



B.E - ELECTRONICS AND COMMUNICATION ENGINEERING

(FOUR YEAR FULL TIME)

CURRICULUM 2008

SEMESTER I

Code No.	Course Title	L	T	P	C
THEORY					
XEC 101	Technical English	3	1	0	4
XEC 102	Mathematics- I	3	1	0	4
XEC 103	Applied Physics	3	1	0	4
XEC 104	Applied Chemistry	3	1	0	4
XEC 105	Engineering Graphics	2	0	3	4
XEC 106	Basic Electrical and Electronics Engineering	3	0	0	3
PRACTICAL					
XEC 107	Applied Physics Lab	0	0	3	2
XEC 108	Applied Chemistry Lab	0	0	3	2
XEC 109	Basic Workshop Practice	0	0	3	2

Total Hours: 33

Total Credits: 29

SEMESTER II

Code No.	Course Title	L	T	P	C
THEORY					
XEC 201	Mathematics – II	3	1	0	4
XEC 202	Computer Programming	4	0	0	4
XEC 203	Electron Devices	3	0	0	3
XEC 204	Circuit Analysis	3	1	0	4
XEC 205	Electronic Circuits-I	3	1	0	4
XEC 206	Electrical Machines	3	0	2	4
PRACTICAL					
XEC 207	Computer Programming Lab	0	0	3	2
XEC 208	Communication Skills Enhancement	2	0	2	3
XEC 209	Electronic Devices and Circuits Lab-I	0	0	3	2

Total Hours: 34

Total Credits: 30

SEMESTER III

Code No.	Course Title	L	T	P	C
THEORY					
XEC301	Professional Ethics and Human values(ECE)	3	0	0	3
XEC 302	Mathematics-III	3	1	0	4
XEC 303	Signals and Systems	3	1	0	4
XEC 304	Data Structures	3	1	0	4
XEC 305	Electromagnetic Fields	3	0	0	3
XEC 306	Electronic Circuits-II	3	0	0	3
PRACTICAL					
XEC 307	Data Structures Lab	0	0	3	2
XEC 308	Electronic Circuits II and Simulation Lab	0	0	3	2

Total Hours: 27

Total Credits: 25

SEMESTER IV

Code No.	Course Title	L	T	P	C
THEORY					
XEC 401	Environmental Science and Engineering	3	0	0	3
XEC 402	Random Process	3	1	0	4
XEC 403	Measurements and instrumentation	3	0	0	3
XEC 404	Transmission Lines and wave guides	3	1	0	4
XEC 405	Digital Electronics	3	1	0	4
XEC 406	Linear Integrated Circuits	3	0	0	3
PRACTICAL					
XEC 407	Linear Integrated Circuit Lab	0	0	3	2
XEC 408	Digital Electronics Lab	0	0	3	2

Total Hours: 27

Total Credits: 25

SEMESTER V

Code No.	Course Title	L	T	P	C
THEORY					
XEC 501	Total Quality Management	3	0	0	3
XEC 502	Numerical methods	3	1	0	4
XEC 503	Digital Signal Processing	3	1	0	4
XEC 504	Communication theory	3	1	0	4
XEC 505	Microprocessor and its Applications	3	0	0	3
XEC 506	Control Systems	3	1	0	4
PRACTICAL					
XEC 507	Digital Signal Processing Lab	0	0	3	2
XEC 508	Microprocessor and Applications Lab	0	0	3	2

Total Hours: 28

Total Credits: 26

SEMESTER VI

Code No.	Course Title	L	T	P	C
THEORY					
XEC 601	Digital Communication	3	0	0	3
XEC 602	Computer Networks	3	0	0	3
XEC 603	Antenna and wave Propagation	3	0	0	3
XEC 604	Embedded Systems	3	0	2	4
XEC 605	Television and Video Engineering	3	0	0	3
XECE**	Elective I	3	0	0	3
PRACTICAL					
XEC 607	RF and Communication Lab	0	0	3	2
XEC 608	Networks Lab	0	0	3	2

Total Hours: 26

Total Credits: 23

SEMESTER VII

Code No.	Course Title	L	T	P	C
THEORY					
XEC 701	Entrepreneurial Development Management	3	0	0	3
XEC702	VLSI Design	4	0	0	4
XEC703	Optical Communication	3	0	0	3
XEC704	Microwave Engineering	4	0	0	4
XECE**	Elective II	3	0	0	3
XECE**	Elective III	3	0	0	3
PRACTICAL					
XEC 707	VLSI Lab	0	0	3	2
XEC 708	Microwave Lab and Optical Lab	0	0	3	2
XEC709	Mini Project	0	0	3	4

Total Hours: 29

Total Credits: 28

SEMESTER VIII

Code No.	Course Title	L	T	P	C
THEORY					
XEC 801	Social Engineering	3	0	0	3
XECE**	Elective IV	3	0	0	3
XECE**	Elective V	3	0	0	3
PRACTICAL					
XEC 804	Project Work	0	0	20	12

Total Hours: 29

Total Credits: 21

Over all Credits: 207

LIST OF ELECTIVES

Code No.	Course Title	L	T	P	C
E51	Advanced Microprocessor	3	0	0	3
E52	Medical Electronics	3	0	0	3
E53	Operating Systems	3	0	0	3
E54	Solid State Electronic Devices	3	0	0	3
E55	Speech Processing	3	0	0	3
E56	Object oriented Programming	3	0	0	3
E57	Computer Hardware and Interfacing	3	0	0	3
E58	Internet and Java	3	0	0	3
E59	Mobile Communication	3	0	0	3
E60	Advanced Digital Signal Processing	3	0	0	3
E61	Electromagnetic Interference and Compatibility	3	0	0	3
E62	High Speed Networks	3	0	0	3
E63	Power Electronics	3	0	0	3
E64	Soft Computing	3	0	0	3
E65	RF Circuit Design	3	0	0	3
E66	Digital Image Processing	3	0	0	3
E67	Computer Architecture	3	0	0	3
E68	Wireless networks	3	0	0	3
E69	Telecommunication Switching and Networks	3	0	0	3
E70	Satellite communication	3	0	0	3
E71	Advanced Electronic system design	3	0	0	3
E72	Optoelectronic devices	3	0	0	3
E73	Telecommunication System Modeling and Simulation	3	0	0	3
E74	Radar and Navigational Aids	3	0	0	3
E75	Remote Sensing	3	0	0	3
E76	Engineering Acoustics	3	0	0	3
E77	Analog Interfacing to Microprocessor Systems	3	0	0	3
E78	Intellectual Property Rights	3	0	0	3
E79	Indian Constitution and Society	3	0	0	3

UNIT – I FOCUS ON LANGUAGE**15**

Word formation with prefixes and suffixes - synonyms and antonyms - nominal compounds , prepositions, homonyms, homophones and hyponyms, Part of speech, use of words as nouns and verbs, phrasal verbs, connectives, sentences patterns.

Suggested Activities

- Using prefixes and suffixes to change the grammatical functions of words – giving synonyms and antonyms, using the same words and its derivatives of different forms
- Expansion of noun + noun phrases - correction of errors in the given sentences.
- Using comparative forms of adjectives in sentences giving a pair of purpose and function statements to be linked with expressions like to in order to so as to (Eg: He used the ignition key. He started the engine. He used the ignition key in order to start the engine)
- Identification of content words in the given text.
- Learning multi functional words that can serve both nouns and verbs
- Analyzing sentences into S,V,O, C and A.

Note: All examples pertaining to this unit should preferably be related to science and technology.

UNIT – II FUNCTIONAL GRAMMAR**15**

Tense forms and voice forms, concord, degrees of comparison, conditional clause, definition of technical terms, Sentences expressing purpose and function, comparison and contrast, cause and effect constructions, imperatives, reported speeches, Modal verbs, infinitives, gerund, participles

Suggested Activities

Giving pairs of cause and effect statements to be linked with expressions like *as / since / because*. Rewriting imperative sentences using assertive form '*should*' (Store energy and tap it when required energy should be and tapped when it is required)

- Rewriting infinitive forms as gerunds (eg: To modernize the administrative office with computers is expensive, Modernizing the administrative office with computers is expensive) Fill in the blanks with appropriate prepositions.
- Choosing sentences in a given text that use different tense forms
- Subject-verb agreement of the sentences given practical
- Providing a context for the use of the tense forms - rewriting the sentences in the impersonal passive form
- Rewriting the sentences in the reported speeches

UNIT III READING

10

Techniques of Reading – Technical articles on invention and discoveries, Reading comprehension on biographies of eminent scientists, engineers and successful entrepreneurs, Practicing - skimming and scanning, Rhetorical functions (narrative, descriptive and argumentative) sequencing of sentences. Connective adverbs. Idioms and phrases, phrasal verbs and cloze test.

Suggested Activities

- Taking a quick glance at the text to predict the content – reading to identify the main theme.
- Identifying the topic sentence in a paragraph – providing suitable titles for paragraphs – matching the titles with the paragraphs.
- Guessing the contextual meaning of words – comprehending a passage and answering questions of varied kinds.
- Transferring of information from a text to graphical representations like tree diagram / flow chart / bar chart / pie chart/ tables.
- Filling the gaps with appropriate missing words from the given list.
- Making notes based on a passage in the format given.
- Using an appropriate format to make notes from a given passage.
- Providing a suitable title after reading the passage.
- Identifying main and supporting ideas by scanning.
- Sequencing of jumbled sentences using linguistic clues (e.g.: reference words).

UNIT IV WRITING I

10

Framing questions and answering, (“Wh” type and “Yes or No”) type note making, (guided and open) making lists, stating problems and proposing solutions, recommendations, instructions, check lists, technical report writing, decoding from graphical representation (flow chart, pie chart, tree diagram) numerical expressions.

