ANNA UNIVERSITY
Chennai-25.
Syllabus for
B.E.(Full Time) Electronics and Communication Engineering

CM125 Chemistry I   3   0   0   100

1.   CHEMICAL THERMODYNAMICS   9

Definition of free energy and spontaneity - Maxwell relations - Gibbs-Helmholtz equation - Van't hoff equations - Stoichiometry and energy balances in Chemical reactions.

2.   DYNAMICS OF CHEMICAL PROCESSES   10

Basic concepts - composite reactions (opposing, parallel and consecutive reactions) - Collision theory - Thermodynamic formulation of reaction rates - unimolecular reactions - Chain reactions (Stationary and non-stationary) - Enzyme Kinetics - Michaelis - Menten Equation.

3.   ELECTRODICS   8

Types of electrodes and cells - Nernst Equation - emf measurement and its applications - Principles of chemical and electrochemical corrosion - corrosion control (Sacrificial anode and impressed current methods).

4.   WATER   8

Water quality parameters - Definition and expression - Estimation of hardness (EDTA method) - Alkalinity (Titrimetry) - Water softening (zeolite) - Demineralisation (Ion- exchangers) and desalination (RO) - Domestic water treatment.

5.   POLYMERS   10

Monomer - Functionality - Degree of polymerisation - Classification based on source and applications - Addition, Condensation and copolymerisation - Mechanism of free -radical polymerisation - Thermoplastics and thermosetting plastics - Processing of plastics - Injection moulding, blow moulding and extrusion processes.

Total No of periods: 45

Text Books:

1. Alkins P.W., " Physical Chemistry ", ELBS, IV Edition, 1998, London.

References:

1. Balasubramanian M.R., Krishnamoorthy S. and Murugesan V., " Engineering Chemistry ",
    Allied Publisher Limited., Chennai, 1993.
2. Karunanidhi M., Ayyaswamy N., Ramachandran T and Venkatraman H., " Applied Chemistry ",
    Anuradha Agencies, Kumbakonam , 1994.
3. Sadasivam V., " Modern Engineering Chemistry - A Simplified Approach ", Kamakya Publications,
    Chennai , 1999.
4. Kuriakose, J.C. and Rajaram J., " Chemistry in Engineering and Technology ", Vol. I and II,
    Tata McGraw-Hill Publications Co.Ltd, New Delhi ,1996.
5. Jain P.C. and Monica J., " Engineering Chemistry ", Dhanpat Rai Publications Co.,(P) Ltd.,
    New Delhi, 1998.

GE131 Engineering Mechanics   3   1   0   100

1.   BASICS   5

Introduction - Units and Dimensions - Laws of Mechanics - Vectors - Vectorial representation of forces and moments - Vector operations.

2.   STATICS OF PARTICLES   8

Coplanar Forces - Resolution and Composition of forces - Equilibrium of a particle - Forces in space - Equilibrium of a particle in space - Equivalent systems of forces - Principle of transmissibility - single equivalent force.

3.   EQUILIBRIUM OF RIGID BODIES   7

Free body diagram - Types of supports and their reactions - requirements of stable equilibrium - Equilibrium of Rigid bodies in two dimensions - Equilibrium of rigid bodies in three dimensions.

4.   PROPERTIES OF SURFACES AND SOLIDS   12

Determination of Areas and Volumes - First moment of area and the centroid - second and product moments of plane area - Parallel axis theorems and perpendicular axis theorems - Polar moment of inertia - Principal moments of inertia of plane areas - Principal axes of inertia - Mass moment of inertia - relation to area moments of inertia.

5.   FRICTION   4

Frictional Force - Laws of Coloumb friction - Simple Contact friction - Rolling Resistance - Belt Friction.

6.   DYNAMICS OF PARTICLES   16

Displacement, Velocity and acceleration their relationship - Relative motion - Curvilinear motion - Newton's Law - Work Energy Equation of particles - Impulse and Momentum - Impact of elastic bodies.

