter.

Radar Receivers - The Radar Receiver - Receiver noise Figure – Superheterodyne Receiver - Duplexers and Receiver Protectors- Radar Displays.

UNIT IV

Introduction - Introduction - Four methods of Navigation.

Radio Direction Finding - The Loop Antenna - Loop Input Circuits - An Aural Null Direction Finder - The Goniometer - Errors in Direction Finding - Adcock Direction Finders - Direction Finding at Very High Frequencies - Automatic Direction Finders – The Commutated Aerial Direction Finder - Range and Accuracy of Direction Finders.

Radio Ranges - The LF/MF Four course Radio Range - VHF Omni Directional Range(VOR) - VOR Receiving Equipment - Range and Accuracy of VOR – Recent Developments.

Hyperbolic Systems of Navigation (Loran and Decca) - Loran-A - Loran-A Equipment - Range and precision of Standard Loran - Loran-C - The Decca Navigation System - Decca Receivers - Range and Accuracy of Decca - The Omega System.

UNIT V

DME and TACAN - Distance Measuring Equipment - Operation of DME - TACAN - TACAN Equipment.

Aids to Approach and Landing - Instrument Landing System - Ground Controlled Approach System - Microwave Landing System(MLS).

Doppler Navigation - The Doppler Effect - Beam Configurations -Doppler Frequency Equations - Track Stabilization - Doppler Spectrum - Components of the Doppler Navigation System - Doppler range Equation - Accuracy of Doppler Navigation Systems.

Inertial Navigation - Principles of Operation - Navigation Over the Earth – Components of an Inertial Navigation System - Earth Coordinate Mechanization - Strapped-Down Systems - Accuracy of Inertial Navigation Systems.

Satellite Navigation System - The Transit System - Navstar Global Positioning System (GPS).

TEXTBOOKS

1. Merrill I. Skolnik , " Introduction to Radar Systems", Tata McGraw-Hill (3rd Edition) 2003.
2. N.S.Nagaraja, Elements of Electronic Navigation Systems, 2nd Edition, TMH, 2000.

REFERENCES

1. Peyton Z. Peebles:, "Radar Principles", Johnwiley, 2004.
2. J.C Toomay, " Principles of Radar", 2nd Edition –PHI, 2004.

812ECT13 - OPTICAL NETWORKS

UNIT I OPTICAL SYSTEM COMPONENTS

Light propagation in optical fibers – Loss & bandwidth, System limitations, Non Linear effects; Solitons; Optical Network Components – Couplers, Isolators & Circulators, Multiplexers & Filters, Optical Amplifiers, Switches, Wavelength Converters.

UNIT II OPTICAL NETWORK ARCHITECTURES

Introduction to Optical Networks; SONET / SDH, Metropolitan-Area Networks, Layered Architecture ; Broadcast and Select Networks – Topologies for Broadcast Networks, Media-Access Control Protocols, Testbeds for Broadcast & Select WDM; Wavelength Routing Architecture.

UNIT III WAVELENGTH ROUTING NETWORKS

The optical layer, Node Designs, Optical layer cost tradeoff, Routing and wavelength assignment, Virtual topology design, Wavelength Routing Testbeds, Architectural variations.

UNIT IV PACKET SWITCHING AND ACCESS NETWORKS

Photonic Packet Switching – OTDM, Multiplexing and Demultiplexing, Synchronisation, Broadcast OTDM networks, Switch-based networks; Access Networks – Network Architecture overview, Future Access Networks, Optical Access Network Architectures; and OTDM networks.

UNIT V NETWORK DESIGN AND MANAGEMENT

Transmission System Engineering – System model, Power penalty - transmitter, receiver, Optical amplifiers, crosstalk, dispersion; Wavelength stabilization ; Overall design considerations; Control and Management – Network management functions, Configuration management, Performance management, Fault management, Optical safety, Service interface.

TEXT BOOK:

1. Rajiv Ramaswami and Kumar N. Sivarajan, "Optical Networks : A Practical Perspective", Harcourt Asia Pte Ltd., Second Edition 2004.

REFERENCES:

1. C. Siva Ram Moorthy and Mohan Gurusamy, "WDM Optical Networks : Concept, Design and Algorithms", Prentice Hall of India, 1st Edition, 2002.
2. P.E. Green, Jr., "Fiber Optic Networks", Prentice Hall, NJ, 1993.

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