Suggested Activities

- Identifying the phrases used for making recommendations in given texts and employing them in making recommendations.
- Writing checklists in the appropriate format.
- Writing instructions for performing tasks at home or at work (use of imperatives).
- Summarizing the discussions and other oral practice activities like role play in the prescribed textbooks.
- Essay writing based on discussion of scientific and technical topics given in the prescribed textbooks.

UNIT V WRITING II

10

Paragraph writing, essay writing, technical report writing, letter writing, (personal, business, letter of application, letter to the editor) resume writing, drafting e-mails, minutes of meeting, memorandum, creative writing.

Suggested Activities

- Using appropriate expressions to define a concept / describe an object / device / process.
- Writing paragraphs on different scientific discourse patterns like classification, comparison and problem / solution – identifying the topic sentence.
- Using unity, cohesion and coherence in paragraph writing.
- Writing formal and business letters using the appropriate format.
- Note – making (guided and open).
- Summarizing and writing paragraphs based on listening tasks in the prescribed textbooks.
- Making recommendations by using modal auxiliary verbs like *should*, *must*, *ought to* etc.

L: 45; T: 15; Total: 60

TEXT BOOK:

1. Department of Humanities and Social Sciences, Anna University, English for Engineers and Technologists, Vols. I & II (Combined Edition), Orient Longman Pvt. Ltd., 2006.

REFERENCES:

1. V.R. Narayanaswami, Strengthen Your Writing, 3rd Edition, Orient Longman, 2005.
2. Andrea J. Rutherford, Basic Communication Skills for Technology, 1st Edition, Pearson Education Asia (Singapore) Pvt. Ltd., Bangalore, 2001.
3. Nell Ann Pickett, Ann A. Laster, Katherine E. Staples, Technical English (Writing, Reading and Speaking), 8th Edition, Pearson Education, USA, Addison Wesley Longman Inc., 2001.
4. “ Power words in Pairs”. Emerald publishers - Chennai

UNIT I MATRICES 9

Eigen values and Eigenvectors of a real matrix – Characteristic equation Properties of Eigen values and Eigen vectors - Cayley - Hamilton theorem (excluding proof) - Similarity transformation (Concept only) – Orthogonal matrix - Orthogonal transformation of a symmetric matrix to diagonal form – Reduction of quadratic form to Canonical form by Orthogonal transformation.

UNIT II THREE DIMENSIONAL ANALYTICAL GEOMETRY 9

Direction Cosine and Ratios – Angle between two lines – Equation of plane – Equation of Straight line – Coplanar lines – shortest distance between skew lines – Sphere – Tangent plane – Plane section of a sphere

UNIT III GEOMETRICAL APPLICATIONS OF DIFFERENTIAL CALCULUS 9

Curvature – Cartesian and polar co – ordinates – Centre and radius of curvature – Circle of curvature – Involutives and evolutes – Envelops – Properties of envelopes and evolutes .

UNIT IV FUNCTION OF SEVERAL VARIABLES 9

Functions of two variables – Partial derivatives – Total differential – Taylor’s expansion – Maxima and Minima – Constrained maxima and minima – Lagrange’s Multiplier method – Jacobians .

UNIT V ORDINARY DIFFERENTIAL EQUATIONS (ODE) AND APPLICATIONS 9

Linear equations of second order with constant and variable coefficients - Simultaneous first order linear equations with constant coefficients – Method of variation of parameters.

L: 45; T:15; Total:60

TEXT BOOKS:

1. Grewal .B.S., “Higher Engineering Mathematics”, 38th Edition- Khanna Publication –Delhi, 2004.
2. Kreyszi.E., “Advance Engineering Mathematics”, 8th Edition-John Wiley & Son (Asia) Ltd, Singapore,. 2001.

REFERENCES:

1. Bali. N.P., Narayana Iyengar, and Chand.N., “Engineering Mathematics” Laxmi Publication Pvt. Ltd-New Delhi, 2003.
2. Veerarajan.T., “Engineering Mathematics (For First Year)”, 4th Edition , John Wiley & Son -Hill Publishing company Ltd, New Delhi, 2005.
3. Kandasamy. P., Thilagavathy. K, and Gunavathy. K., “Engineering Mathematics”-Volume I &II, S. Chand & Co, New Delhi, 2005.
4. Venkataraman. M. K., “Engineering Mathematics”-Volume I &II, Revised enlarged 4th Edition, The National Publishing Company-Chennai, 2004.

UNIT-I ACOUSTICS AND ULTRASONICS**9**

Acoustics: Classification of sound – Characteristics of musical sound – Loudness – Weber-Fechner law – Decibel – Absorption Coefficient – Reverberation – Reverberation time – Sabine's Formula (growth & decay) – Factors affecting acoustics of buildings (reverberation time, loudness, focusing, echo, echelon effect, resonance and noise) and their remedies.

Ultrasonics: Production: Magnetostriction and Piezo electric methods –Applications

UNIT-II WAVE OPTICS, LASERS AND FIBRE OPTICS**9**

Wave Optics: Photo elasticity: Birefringence – Stress-optic law - Effect of a stressed model in a plane polariscope – Isoclinic and Isochromatic fringes (definitions) – Photoelastic bench.

Laser: Nd – YAG laser, CO₂ laser, semiconductor laser (homojunction) – Uses of lasers – Holography.

Fibre Optics: Principle and propagation of light in optical fibres – Numerical Aperture and Acceptance angle – Types of optical fibres (material, refractive index, mode) – Applications: Fibre optics communication system (block diagram only).

UNIT-III CRYSTAL PHYSICS AND NDT**9**

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 structures.

NDT: Liquid penetrant method – Ultrasonic flaw detection – Ultrasonic flaw detector (block diagram)– X-ray Radiography: displacement method – X-Ray Fluoroscopy– Merits and Demerits of each method

UNIT- IV CONDUCTING MATERIALS**9**

Conductors: Wiedermann Franz law - Lorentz number –Fermi distribution function – Density of energy states – carrier concentration - effect of temperature on fermi energy level

Semiconductors: Semiconductor-properties- types of semiconductor, Hall effect – Determination of Hall co-efficient.

Superconductors: Super conducting phenomena – Properties of superconductors – Meissner effect , Isotope effect – Type I and Type II superconductors– Applications – Magnetic levitation and SQUID

Dielectrics: Electrical susceptibility - Dielectric constant – Electronic, ionic, orientational and space charge polarization – Frequency and temperature dependence of polarization – Internal field – Claussius-Mosotti relation (derivation) - Dielectric loss – Dielectric breakdown – Uses of dielectric materials (Capacitor and Transformer).

Introduction to New Materials: Metallic glasses – Nano materials – Shape memory alloys – Bio-materials.

L:45; T:15; Total: 60

TEXT BOOKS:

1. Avadhanulu M.N. and Kshirsagar P.G., “A Text Book of Engineering Physics”, S.Chand & Company Ltd., 7th Enlarged Revised Ed., 2005.
2. Gaur R. K. and Gupta S. L., “Engineering Physics”, Dhanpat Rai Publishers, New Delhi, 2001.

REFERENCES:

1. Pillai S. O., “Solid State Physics”, New Age International Publication, New Delhi, Fifth Edition, 2003.
2. Rajendran V. and Marikani A., “Materials Science”, Tata McGraw Hill Publishing Company Ltd, New Delhi, 2004.

UNIT - I WATER TECHNOLOGY 9

Source and types of water – water quality parameters – definition and expression – hard water – estimation of hardness (EDTA method) and alkalinity – boiler feed water – requirements – disadvantages of using hard water in boilers – internal conditioning (phosphate, calgon and carbonate conditioning methods) – external conditioning – demineralization process – desalination (RO method) – domestic water treatment.

UNIT - II ELECTROCHEMISTRY 9

Electrode potentials – difference between electrolytic cells and electrochemical cells – Standard electrodes (H₂ and calomel electrodes) – Determination of pH using glass electrodes – Nernst equation – problems – electrochemical series – emf – measurements and its applications – Galvanic cells – Concentration cell – problems – reversible and irreversible cells – conductometric titrations.

UNIT- III CORROSION AND ITS INHIBITION 9

Corrosion – principles of chemical corrosion – Pilling – Bedworth rule – principles of electrochemical corrosion – difference between chemical and electrochemical corrosion – types of corrosion – factors influencing corrosion – corrosion control methods – pre-treatment of metal surface – electroplating and electroless plating.

UNIT - IV NUCLEAR ENERGY AND ENERGY STORAGE DEVICES 9

Nuclear fission process – definition, mechanism and characteristics – chain reactions – nuclear energy and its calculations – types of nuclear fission reaction – atom bomb – light water nuclear power plant – breeder reactor – batteries – introduction – types of batteries – primary and secondary batteries – dry cell – lead acid, Ni-Cd and Li batteries – alkaline batteries – principles and applications of solar cells.

UNIT - V POLYMERS 9

Monomers and polymers – types of polymerization reaction – mechanism of polymerization (free radical) – engineering plastics – PVC, teflon, polycarbonate, polyurethane and thermocole – properties – applications – compounding of plastics, moulding methods – injection, compression moulding and blow moulding – polymer blends and alloys.

L:45; T: 15; Total: 60

TEXT BOOKS:

1. P.C. Jain and Monicka Jain, Engineering Chemistry, Dhanpat Raj Publishing Company (P) Ltd, New Delhi – 2002.
2. S.S. Dara. A Text book of Engineering Chemistry, S. Chand & Company Ltd, New Delhi – 2003.

REFERENCES:

1. B.K. Sharma, Engineering Chemistry, Krishna Prakasam Media (P) Ltd., Meerut, 2001.
2. Mars G. Fontana, Corrosion Engineering, Tata McGraw Hill Publishing Co., New Delhi, 2005.

**XEC105 ENGINEERING GRAPHICS
(First Angle Projection only)**

2 0 3 4

UNIT I PROJECTION OF POINTS, LINES AND PLANE SURFACES 6+9

General principles of orthographic projection – Layout of views – Projection of points, straight lines – Determination of true lengths and true inclinations and location of traces

UNIT II PROJECTION OF SOLIDS AND SECTION OF SOLIDS 6+9

Projection of polygonal surface and circular lamina inclined to any one plane - Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to both the reference plane.