7.   ELEMENTS OF RIGID BODY DYNAMICS   8

Translation and Rotation of Rigid Bodies - Velocity and acceleration - General Plane motion - Moment of Momentum Equations - Rotation of rigid Body - Work energy equation.

Total No of periods: 60

GE131 Engineering Mechanics   3   1   0   100

Text Books:

1. Beer and Johnson, " Vector Mechanics for Engineers ", Vol. 1 " Statics " and
   Vol. 2 " Dynamics ", McGraw Hill International Edition, 1995.
2. Merriam, " Engineering Mechanics ", Vol.1 " Statics " and Vol.2 " Dynamics 2/e ",
   Wiley International, 1988.

References:

1. Rajasekaran S. and Sankara Subramanian, G., " Engineering Mechanics - Statics and
   Dynamics ".
2. Irving, H., Shames, " Engineering Mechanics - Statics and Dynamics ", Thrid Edition,
   Prentice-Hall of India Pvt.Ltd., 1993.
3. Mokoshi, V.S., " Engineering Mechanics ", Vol.1 " Statics " and Vol.2 " Dynamics ",
   Tata McGraw Hill Books, 1996.
4. Timoshenko and Young, " Engineering Mechanics ", 4/e, McGraw Hill, 1995.
5. McLean, " Engineering Mechancis ", 3/e, SCHAUM Series, 1995.

MA131 Mathematics I   **3   1   0   100**

.   **(Revised Syllabus For B.E. / B.Tech. Programmes - Effective From June 2002)**

1.   MATRICES   9

Characteristic equation - Eigen values and eigen vectors of a real matrix. Some properties of eigen values, Cayley-Hamilton theorem, Orthogonal reduction of a symmetric matrix to diagonal form - Orthogonal matrices - Reduction of quadratic form to canonical form by orthogonal transformation.

2.   THREE DIMENSIONAL ANALYTICAL GEOMETRY   9

Direction cosines and ratios - Angle between two lines - Equation of a plane - Equation of a straight line - Co-planer lines - Shortest distance between skew lines - Sphere - Tangent plane - Plane section of a sphere - orthogonal spheres.

3.   GEOMETRICAL APPLICATIONS OF DIFFERENTIAL CALCULUS   9

Curvature - cartesian and polar coordinates - Circle of curvature - Involutes and Evolutes - Envelopes - properties of envelopes - Evolute as envelope of normals.

4.   FUNCTIONS OF SEVERAL VARIABLES   9

Functions of two variables - Partial derivatives - Total differential - Differentiation of implicit functions - Taylor's expansion - Maxima and Minima - Constrained Maxima and Minima by Lagrangean Multiplier method - Jacobians - differentian under integral sign.

5.   ORDINARY DIFFERENTIAL EQUATIONS   9

Simultaneous first order linear equations with constant coefficients - Linear equations of second order with constant and variable coefficients - Homogeneous equation of Euler type - equations reducible to homogeneous form - Method of reduction of order - Method of variation of parameters.

6.   TUTORIAL   15

Total No of periods: 60

MA131 Mathematics I   **3   1   0   100**

Text Books:

*1. Kreyszig, E., " Advanced Engineering Mathematics " (8th Edition), John Wiley and Sons (Asia)
    Pte Ltd., Singapore, 2001*
2. Veerarajan, T., " Engineering Mathematics ", Tata McGraw Hill Publishing Co., NewDelhi, 1999.

References:

1. Grewal, B.S., " Higher Engineering Mathematics " (35th Edition), Khanna Publishers, Delhi , 2000.
*2. Kandasamy, P., Thilagavathy, K., and Gunavathy, K., " Engineering Mathematics ", Volume I
    (4th Revised Edition), S. Chand & Co., New Delhi, 2000.*
*3. Narayanan, S., Manicavachagom Pillay, T.K., Ramanaiah, G., " Advanced Mathematics for
    Engineering Students ", VolumeI   (2nd Edition), S. Viswanathan (Printers & Publishers), 1992.*
*4. Venkataraman, M.K. " Engineering Mathematics - First year " National Publishing Company,
    Chennai (2nd Edition), 2000.*

PH125 Physics I   **3   0   0   100**

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1.   PROPERTIES OF MATTER   9

Elasticity - stress-strain diagram-factors affecting elasticity - Twisting couple on a wire-Shafts-Torsion pendulum-Depression of a cantilever- Young's modulus by cantilever-Uniform and Non Uniform bending-I shape girders-Production and measurement of high vacuum-Rotary pump-Diffusion pump-Pirani Gauge-Penning gauge-Viscosity-Oswald Viscometer-Comparision of viscosities.