UNIT III SECTION OF SOLIDS 6+9

Sectioning of solids in simple vertical position by cutting planes inclined to both the reference plane - Obtaining true shape of section.

UNIT IV DEVELOPMENT OF SURFACES AND INTERSECTION OF SOLIDS 6+9

Development of lateral surfaces of simple and truncated solids – prisms, pyramids, cylinders and cones -Development of lateral surfaces of two Intersecting solids – prism & cylinder, cylinder & cylinder – Axis at right angles with no offset.

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS 6+9

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

Perspective projection of regular solids -by visual ray and vanishing point methods.

LECTURE : 30

**PRACTICES : 45
75**

TOTAL

NOTE

1. 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.

TEXT BOOKS:

1. K.Venugopal “Engineering Graphics”, New Age International (P) Limited, 2002.
2. K.V. Natarajan “A text book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2006.

REFERENCES:

1. N.D. Bhatt “Engineering Drawing” Charotar publishing House 46th Edition, 2003.
2. K.R. Gopalakrishnana. “Engineering Drawing” (Vol. I & II) Subhas Publications – 1998.
3. Luzadder and Duff, “Fundamentals of Engineering Drawing” Prentice Hall of India Pvt Ltd, XI Edition - 2001.

STANDARDS:

1. IS10711 – 2001 Technical products Documentation – Size and Layout of Drawing sheets.
2. IS9609 (Parts 0 & 1) – 2001 Technical product Documentation – Lettering.
3. IS11669 – 1986 Dimensioning on Technical Drawings.
4. IS15021 (Parts 1-4) – 2001 Technical Drawings – Projection Methods.

ELECTRICAL ENGINEERING**UNIT I D.C. AND A.C. CIRCUITS 9**

Definition of current – potential – resistance, power, and energy –symbol and units – international system of units – Ohm's law – Kirchhoff's laws – solution of series, parallel and series parallel circuits. Generation of alternating emf, average and rms values – form and peak factors, concept of phasor representation – complex operator "j" – AC circuits involving R, L, C parameters – reactance and impedance – power factor and power components in ac circuits – series and parallel resonances – simple problems.

Construction and principle of operation of: moving coil and moving iron instruments (only voltmeters and ammeters) – dynamometer type wattmeter – Induction type energy meter – Megger.

UNIT II D C MACHINES 9

Construction of DC Machines – Theory of operation of DC Generators – Characteristics of DC Generators. Operating principle of DC motors – Types of DC motors and their Characteristics – Speed controls of DC motors.

UNIT III TRANSFORMERS 9

Principle of operation of Transformers – Types – Equivalent circuit – Voltage regulation – Efficiency – Testing – All Day Efficiency – Principle of operation of Three phase transformers – Transformer connections.

ELECTRONICS ENGINEERING**UNIT IV: ELECTRONIC COMPONENTS, DEVICES AND POWER CONVERTERS****9**

Active and Passive components, Introduction to transducers, Resistive, Inductive and Capacitive transducers. Basic principle and characteristics of PN diode, Zener diode, Bipolar Junction Transistor, Field Effect Transistors (JFET, MOSFET), UJT, Thyristor (SCR, Diac, Triac), photoelectric devices (LDR, photodiode, phototransistor), photovoltaic devices, operating principles of Half and Full wave rectifiers, Bridge rectifier, Choppers, Inverters, Voltage controllers, Voltage Regulators.

UNIT V: DIGITAL ELECTRONICS 9

Symbol, truth table and circuit of basic logic gates, universal gates, Half adder, Full adder, flip flops – RS, JK, T and D, Basic of Counters, Shift registers.

Total :45

TEXT BOOKS:

1. B.L. Theraja, Electrical Technology Vol I & II, S. Chand & Co., 2005.
2. Edward Hughes, Electrical and Electronics Technology, Pearson Education Limited, Ninth edition, 2005.
3. Floyd & Jain, Digital Fundamentals, Pearson Education, 8th Edition, 2003

REFERENCES:

1. B.R. Gupta, Principles of Electrical Engineering, S. Chand & Co.,2002.
2. I.J. Nagrath, Elements of Electrical Engineering, Tata McGraw Hill Publishing Co Ltd., New Delhi. 2000.
3. K.A. Muraleedharan, R. Muthusubramanian and S. Salivahanan, Basic Electrical and Electronics and Computer Engineering, Tata McGraw Hill, 1997.
4. Robert L. Boylestad & Louis Nashelsky Electronics devices and Circuit Theory, Pearson Education, 8th Edition, 2002.
5. Albert P.Malvino,'Electronic Principles'.

1. Torsional Pendulum – Determination of moment of inertia of disc and rigidity modulus of the material of a wire.
2. Non -Uniform Bending – Determination of Young’s Modulus.
3. Viscosity – Determination of Co-efficient of Viscosity of a liquid by Poiseuille’s flow.
4. Spectrometer – Dispersive power of a prism.
5. Air wedge - Determination of thickness of thin wire.
6. Lee’s Disc – Determination of thermal conductivity of a bad conductor.
7. Spectrometer – Determination of wavelength of Hg source using Grating.
8. Band gap determination of a semiconductor.
9. Spectrometer – id curve.
10. Semiconductor laser –
 - i. Determination of wavelength of Laser using grating.
 - ii. Particle size determination.
 - iii. Determination of numerical aperture and acceptance angle of an optical fibre.

LIST OF EXPERIMENTS (Any 10 Experiments)

- 1) Determination of total hardness, temporary & permanent hardness of water by EDTA method.
- 2) Determination of alkalinity of water sample.
- 3) Determination of chloride content of water sample by argentometric method.
- 4) Determination of DO content by Winkler's method.
- 5) Estimation of copper in brass.
- 6) Determination of strength of Hydrochloric acid by pH metric method.
- 7) Conductometric titration between strong acid and strong base.
- 8) Conductometric titration of mixture of acids.
- 9) Conductometric precipitation titration using barium chloride and sodium sulphate.
- 10) Determination of strength of iron by potentiometric method using dichromate.
- 11) Estimation of iron (1,10 – phenanthroline / thiocyanate method) or Ni (DMG) in the given solution by spectrometric method
- 12) Determination of sodium and potassium ions in water sample by flame photometric method.
- 13) Determination of molecular weight of a polymer by viscometry method.
- 14) Determination of percentage of calcium in limestone by EDTA method.

References for Chemistry Laboratory

- (1) J. Mendham, R.C. Denney, J.D. Barnes and N.J.K. Thomas, Vogel's Textbook of Quantitative Chemical Analysis, 6th Edition, Pearson Education, 2004.
- (2) D.P. Shoemaker and C.W. Garland, Experiments in Physical Chemistry, McGraw Hill, London.

- A) WOOD WORK** : Sawing, Planning and making common joints like TEE, Half lap and dovetail (any two)
- B) PLUMBING** : Basic pipe connection using valves, taps, couplings, unions, reducers, elbows in household fitting - Practice in mixed pipe connections: Metal, plastic and flexible pipes used in household appliances Preparation of line sketches for (i) water supply lines (ii) sewage lines.
- C) DEMONSTRATION (CIVIL ENGINEERING)** : Study of pipe connections on the suction and delivery pipe layouts.
Study of joints in door panels, wooden furniture.
Bar bending -Straightening of rods and cutting- 90°, 130° bend formation - 45°, 30° crank formation-Stirrups fabrication-Binding and placing of steel reinforcement
- D) FITTING** : Square, dovetail and hemisphere fitting of metal plate of 3mm
- E) WELDING** : (i) Preparation of arc welding of butt joints, lap joints and tee joints.
(ii) Gas welding practice.

UNIT I MULTIPLE INTEGRALS 9

Double integration-Cartesian and polar coordinates-change of order of integration-area as a double integral-change of variables between Cartesian and polar coordinates-triple integration.

UNIT II VECTOR CALCULUS 9

Gradient, divergence and curl-directional derivative-irrotational and solenoidal vector fields-Line, Surface and Volume Integral - Greens theorem in a plane, Gauss divergence theorem and Stoke's theorem (excluding proof)-simple applications.

UNIT III ANALYTIC FUNCTIONS 9

Function of a complex variable-analytic function -necessary condition-Cauchy - Riemann equation - sufficient condition (excluding proof)-properties of analytical function-harmonic conjugate-construction of analytic function.

UNIT IV COMPLEX INTEGRATION 9

Statement and application of Cauchy's integral theorem and integral formula-Taylor and Laurent expansion – isolated singularities – residuals - cauchy residue theorem. Contour integration over unit circle and semicircular contours (excluding poles on boundaries).

UNIT V LAPLACE TRANSFORM 9

Laplace Transform-conditions for existence- elementary functions- properties- derivatives and integrals of transforms-Transform of derivatives and integrals - Transforms of unit step function and impulse function-Transform of periodic functions – Convolution Theorem – Inverse transforms – Application to solution of linear ordinary differential equations up to second order with constant coefficients.

L:45; T:15; Total:60

TEXT BOOKS:

1. Grewal .B.S. Higher Engineering Mathematics, Thirty eighth Edition, Khanna Publication , Delhi 2004.
2. Kreyszig, E , Advance Engineering Mathematics, Eighth Edition, John Wiley and Son (Asia) Ltd Singapore 2001.

REFERENCES:

1. Bali N.P and Narayana Iyengar, N.Chand, Engineering Mathematics Laxmi Publication Pvt, Ltd, New Delhi, 2003.
2. Veerarajan. T., Engineering Mathematics Fourth Edition , Tata McGraw Publishing company Ltd, New Delhi, 2005.
3. Kandasamy. P., Thilagavathy. K, and Gunavathy. K Engineering Mathematics Volume I , II and III S. Chand & Co, New Delhi, 2005.
4. Venkataraman. M. K., Engineering Mathematics, Volume I and II Revised enlarge Fourth Edition, The National Publishing Company, Chennai, 2004.