2.   ACOUSTICS   9

Acoustics of buildings-Absorption coefficient-Intensity-Loudness-Reverberation time-Sabine's formula-Noise pollution-Noise control in a machine-Ultrasonics-production-Magnetostriction and Piezoelectric methods-Applications of ultrasonics in Engineering and Medicine.

3.   HEAT AND THERMODYNAMICS   9

Thermal conductivity-Forbe's and Lee's Disc methods-Radial flow of heat-Thermal conductivity of rubber and glass-Thermal insulation in buildings-Laws of thermodynamics-Carnot's cycle as heat engine and refrigerator-Carnot's theorem-Ideal Otto and Diesel engines-Concept of entropy-Entropy Temperature diagram of carnot's cycle.

4.   OPTICS   9

Photometry-Lummer Brodhum photometer-Flicker Photometer-Antireflection coating-Air wedge-Testing of flat surfaces-Michelson's Interferometer and its applications-Photoelasticity and its applications-Sextant-Metallurgical microscope-Scanning electron microscope.

5.   LASER AND FIBRE OPTICS   9

Principle of lasers-laser characteristics-Ruby-NdYAG, He-Ne, CO_2 and semiconductor lasers-propagation of light through optical fibers-types of optical fibre-Applications of optical fibres as optical waveguides and sensors.

Total No of periods: 45

PH125 Physics I   **3   0   0   100**

Text Books:

1. Arumugam.M., " Engineering Physics ", Anuradha Publications, 1998.

References:

1. Resnik R. and Halliday D., " Physics ", Wiley Eastern, 1986.
2. Nelkon M. and Parker.P., " Advanced Level Physics ", Arnald-Heinemann, 1986.
3. Vasudeva A.S., " Modern Engineering Physics ", S. Chand and Co., 1998..
4. Gaur, R.K., and Gupta, S.L., " Engineering Physics ", Dhanpat Rai and Sons, 1988.
5. Mathur, D.S, " Elements of properties of Matter ", S.Chand & Co., 1989.

CM126 Chemistry Lab   0   0   2   100

.   **30**

1. Preparation of standard solutions.
2. Estimation of hardness of water by EDTA method
3. Estimation of different types and amounts of alkalinity in water - Indicator method
4. Determination of dissolved oxygen - Winkler's method.
5. Estimation of iron in water - Spectrophotometric method.
6. Estimation of sodium in water - Flame Photometric method
7. Determination of molecular weight of polymers-Viscometric method.
8. Determination of total dissolved solids in water.
9. Corrosion experiments:
   * Corrosion rate measurements
   * Inhibition efficiency.
10. Electrochemistry experiments:
   * Determination of emf.
   * Single electrode potential
   * Potentiometric and conductometric titration

                                                              Total No of periods: 30

GE132 Computer Practice I   1   0   3   100

1.   FUNDAMENTALS OF COMPUTERS AND OPERATING SYSTEMS   4

Evolution of Computers - Organization of Modern Digital Computers-Single user Operating System-Multitasking OS-GUI

2.   OFFICE AUTOMATION   11

a) Word Processing
b) Data Base Management System
c) Spread Sheet Package
d) Presentation Software

3.   PRACTICALS   45

Total No of periods: **60**

Text Books:

1. *Ghosh Dastidar, Chattopadhyay and Sarkar, " Computers and Computation - A Beginner's Guide ", Prentice Hall of India, 1999.*

References:

1. *Nelson, Microsoft Office 97, Tata McGraw Hill, 1999.*
2. *Taxali, " PC Software for Windows Made Simple ", Tata McGraw Hill, 1999.*

GE133 Workshop Practice   0   0   4   100

1.   SHEET METAL   10

Tools and Equipments - Fabrication of tray, cone, etc., with sheet metal

2.   WELDING   10

Tools and Equipemts - Arc Welding of butt joint, Tap Joint, Tee fillet etc., Demonstration of gas welding.