UNIT I BASICS OF COMPUTER AND PROGRAMMING**12**

Digital Computer Fundamentals –Block diagram of a computer–Component of a computer system–Hardware and Software–Categories of Software–Bootting–Installing and uninstalling Software–Software piracy–Software terminologies–Applications of Computers–Algorithm – Design - Flow chart –History of Internet–Internet Services.

UNIT II BASIC ELEMENTS OF C**12**

Introduction to C – Lexical elements of C – Operators and expressions – Operator precedence and associativity of operators – Input and Output Functions – Simple computational problems - Program Control Structures- Control statements – Branching, looping, nested control structures, switch, break, continue, goto statements– Problems using control structures.

UNIT III FUNCTIONS AND PROGRAM STRUCTURES**12**

Prototypes and Functions–Declaring, defining and accessing functions–Parameter passing methods–Recursion–Storage classes–auto, extern, static and register–Library functions-Programs using functions.

Arrays:

Defining and processing arrays–Passing arrays to functions–Multi-dimensional arrays–Strings and basic operations on strings–Enumerated data types–Programs using simple sorting, searching and merging of arrays.

UNIT IV POINTERS**12**

Pointer concept–Declaration–Accessing variable through pointer–Initializing pointer variable–Pointers and Functions–Pointers and Arrays–Pointers and Structures–Example programs using pointers with function, arrays and structures–Command line arguments – Dynamic memory allocation–Operations on pointers.

UNIT V STRUCTURES, UNIONS AND FILE HANDLING**12**

Structures–User defined data types–Union–Nested structure, passing structures to functions - Self referential structures - File pointer–High level File operations–Opening and closing of file–Creating, Processing and Updation on files–Simple file handling programs.

L:60;Total :60

TEXT BOOKS:

1. Byron Gottfried, "Programming with C", II Edition, (Indian Adapted Edition), TMH publications, 2006.
2. Yeshwant Kanethker, "Let us C", BPB Publications, 2004

REFERENCES:

1. Brian W. Kernighan and Dennis M. Ritchie, "The C Programming Language", Pearson Education Inc. (2005).
2. Behrouz A. Forouzan and Richard. F. Gilberg, "A Structured Programming Approach Using C", II Edition, Brooks–Cole Thomson Learning Publications, 2001.
3. Johnsonbaugh R. and Kalin M., "Applications Programming in ANSI C", III Edition, Pearson Education India, 2003.

UNIT I: ELECTRON BALLISTICS AND INTRINSIC SEMICONDUCTORS 9

Force on charge in electric field – Motion of Charge in uniform and time varying electric fields – Force on a moving charge in a magnetic field – calculation of cyclotron frequency – calculation of electrostatic and magnetic deflection sensitivity.

Energy band structure of conductors, semiconductors and insulators – Density distribution of available energy states in semiconductors – Fermi-Dirac probability distribution function at different temperatures – Thermal generation of carriers – Calculation of electron and hole densities in intrinsic semiconductors – Intrinsic concentration – Mass Action Law.

UNIT II : EXTRINSIC SEMICONDUCTOR AND PN JUNCTIONS 9

N and P type semiconductors and their energy band structures – Law of electrical neutrality – Calculation of location of Fermi level and free electron and hole densities in extrinsic semiconductors – Mobility, drift current and conductivity – Diffusion current – Continuity equation - Hall effect.

Band structure of PN Junction – Current Component in a PN Junction – Derivation of diode equation – Temperature dependence of diode characteristics.

UNIT III SWITCHING CHARACTERISTICS OF PN JUNCTION AND SPECIAL DIODES 9

Calculation of transition and diffusion capacitance – Varactor diode – charge control description of diode – switching characteristics of diode – Mechanism of avalanche and Zener breakdown – Temperature dependence of breakdown voltages – Backward diode – Tunneling effect in thin barriers Tunnel diode – Photo diode – Light emitting diodes.

UNIT IV BIPOLAR JUNCTION TRANSISTORS AND FIELD EFFECT TRANSISTORS 9

Construction of PNP and NPN transistors – BJT current components – Emitter to collector and base to collector current gains – Base width modulation CB and CE characteristics – Breakdown characteristics – Ebers – Moll model – Transistor switching times.

Construction and Characteristics of JFET – Relation between Pinch off Voltage and drain current – Derivation. MOSFETS – Enhancement and depletion types.

UNIT V METAL SEMICONDUCTOR CONTACTS AND POWER CONTROL DEVICES **9**

Metal Semiconductor Contacts - Energy band diagram of metal semiconductor junction Schottky diode and ohmic contacts.

Power control devices: Characteristics and equivalent circuit of UJT - intrinsic stand off ratio. PNP diode – Two transistor model, SCR, Triac, Diac.

L:45; Total : 45

TEXT BOOK:

1. Jacob Millman & Christos C.Halkias, "Electronic Devices and Circuits" Tata McGraw-Hill, 1991 .

REFERENCES:

1. Nandita Das Gupta and Amitava Das Gupta, Semiconductor Devices – Modelling and Technology, Prentice Hall of India, 2004.
2. Donald A.Neaman," Semiconductor Physics and Devices" 3rd Ed., Tata McGraw-Hill , 2002.
3. S.Salivahanan, N.Sureshkumar and A.Vallavaraj, Electronic Devices and Circuits, TMH, 1998.
4. S.M.Sze, Semiconductor Devices – Physics and Technology, 2nd edn. John Wiley, 2002.
5. Ben G.Streetman and Sanjay Banerjee, Solid State Electronic Devices, Pearson Education 2000.

UNIT I BASIC CIRCUIT CONCEPTS**9**

Lumped circuits: Circuit elements, ideal sources (independent and dependent), linear passive parameters R, L and C; V-I relationship of circuit elements; sinusoidal voltage and current, RMS value, form factor; Kirchoff's Laws; analysis of series and parallel circuits: Network reduction; voltage and current division, source transformation, star/delta transformation.

UNIT II TRANSIENT ANALYSIS OF FIRST & SECOND ORDER CIRCUITS**9**

Source free response of RL and RC circuits; forced (step) response of RL and RC circuits; source free response of RLC series circuit; forced (step) response of RLC series circuit; forced response of RL, RC and RLC series circuit to sinusoidal excitation; time constant and natural frequency of oscillation of circuits. Laplace Transform application to the solution of RL, RC & RLC circuits: Initial and final value theorems and applications, concept of complex frequency, driving point and transfer impedance, poles and zeros of network function.

UNIT III SINUSOIDAL STEADY STATE ANALYSIS**9**

Concept of phasor and complex impedance / admittance; analysis of simple series and parallel circuits: Active power, reactive power, apparent power (volt ampere), power factor and energy associated with these circuits; concept of complex power; phasor diagram, impedance triangle and power triangle associated with these circuits. Resonance in series and parallel circuits: Q factor, half-power frequencies and bandwidth of resonant circuits.

UNIT IV MULTI DIMENSIONAL CIRCUIT ANALYSIS & NETWORK THEOREMS**9**

Node voltage analysis of multi node circuit with current sources, rules for constructing nodal admittance matrix [Y] for solving matrix equation $[Y] V=I$; Mesh-current analysis of multi node circuits with voltage sources, rules for constructing mesh impedance matrix[Z] for solving matrix equation $[Z]I=V$. Super position theorem, Thevenin's theorem, Norton's theorem, Reciprocity theorem, Compensation theorem, Tellegen's theorem, Millman's theorem, maximum power transfer theorem for variable resistance load, variable impedance load and variable resistance and fixed reactance load.

UNIT V COUPLED CIRCUITS AND THREE PHASE CIRCUITS

9

Coupled circuits: mutual inductance, coefficient of coupling, dot convention; analysis of simple coupled circuits. Three phase circuits: three phase balanced / unbalanced voltage sources, symmetrical components, analysis of three phase 3-wire and 4-wire circuits with star and delta connected loads (balanced & unbalanced), phasor diagram of voltages & currents, power and power factor measurements in three phase circuits.

L: 45;T:15; Total : 60

TEXT BOOKS:

1. William H.Hayt Jr, Jack E.Kemmerly, and Steven M.Durbin, 'Engineering Circuit Analysis', Tata McGraw Hill Publishing Co Ltd, New Delhi, 2002.
2. Joseph A.Edminister, Mahmood Nahvi, 'Electric Circuits', Schaum's Series, Tata McGraw Hill publishing Co. Ltd., New Delhi 2001.

REFERENCES:

1. R.C. Dorf, 'Introduction to Electric Circuits', John Wiley & Sons Inc, New York, Second Edition, 2003.
2. Charles K.Alexander, Mathew N.O. Sadiku, 'Fundamentals of Electric Circuit', McGraw Hill, N.Y, 2003.
3. M.E.Valkenburg, "Networks Analysis ",Prentice-Hall of India Pvt Ltd, New Delhi,1996

UNIT I TRANSISTOR BIASING**9**

BJT – Need for biasing - 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 to the extent possible. Advantage of Self bias (voltage divider bias) over other types of biasing. Use of Self bias circuit as a constant current circuit. Source self bias and voltage divider bias for FET. Use of JFET as a voltage variable resistor.

UNIT II MIDBAND ANALYSIS OF SMALL SIGNAL AMPLIFIERS**9**

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. Darlington connection using similar and Complementary transistors. 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, Transconductance. Use as Linear amplifier, limiter, amplitude modulator.

UNIT III FREQUENCY RESPONSE OF AMPLIFIERS**9**

General shape of frequency response of amplifiers. Definition of cut off frequencies and bandwidth. Low frequency analysis of amplifiers to obtain lower cut off frequency Hybrid – pi equivalent circuit of BJTs. High frequency analysis of BJT amplifiers to obtain upper cut off frequency. 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 cut off frequencies of multistage amplifiers. Amplifier rise time and sag and their relation to cut off frequencies.

UNIT IV LARGE SIGNAL AMPLIFIERS**9**

Classification of amplifiers (Class A, B, AB, C&D), Efficiency of class A, RC coupled and transformer-coupled power amplifiers. Class B complementary-symmetry, push-pull power amplifiers. Calculation of power output, efficiency and power dissipation. Crossover distortion and methods of eliminating it. Heat flow calculations using analogous circuit. Calculation of actual power handling capacity of transistors with and without heat sink. Heat sink design.

UNIT V RECTIFIERS AND POWER SUPPLIES

9

Half-wave, full-wave and bridge rectifiers with resistive load. Analysis for V_{dc} and ripple voltage with C, CL, L-C and C-L-C filters. Voltage multipliers Zener diode regulator. Electronically regulated d.c power supplies. Line regulation, output resistance and temperature coefficient. Switched mode power supplies. Power control using SCR.

L:45 T:15; Total:60

TEXT BOOKS:

Millman J. and Halkias .C., " Integrated Electronics ", Tata McGraw-Hill.

REFERENCES:

1. Robert L. Boylestad and Louis Nashelsky, 8th edn., PHI, 2002.
2. S.Salivahanan, et.al, "Electronic Devices and Circuits", TMH, 1998.
3. Floyd, Electronic Devices, Sixth edition, Pearson Education, 2003.
4. I.J. Nagrath, Electronics – Analog and Digital, PHI, 1999.

XEC206	ELECTRICAL MACHINES	3 0 2 4
UNIT I	D.C. MACHINES	9
	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	9
	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	9
	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	9
	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	9
	Structure of electric power systems – Generation, transmission, sub-transmission and distribution systems - EHVAC and EHVDC transmission systems – Substation layout – Insulators – cables.	

L:45; Total:45

TEXT BOOKS:

1. D.P.Kothari and I.J.Nagrath, 'Basic Electrical Engineering', Tata McGraw Hill publishing company ltd, second edition, 2002.
2. C.L. Wadhwa, 'Electrical Power Systems', Wiley eastern ltd India, 1985.

REFERENCES:

1. S.K.Bhattacharya, 'Electrical Machines', Tata McGraw Hill Publishing company ltd, second edition, 1998.
2. V.K.Mehta and Rohit Mehta, 'Principles of Power System', S.Chand and Company Ltd, third edition, 2003.

INTRODUCTION

Application Packages

1. Word
2. Spread sheet
3. Power point

C PROGRAMMING

1. Programs using Operators and Expressions
2. Programs using IO Formatting
3. Programs using Control Structures
4. Programs using Looping Structures
5. Programs using Arrays and String manipulations
6. Programs using Functions and Recursion
7. Programs using Structures and Unions
8. Programs using Pointers
9. Programs using Files
10. Programs using Command line arguments

UNIT – I EXTENSIVE LISTENING**12**

Listening and typing –Listening and sequencing of information – Filling in the blanks – Listening and answering the question. Cloze Exercises- Vocabulary building – Dictionary habits a brief note on Thesaurus.

Listening to specific speeches, discussions, interviews, debates, lectures. (Instructional Aids: Audio cassettes, Tape recorders, Language Software.

Suggested Activities

- Gap filling activities while listening to a text
- Listening and identifying the missing words in a given text
- Listening to a brief conversation and answering questions orally
- Listening to commentaries on television or radio to improve listening skills
- Paying attention to speaker's appearance, expressions, body movements and posture that convey meaning to his/her words.

UNIT – II INTENSIVE LISTENING**12**

Listening for specific information – note taking-guided and open – listening comprehension- listening to specific speeches-interviews –debates lectures.

Suggested Activities

- Taking notes during lectures.
- Listening to a discourse and filling up gaps in a work sheet.
- Informational comprehension and literal comprehension tasks based on listening- post listening quiz.
- Listening to a passage preferably technical and answering questions choosing appropriate options (multiple choice)

Note : These listening activities can be done using a work sheet in a language laboratory or in the class room using a tape recorder.

Oral practice –developing confidence-introducing oneself-asking for or eliciting information-offering suggestions and recommendations.

Analysing problems and providing solutions- expressing opinions (agreement and disagreement) Role of idioms in Spoken Communication Pronunciation Practice-Stress intonation, accent, questions for oral discussions, describing objects, presenting information, Process description, narrating events, giving introduction, welcome speech and proposing a vote of thanks.

Suggested Activities

- Introducing oneself and others
- Role play activities based on real –life situations
- Discussing travel plan / industrial visit
- Giving oral instructions for performing tasks at home, at class-room and at work place
(use of imperatives)
- Participating in a short classroom-discussion on a controversial topic (eg. For and against reservation policy in educational institutions)
- Oral presentation on topics related to science and technology.

UNIT IV CONVERSATION

Face to Face conversation- Telephonic conversation- Role play activities (Students take on roles and engage in conversation) participating in an interview situational dialogues.

Suggested Activities

- Making either telephonic conversations or face to face conversation- making request- Asking questions-making recommendations using modal verbs-Giving instructions using imperatives – Expressing purpose and function-obligation and preference- Accepting and offering counseling .

Resume/ Report preparation / Letter writing

Structure the resume/ report letter writing/ E-mail communication samples

Presentation skills

Elements of an effective presentation – structure of presentation- presentation tools- voice modulation- audience analysis – body language- video samples.

Soft skills

The management- articulation – assertiveness – psychometrics- innovation and creative – stress management and poise- video samples

Group discussion

Why is GD part of selection process?- Structure of GD- moderator – led and other GDs – Strategies in GD- Team spirit- Body language(gestures)- Mock GD- Video samples.

Interview skills

Kinds of interviews- required key skills – corporate culture – mock interview- video samples.

L:30; P: 30; Total:60

TEXT BOOKS:

1. Meenakshi Raman, Sangeetha Sharma: Technical Communication Principles and Practice, Oxford University Press.

REFERENCES:

1. Jeremy Comfort, Pamela Rogerson, Trish Stott and Derek Utley: Speaking Effectively, Cambridge University Press.
2. Jayashree Balan; Spoken English, Vijay Nicole Imprints Private Ltd., Chennai.
3. Jean Naterop and Rod Revell (1988) Telephoning in English (Cambridge University Press
4. David Martur (1994), Tough Talking, University Press, Hyderabad.

Ex.1: Diode Forward characteristics.

- (i) Determination of η from the plot of $\ln I$ vs V .
- (ii) Determinations reverse saturation current.

[Note that reverse characteristics of Diodes cannot be measured using common instruments available in the Lab.]

Ex.2: Input and Output characteristics of BJT.

- (i) Determination of h parameters from the graph.

Ex.3: Output characteristics of JFET.

- (i) Plot of Transfer characteristics from the output characteristics.
- (ii) Determination of pinch off voltage and I_{dss}

Ex.4: Fixed Bias amplifier circuits using BJT.

- (i) Waveforms at input and output without bias.
- (ii) Determination of bias resistance to locate Q-point at center of load line.
- (iii) Measurement of h_{FE} and gain.
- (iv) Calculation of $h_{ie} = V_T / I_{bdc}$ and gain assuming $h_{FE} = h_{fe}$.
- (v) Plot of frequency response.

Ex.5: BJT Amplifier using voltage divider bias (self bias) with unbypassed emitter resistor.

- (i) Measurement of input resistance and gain
- (ii) Comparison with calculated values.
- (iii) Plot of DC collector current as a function of collector resistance (application as constant current circuit).

Ex.6: Source follower with Bootstrapped gate resistance.

- (i) Measurement of gain, input resistance and output resistance with and without Bootstrapping .
- (ii) Comparison with calculated values.

Ex.7: Class B Complementary symmetry power amplifier

- (i) Observation of the output wave form with cross over Distortion.
- (ii) Modification of the circuit to avoid cross over distortion.
- (iii) Measurement of maximum power output.
- (iv) Determination of efficiency.
- (v) Comparison with calculated values.

Ex.8: Differential amplifier using BJT.

- (i) Construction of the circuit.
- (ii) Measurement of DC collector current of individual transistors.
- (iii) Equalization of DC current using individual emitter resistance (50 – 100 Ohms)
- (iv) Measurement of CMRR.

Ex.9: Power supply Full wave rectifier with simple capacitor filter.

- (i) Measurement of DC voltage under load and ripple factor, Comparison with calculated values.
- (ii) Measurement of load regulation characteristics (V_{out} vs I_{out}) Comparison with calculated values.

Ex.10: Measurement of UJT and SCR Characteristics.

- (i) Firing Characteristics of SCR.
- (ii) Measurement of Intrinsic stand off ratio of UJT.

1. HUMAN VALUES 10

Morals, Values and Ethics – Integrity – Work Ethic – Service Learning – Civic Virtue – Respect for Others – Living Peacefully – caring – Sharing – Honesty – Courage – Valuing Time – Co-operation – Commitment – Empathy – Self-Confidence – Character – Spirituality

2. ENGINEERING ETHICS 9

Senses of 'Engineering Ethics' - variety of moral issued - types of inquiry - moral dilemmas - moral autonomy - Kohlberg's theory - Gilligan's theory - consensus and controversy – Models of Professional Roles - theories about right action - Self-interest - customs and religion - uses of ethical theories.

3. ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as experimentation - engineers as responsible experimenters - codes of ethics - a balanced outlook on law - the challenger case study

4. SAFETY, RESPONSIBILITIES AND RIGHTS 9

Safety and risk - assessment of safety and risk - risk benefit analysis and reducing risk - the three mile island and chernobyl case studies.
Collegiality and loyalty - respect for authority - collective bargaining - confidentiality - conflicts of interest - occupational crime - professional rights - employee rights - Intellectual Property Rights (IPR) - discrimination.

5. GLOBAL ISSUES 8

Multinational corporations - Environmental ethics - computer ethics - weapons development - engineers as managers-consulting engineers-engineers as expert witnesses and advisors -moral leadership-sample code of Ethics like ASME, ASCE, IEEE, Institution of Engineers(India), Indian Institute of Materials Management, Institution of electronics and telecommunication engineers(IETE),India, etc.

L:45; Total:45

TEXT BOOKS:

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw-Hill, New York, 1996.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.

REFERENCES:

1. Charles D. Fleddermann, "Engineering Ethics", Pearson Education / Prentice Hall, New Jersey, 2004 (Indian Reprint)
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available)
3. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003.
4. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001.

UNIT I PARTIAL DIFFERENTIAL EQUATIONS**9 + 3**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solution of standard types of first order partial differential equations – Lagrange's linear equation – Linear partial differential equations of second and higher order with constant coefficients.

UNIT II FOURIER SERIES**9 + 3**

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.

UNIT III BOUNDARY VALUE PROBLEMS**9 + 3**

Classification of second order quasi linear partial differential equations – Solutions of one dimensional wave equation – One dimensional heat equation – Steady state solution of two-dimensional heat equation (Insulated edges excluded) – Fourier series solutions in Cartesian coordinates.

UNIT IV FOURIER TRANSFORM**9 + 3**

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

UNIT V Z -TRANSFORM AND DIFFERENCE EQUATIONS**9 + 3**

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

L:45 T:15; Total : 60

TEXT BOOKS:

1. Grewal, B.S., “Higher Engineering Mathematics”, Thirty Sixth Edition , Khanna Publishers, Delhi, 2001.
2. Kandasamy, P., Thilagavathy, K., and Gunavathy, K., “Engineering Mathematics Volume III”, S. Chand & Company Ltd., New Delhi, 1996.
3. Wylie C. Ray and Barrett Louis, C., “Advanced Engineering Mathematics”, Sixth Edition, McGraw-Hill, Inc., New York, 1995.

REFERENCES:

1. Andrews, L.A., and Shivamoggi B.K., “Integral Transforms for Engineers and Applied Mathematicians,” Macmillen, New York, 1988.
2. Narayanan, S., Manicavachagom Pillay, T.K. and Ramaniah, G., “Advanced Mathematics for Engineering Students”, Volumes II and III, S. Viswanathan (Printers and Publishers) Pvt. Ltd. Chennai, 2002.
3. Churchill, R.V. and Brown, J.W., “Fourier Series and Boundary Value Problems”, Fourth Edition, McGraw-Hill Book Co., Singapore, 1987.

UNIT I REPRESENTATION OF SIGNALS 9

Continuous and discrete time signals: Classification of Signals – Periodic aperiodic even – odd – energy and power signals – Deterministic and random signals – complex exponential and sinusoidal signals – periodicity – properties of discrete time complex exponential unit impulse – unit step impulse functions – Transformation in independent variable of signals: time scaling, time shifting.

Determination of Fourier series representation of continuous time and discrete time periodic signals – Explanation of properties of continuous time and discrete time Fourier series.

UNIT II ANALYSIS OF CONTINUOUS TIME SIGNALS AND SYSTEMS 9

Continuous time Fourier Transform and Laplace Transform analysis with examples – properties of the Continuous time Fourier Transform and Laplace Transform basic properties, Parseval's relation, and convolution in time and frequency domains.

Basic properties of continuous time systems: Linearity, Causality, time invariance, stability, magnitude and Phase representations of frequency response of LTI systems -Analysis and characterization of LTI systems using Laplace transform:

Computation of impulse response and transfer function using Laplace transform.

UNIT III SAMPLING THEOREM AND z-TRANSFORMS 9

Representation of continuous time signals by its sample - Sampling theorem – Reconstruction of a Signal from its samples, aliasing – discrete time processing of continuous time signals, sampling of band pass signals

Basic principles of z-transform - z-transform definition – region of convergence – properties of ROC – Properties of z-transform – Poles and Zeros – inverse z-transform using Contour integration - Residue Theorem, Power Series expansion and Partial fraction expansion, Relationship between z-transform and Fourier transform.

UNIT IV DISCRETE TIME SYSTEMS 9

Computation of Impulse & response & Transfer function using Z Transform. DTFT Properties and examples – LTI-DT systems -Characterization using difference equation – Block diagram representation – Properties of convolution and the interconnection of LTI Systems – Causality and stability of LTI Systems.

UNIT V SYSTEMS WITH FINITE AND INFINITE DURATION IMPULSE RESPONSE 9

Systems with finite duration and infinite duration impulse response – recursive and non-recursive discrete time system – realization structures – direct form – I, direct form – II, Transpose, cascade and parallel forms.

L:45; T:15; Total:60

TEXT BOOKS:

1. Alan V. Oppenheim, Alan S. Willsky with S. Hamid Nawab, Signals & Systems, 2nd edn., Pearson Education, 1997.

REFERENCES:

1. John G. Proakis and Dimitris G. Manolakis, Digital Signal Processing, Principles, Algorithms and Applications, 3rd edn., PHI, 2000.
2. M. J. Roberts, Signals and Systems Analysis using Transform method and MATLAB, TMH 2003.
3. Simon Haykin and Barry Van Veen, Signals and Systems, John Wiley, 1999
4. K. Lindner, "Signals and Systems", McGraw Hill International, 1999.
5. Moman .H. Hays, "Digital Signal Processing", Schaum's outlines, Tata McGraw-Hill Co Ltd., 2004.
6. Ashok Amhardar, "Analog and Digital Signal Processing", 2nd Edition Thomson 2002.

XEC 304 DATA STRUCTURES 3 1 0 4

UNIT I PROBLEM SOLVING 9

Problem solving – Top-down Design – Implementation – Verification – Efficiency – Analysis – Sample algorithms.

UNIT II LISTS, STACKS AND QUEUES 8

Abstract Data Type (ADT) – The List ADT – The Stack ADT – The Queue ADT

UNIT III TREES 10

Preliminaries – Binary Trees – The Search Tree ADT – Binary Search Trees – AVL Trees – Tree Traversals – Hashing – General Idea – Hash Function – Separate Chaining – Open Addressing – Linear Probing – Priority Queues (Heaps) – Model – Simple implementations – Binary Heap

UNIT IV SORTING 9

Preliminaries – Insertion Sort – Shellsort – Heapsort – Mergesort – Quicksort – External Sorting

UNIT V GRAPHS 9

Definitions – Topological Sort – Shortest-Path Algorithms – Unweighted Shortest Paths – Dijkstra’s Algorithm – Minimum Spanning Tree – Prim’s Algorithm – Applications of Depth-First Search – Undirected Graphs – Biconnectivity – Introduction to NP-Completeness

L:45; T:15; Total:60

TEXT BOOKS

1. R. G. Dromey, “How to Solve it by Computer” (Chaps 1-2), Prentice-Hall of India, 2002.
2. M. A. Weiss, “Data Structures and Algorithm Analysis in C”, 2nd ed, Pearson Education Asia, 2002. (chaps 3, 4.1-4.4 (except 4.3.6), 4.6, 5.1-5.4.1, 6.1-6.3.3, 7.1-7.7 (except 7.2.2, 7.4.1, 7.5.1, 7.6.1, 7.7.5, 7.7.6), 7.11, 9.1-9.3.2, 9.5-9.5.1, 9.6-9.6.2, 9.7)

REFERENCES:

1. Y. Langsam, M. J. Augenstein and A. M. Tenenbaum, “Data Structures using C”, Pearson Education Asia, 2004
2. Richard F. Gilberg, Behrouz A. Forouzan, “Data Structures – A Pseudocode Approach with C”, Thomson Brooks / COLE, 1998.
3. Aho, J. E. Hopcroft and J. D. Ullman, “Data Structures and Algorithms”, Pearson education Asia, 1983.

UNIT - I INTRODUCTION**8**

Sources and effects of electromagnetic fields – Vector fields – Different co-ordinate systems(brief description only) - Divergence theorem – Stoke's theorem.

UNIT - II ELECTROSTATICS**10**

Coulomb's Law – Definitions-Electric charge, Electric field, flux, Properties of Flux lines, Flux density, Field intensity-Permittivity –Field due to point and continuous charges – Gauss's law and application – Electrical potential – Electric field and equipotential plots – Electric field in free space, conductors, dielectric – Dielectric polarization, Electric field in multiple dielectrics – boundary conditions, Poisson's and Laplace's equations, Example of application of Laplace equation – Capacitance, loss angle of capacitor-energy density – Dielectric strength.

UNIT – III MAGNETOSTATICS**9**

Lorentz Law of force, magnetic flux line, properties of magnetic flux lines, magnetic field intensity-permeability – Biot–savart's Law - Ampere's Law – Magnetic field due to straight conductors, circular loop, solenoid– Magnetic flux density (B) – B in free space, conductor, magnetic materials – Magnetization – Magnetic field in multiple media – Boundary conditions – Scalar and vector potential – Magnetic force – Torque – Self Inductance(L), Mutual Inductance(M) – Energy density – Magnetic circuits-permanent magnets.

UNIT - IV ELECTRODYNAMIC FIELDS**9**

Faraday's law of induced emf, eddy current loss- Hysteresis loss-Transformer and motional EMF, Maxwell's equations (differential and integral forms) –Conduction current, Displacement current – Relation between conduction current density and electric field intensity-Qualitative differences between field theory and circuit theory- Electro magnetic shielding.

UNIT – V ELECTROMAGNETIC WAVES**9**

Generation of electromagnetic waves– Electro Magnetic Wave equations – Wave parameters; velocity, intrinsic impedance, propagation constant, surge impedance of a line in terms of energy balance – Waves in free space, lossy and loss less dielectrics, conductors-skin depth, Poynting vector, typical applications of poynting vector – Plane wave- reflection and refraction- relation between electric field intensity and magnetic field intensity-Introduction to Wave guides.

L:45; TOTAL:45

TEXT BOOKS:

1. John.D.Kraus, 'Electromagnetics', McGraw Hill book Co., New York, Fourth Edition, 1991.
2. William. H.Hayt, 'Engineering Electromagnetics', Tata McGraw Hill edition, 2001.

REFERENCES:

1. D.Sathaiah-M.Anitha, 'Electro magnetic fields' First edition-2007, SCITECH publications (India) Pvt Ltd., Chennai.
2. Joseph. A.Edminister, 'Theory and Problems of Electromagnetics', Second edition, Schaum Series, Tata McGraw Hill, 1993.
3. I.J. Nagrath, D.P. Kothari, 'Electric Machines', Tata McGraw Hill Publishing Co Ltd, Second Edition, 1997.
4. Kraus and Fleish, 'Electromagnetics with Applications', McGraw Hill International Editions, Fifth Edition, 1999.
5. Sadiku, 'Elements of Electromagnetics', Second edition, Oxford University Press, 1995.

UNIT 1 FEEDBACK AMPLIFIERS 9

Block diagram. Loop gain. Gain with feedback. Desensitivity of gain. Distortion and cut off frequencies with feedback. The four basic feedback topologies and the type of gain stabilized by each type of feedback. Input and Output resistances with feedback. Method of identifying feedback topology, feedback factor and basic amplifier configuration with loading effect of feedback network taken into account. Analysis of feedback amplifiers. Nyquist criterion for stability of feedback amplifiers.

UNIT II OSCILLATORS 9

Barkhausen Criterion. Mechanism for start of oscillation and stabilization of amplitude. Analysis of Oscillator using Cascade connection of one RC and one CR filters. RC phase shift Oscillator. Wienbridge Oscillator and twin-T Oscillators. Analysis of LC Oscillators, Colpitts, Hartley, Clapp, Miller and Pierce oscillators. Frequency range of RC and LC Oscillators. Quartz Crystal Construction. Electrical equivalent circuit of Crystal. Crystal Oscillator circuits.

UNIT III TUNED AMPLIFIERS 9

Coil losses, unloaded and loaded Q of tank circuits. Analysis of single tuned and synchronously tuned amplifiers. Instability of tuned amplifiers. Stabilization techniques. Narrow band neutralization using coil. Broad banding using Hazeltine neutralization. Class C tuned amplifiers and their applications. Efficiency of Class C tuned Amplifier.

UNIT IV WAVE SHAPING AND MULTIVIBRATOR CIRCUITS 9

RL & RC Integrator and Differentiator circuits. Diode clippers, clampers and slicers. Collector coupled and Emitter coupled Astable multivibrator. Monostable multivibrator. Bistable multivibrators. Triggering methods. Storage delay and calculation of switching times. Speed up capacitors. Schmitt trigger circuit.

UNIT V BLOCKING OSCILLATORS AND TIMEBASE GENERATORS 9

Monostable and Astable Blocking Oscillators using Emitter and base timing. Frequency control using core saturation. Pushpull operation of Astable blocking oscillator i.e., inverters. Pulse transformers. UJT sawtooth generators. Linearization using constant current circuit. Bootstrap and Miller saw-tooth generators. Current time base generators.

L:45; Total : 45

TEXT BOOKS:

1. Millman and Halkias. C., "Integrated Electronics", Tata McGraw-Hill 1991,(I,II).
2. Schilling and Belove, "Electronic Circuits", TMH, Third Edition, 2002 (Unit - III)
3. Millman J. and Taub H., "Pulse Digital and Switching waveform", McGraw-Hill International (UNIT – IV & V)
4. Robert L. Boylestead and Louis Nasheresky, 8th edn., PHI, 2002.

REFERENCES:

1. Sedra / Smith, "Micro Electronic Circuits" Oxford university Press, 2004.
2. David A. Bell, " Solid State Pulse Circuits ", Prentice Hall of India, 1992.

Implement the following exercises using C:

1. Array implementation of List Abstract Data Type (ADT)
2. Linked list implementation of List ADT
3. Cursor implementation of List ADT
4. Array implementations of Stack ADT
5. Linked list implementations of Stack ADT

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

- (a) Program for 'Balanced Paranthesis'
- (b) Array implementation of Stack ADT
- (c) Linked list implementation of Stack ADT
- (d) Program for 'Evaluating Postfix Expressions'

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

6. Implement the application for checking 'Balanced Paranthesis' using array implementation of Stack ADT (by implementing files (a) and (b) given above)
7. Implement the application for checking 'Balanced Paranthesis' using linked list implementation of Stack ADT (by using file (a) from experiment 6 and implementing file (c))
8. Implement the application for 'Evaluating Postfix Expressions' using array and linked list implementations of Stack ADT (by implementing file (d) and using file (b), and then by using files (d) and (c))
9. Queue ADT
10. Search Tree ADT - Binary Search Tree
11. Heap Sort
12. Quick Sort

Electronic Circuits Lab

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

SIMULATION USING PSPICE:

1. Differential amplifier
 2. Active filter : Butterworth IInd order LPF
 - 3 Astable, Monostable and Bistable multivibrator - Transistor bias
 4. D/A and A/D converter (Successive approximation)
 5. Analog multiplier
- CMOS Inverter, NAND and NOR

UNIT I INTRODUCTION TO ENVIRONMENTAL STUDIES AND ENERGY**12**

Definition, scope and importance – Need for public awareness – 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.

UNIT II ECOSYSTEMS AND BIODIVERSITY**12**

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 - Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT III ENVIRONMENTAL POLLUTION**8**

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 urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT**7**

Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns, Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, Wasteland reclamation – Consumerism and waste products – Environment Protection Act – Air (Prevention and Control of Pollution) Act – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness

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.

L:45; Total :45

TEXT BOOKS:

1. Gilbert M.Masters, Introduction to Environmental Engineering and Science, Pearson Education Pvt., Ltd., Second Edition, ISBN 81-297-0277-0, 2004.
2. Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co.
3. Townsend C., Harper J and Michael Begon, Essentials of Ecology, Blackwell Science.
4. Trivedi R.K. and P.K. Goel, Introduction to Air Pollution, Techno-Science Publications.

REFERENCES:

1. Trivedi R.K., 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. Wager K.D., Environmental Management, W.B. Saunders Co., Philadelphia, USA, 1998.
4. S.K.Dhameja, Environmental Engineering and Management, S. K. Kataria and Sons, New Delhi, 1999.

UNIT I PROBABILITY AND RANDOM VARIABLE 9 + 3

Axioms of probability - Conditional probability - Total probability – Baye’s theorem - Random variable - Probability mass function - Probability density functions- Properties –Moments - Moment generating functions and their properties.

UNIT II STANDARD DISTRIBUTIONS 9 + 3

Binomial, Poisson, Geometric, Negative Binomial, Uniform, Exponential, Gamma, Weibull and Normal distributions and their properties - Functions of a random variable.

UNIT III TWO DIMENSIONAL RANDOM VARIABLES 9 + 3

Joint distributions - Marginal and conditional distributions – Covariance - Correlation and regression - Transformation of random variables - Central limit theorem.

UNIT IV CLASSIFICATION OF RANDOM PROCESSES 9 + 3

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.

UNIT V CORRELATION AND SPECTRAL DENSITIES 9 + 3

Auto correlation - Cross correlation - Properties – Power spectral density – Cross spectral density - Properties – Wiener-Khintchine relation – Relationship between cross power spectrum and cross correlation function - Linear time invariant system - System transfer function –Linear systems with random inputs – Auto correlation and cross correlation functions of input and output.

L:45; T:15; Total : 60

TEXT BOOKS:

1. Ross, S., “A First Course in Probability”, Fifth edition, Pearson Education, Delhi, 2002.
2. Peebles Jr. P.Z., “Probability Random Variables and Random Signal Principles”, Tata McGraw-Hill Publishers, Fourth Edition, New Delhi, 2002. (Chapters 6, 7 and 8).

REFERENCES

1. Henry Stark and John W. Woods “Probability and Random Processes with Applications to Signal Processing”, Pearson Education, Third edition, Delhi, 2002.
2. Veerarajan. T., “Probability, Statistics and Random process”, Tata McGraw-Hill Publications, Second Edition, New Delhi, 2002.
3. Ochi, M.K. , “Applied Probability and Stochastic Process”, John Wiley & Sons, New York, 1990.

UNIT I BASIC MEASUREMENT CONCEPTS 9

Measurement systems – Static and dynamic characteristics – units and standards of measurements – error analysis – moving coil, moving iron meters – multimeters – True RMS meters – Bridge measurements – Maxwell, Hay, Schering, Anderson and Wien bridge.

UNIT II BASIC ELECTRONIC MEASUREMENTS 9

Electronic multimeters – Cathode ray oscilloscopes – block schematic – applications – special oscilloscopes – Q meters – Vector meters – RF voltage and power measurements.

UNIT III SIGNAL GENERATORS AND ANALYZERS 9

Function generators – RF signal generators – Sweep generators – Frequency synthesizer – wave analyzer – Harmonic distortion analyzer – spectrum analyzer.

UNIT IV DIGITAL INSTRUMENTS 9

Comparison of analog and digital techniques – digital voltmeter – multimeters – frequency counters – measurement of frequency and time interval – extension of frequency range – measurement errors.

UNIT V DATA ACQUISITION SYSTEMS AND FIBER OPTIC MEASUREMENTS**9**

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

L:45; Total : 45**TEXT BOOKS:**

1. Albert D.Helfrick and William D.Cooper – Modern Electronic Instrumentation and Measurement Techniques, Prentice Hall of India, 2003.

REFERENCES:

1. Joseph J.Carr, Elements of Electronics Instrumentation and Measurement, Pearson education, 2003.
2. Alan. S. Morris, Principles of Measurements and Instrumentation, Prentice Hall of India, 2nd edn., 2003.
3. Ernest O. Doebelin, Measurement Systems- Application and Design-Tata McGraw-Hill-2004.

UNIT I TRANSMISSION LINE THEORY**9**

Different types of transmission lines – Definition of Characteristic impedance – The transmission line as a cascade of T-Sections - Definition of Propagation Constant.

General Solution of the transmission line – The two standard forms for voltage and current of a line terminated by an impedance – physical significance of the equation and the infinite line – The two standard forms for the input impedance of a transmission line terminated by an impedance – meaning of reflection coefficient – wavelength and velocity of propagation.

Waveform distortion – distortion less transmission line – The telephone cable – Inductance loading of telephone cables.

Input impedance of lossless lines – reflection on a line not terminated by Z_0 - Transfer impedance – reflection factor and reflection loss – T and Π Section equivalent to lines.

UNIT II THE LINE AT RADIO FREQUENCIES**9**

Standing waves and standing wave ratio on a line – One eighth wave line – The quarter wave line and impedance matching – the half wave line.

The circle diagram for the dissipationless line – The Smith Chart – Application of the Smith Chart – Conversion from impedance to reflection coefficient and vice-versa. Impedance to Admittance conversion and viceversa – Input impedance of a lossless line terminated by an impedance – single stub matching and double stub matching.

UNIT III GUIDED WAVES**8**

Waves between parallel planes of perfect conductors – Transverse electric and transverse magnetic waves – characteristics of TE and TM Waves – Transverse Electromagnetic waves – Velocities of propagation – component uniform plane waves between parallel planes – Attenuation of TE and TM waves in parallel plane guides – Wave impedances.

UNIT IV RECTANGULAR WAVEGUIDES**9**

Transverse Magnetic Waves in Rectangular Wave guides – Transverse Electric Waves in Rectangular Waveguides – characteristic of TE and TM Waves – Cutoff wavelength and phase velocity – Impossibility of TEM waves in waveguides – Dominant mode in rectangular waveguide – Attenuation of TE and TM modes in rectangular waveguides – Wave impedances – characteristic impedance – Excitation of modes.

UNIT V CIRCULAR WAVE GUIDES AND RESONATORS**10**

Bessel functions – Solution of field equations in cylindrical co-ordinates – TM and TE waves in circular guides – wave impedances and characteristic impedance – Dominant mode in circular waveguide – excitation of modes – Microwave cavities, Rectangular cavity resonators, circular cavity resonator, semicircular cavity resonator, Q factor of a cavity resonator for TE₁₀₁ mode.

L:45; T:15; Total:60

TEXT BOOKS

1. J.D.Ryder “Networks, Lines and Fields”, PHI, New Delhi, 2003. (Unit I & II)
2. E.C. Jordan and K.G.Balmain “Electro Magnetic Waves and Radiating System, PHI, New Delhi, 2003. (Unit III, IV & V)

REFERENCES

1. Ramo, Whineery and Van Duzer: “Fields and Waves in Communication Electronics” John Wiley, 2003.
2. David M.Pozar: Microwave Engineering – 2nd Edition – John Wiley.
3. David K.Cheng,Field and Waves in Electromagnetism, Pearson Education, 1989.
4. Umesh Sinha, “Transmission Lines And Networks” Sathya Prakashan Publishers, 7th Edition, 2001

UNIT I NUMBER SYSTEMS**9**

Binary, Octal, Decimal, Hexadecimal-Number base conversions – complements – signed Binary numbers. Binary Arithmetic- Binary codes: Weighted –BCD-2421-Gray code-Excess 3 code-ASCII –Error detecting code – conversion from one code to another-Boolean postulates and laws –De-Morgan’s Theorem- Principle of Duality- Boolean expression – Boolean function- Minimization of Boolean expressions – Sum of Products (SOP) –Product of Sums (POS)-Minterm- Maxterm- Canonical forms – Conversion between canonical forms –Karnaugh map Minimization – Don’t care conditions.

UNIT II**9**

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.

COMBINATIONAL CIRCUITS:

Design procedure – Adders-Subtractors – Serial adder/ Subtractor - Parallel adder/ Subtractor- Carry look ahead adder- BCD adder- Magnitude Comparator- Multiplexer/ Demultiplexer- encoder / decoder – parity checker – code converters. Implementation of combinational logic using MUX, ROM, PAL and PLA.

UNIT III SEQUENTIAL CIRCUIT**9**

Flip flops SR, JK, T, D and Master slave – Characteristic table and equation – Application table – Edge triggering –Level Triggering –Realization of one flip flop using other flip flops –Asynchronous / Ripple counters – Synchronous counters –Modulo – n counter –Classification of sequential circuits – Moore and Mealy -Design of Synchronous counters: state diagram- State table –State minimization –State assignment- ASM-Excitation table and maps-Circuit implementation - Register – shift registers- Universal shift register – Shift counters – Ring counters.

UNIT IV ASYNCHRONOUS SEQUENTIAL CIRCUITS**9**

Design of fundamental mode and pulse mode circuits – primitive state / flow table – Minimization of primitive state table –state assignment – Excitation table – Excitation map- cycles – Races –Hazards: Static –Dynamic –Essential –Hazards elimination.

UNIT V MEMORY DEVICES**9**

Classification of memories –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 –ROM organization - PROM –EPROM –EEPROM –EAPROM –Programmable Logic Devices –Programmable Logic Array (PLA)- Programmable Array Logic (PAL)-Field Programmable Gate Arrays (FPGA).

TEXT BOOKS

1. M. Morris Mano, Digital Design, 3.ed., Prentice Hall of India Pvt. Ltd., New Delhi, 2003/Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003 – (Unit I, II, V)
2. John .M Yarbrough, Digital Logic Applications and Design, Thomson- Vikas publishing house, New Delhi, 2002. (Unit III, IV)

REFERENCES

1. S. Salivahanan and S. Arivazhagan, Digital Circuits and Design, 2nd ed., Vikas Publishing House Pvt. Ltd, New Delhi, 2004
2. Charles H.Roth. "Fundamentals of Logic Design", Thomson Publication Company, 2003.
3. Donald P.Leach and Albert Paul Malvino, Digital Principles and Applications, 5 ed., Tata McGraw Hill Publishing Company Limited, New Delhi, 2003.
4. R.P.Jain, Modern Digital Electronics, 3 ed., Tata McGraw–Hill publishing company limited, New Delhi, 2003.
5. Thomas L. Floyd, Digital Fundamentals, Pearson Education, Inc, New Delhi, 2003
6. Donald D.Givone, Digital Principles and Design, Tata Mc-Graw-Hill Publishing company limited, New Delhi, 2003.

UNIT I CIRCUIT CONFIGURATION FOR LINEAR ICs **9**

Current sources, Analysis of difference amplifiers with active loads, supply and temperature independent biasing, Band gap references, Monolithic IC operational amplifiers, specifications, frequency compensation, slew rate and methods of improving slew rate.

UNIT II APPLICATIONS OF OPERATIONAL AMPLIFIERS **9**

Linear and Nonlinear Circuits using operational amplifiers and their analysis, Inverting and Non inverting Amplifiers, Differentiator, Integrator, Voltage to current converter, Instrumentation amplifier, Sine wave Oscillator, Low-pass and band-pass filters, Comparator, Multivibrators and Schmitt trigger, Triangular wave generator, Precision rectifier, Log and Antilog amplifiers, Non-linear function generator.

UNIT III ANALOG MULTIPLIER AND PLL **9**

Analysis of four quadrant (Gilbert cell) and variable transconductance multipliers, Voltage controlled Oscillator, Closed loop analysis of PLL, AM, PM and FSK modulators and demodulators, Frequency synthesizers, Compander ICs.

UNIT IV ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTERS **9**

Analog switches, High speed sample and hold circuits and sample and hold ICs, Types of D/A converter, Current driven DAC, Switches for DAC, A/D converter-Flash, Single slope, Dual slope, Successive approximation, Delta Sigma Modulation, Voltage to Time converters.

UNIT V SPECIAL FUNCTION ICs **9**

Astable and Monostable Multivibrators using 555 Timer, Voltage regulators-linear and switched mode types, Switched capacitor filter, Frequency to Voltage converters, Tuned amplifiers, Power amplifiers and Isolation Amplifiers, Video amplifiers, Fiber optic ICs and Opto-couplers.

LECTURE=45**TOTAL : 45****TEXT BOOK**

1. Sergio Franco, 'Design with operational amplifiers and analog integrated circuits', McGraw-Hill, 1997.
2. D.Roy Choudhry, Shail Jain, "Linear Integrated Circuits", New Age International Pvt. Ltd., 2000.

REFERENCES

1. Gray and Meyer, 'Analysis and Design of Analog Integrated Circuits', Wiley International, 1995.
2. J.Michael Jacob, 'Applications and Design with Analog Integrated Circuits', Prentice Hall of India, 1996.
3. Ramakant A.Gayakwad, 'OP-AMP and Linear IC's', Prentice Hall / Pearson Education, 1994.
4. K.R.Botkar, 'Integrated Circuits'. Khanna Publishers, 1996.
5. Taub and Schilling, Digital Integrated Electronics, McGraw-Hill, 1997.
6. Millman.J. and Halkias.C.C. 'Integrated Electronics', McGraw-Hill, 1972.
7. William D.Stanely, 'Operational Amplifiers with Linear Integrated Circuits'. Pearson Education, 2004.

Design and testing of

1. Inverting, Non inverting and Differential amplifiers.
2. Integrator and Differentiator.
3. Instrumentation amplifier.
4. Active lowpass and bandpass filter.
5. Astable, Monostable multivibrators and Schmitt Trigger using op-amp.
6. Phase shift and Wien bridge oscillator using op-amp.
7. Astable and monostable using NE555 Timer.
8. PLL characteristics and Frequency Multiplier using PLL.
9. DC power supply using LM317 and LM723.
10. Study of SMPS control IC SG3524 / SG3525.

1. Design and implementation of Adders and Subtractors 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 2Bit 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
Implementation of SISO, SIPO, PISO and PIPO shift registers using Flip- flops