3.   FITTING   10

Tools and Equipments- Practice in Chipping, Filling, Drilling - making Vee joints, square and dove tail joints.

4.   CARPENTRY   10

Tools and Equipments-Planning Practice-making halving joint and dove tail joint models.

5.   FOUNDRY   10

Tools and Equipments Preparation of moulds of simple objects like flange, gear V- grooved pulley etc.

6.   SMITHY   10

Tools and Equipments - Demonstration for making simple parts like keys, bolts etc.

                                              Total No of periods: 60

GE133 Workshop Practice   **0   0   4   100**

References:

1. *Venkatachalapathy V.S., " First Year Engineering Workshop Practice ",*
    Raamalinga Publications, Madurai, 1999.
2. *Kanaiah P.and Narayana K.C., " Manual on Workshop Practice Scitech Publications ",*
    Chennai, 1999.

PH126 Physics Lab   0   0   2   100

1.   **PRACTICALS**   30

1. Young's modulus by non uniform bending.
2. Rigidity modulus and moment of inertia using Torsion Pendulum
3. Viscosity of a liquid by Poiseuille's method.
4. Wavelength determination using grating by Spectrometer.
5. Particle size determination by Laser
6. Thermal conductivity by Lees' disc.
7. Thickness of wire by Air wedge.
8. Thermo emf measurement by potentiometer.

Total No of periods: 30

EC141 Electronic Devices　　　　　　　　　　**3**　　**0**　　**0**　　**100**

1.　ELECTRON DYNAMICS　　　　　　　　　　9

Motion of electron in electric, magnetic and combined electric and magnetic fields, Detection and focusing system of Oscilloscope tube, Television picture tube, LCD and Flat panel displays.

2.　TRANSPORT PHENOMENON IN SEMICONDUCTOR　　　　　9

Mobility and Conductivity, Drift and Diffusion Currents, Continuity equation, Minority carrier injection and recombination in Homogeneous semiconductors, Thermistors, Peizo Resistors, Hall effect, Thermoelectric effect.

3.　PN JUNCTION　　　　　　　　　　10

Analysis of PN Junction and Diode equation, Transition and diffusion capacitance, Break down characteristics, Charge control model and switching characteristics, Tunnel diode, Light Emitting Diode, Bipolar Junction transistor, Ebers moll's equation, Charge control approach to hybrid pi model, Breakdown and switching characteristics, Power transistor, JFET, Theory of operation and current equations.

4.　METAL SEMICONDUCTOR STRUCTURE　　　　　　　8

Band diagram, Structure of current flow mechanisms of metal semiconductor junction, Semiconductor - metal junction diode, MOSFET, Threshold voltage, Gate capacitance and characteristics, Power MOSFET.

5.　SPECIAL SEMICONDUCTOR DEVICES AND DEVICE TECHNOLOGY　　9

Charge transfer device, UJT, SCR, Diac, Triac, GTO, and Introduction to Gallium Arsenide Devices, Device technology, Planar Process, Diffusion, Ion implantation and Vapour deposition, Additive and substractive sequences, Procell sequence for bipolar, NMOS and CMOS integrated circuits.

Total No of periods:　　**45**

EC141 Electronic Devices   **3   0   0   100**

Text Books:

1. *Millman and Halkias, " Electronic Devices and Circuits ", Tata McGraw Hill, 1991.*
2. *David A. Bell, " Electron Devices and Circuits ", 3rd Edition, Prentice Hall of India, 1999.*

References:

1. *Jasprit Singh, " Semiconductor Devices an Introduction ", McGraw Hill International Edition, 1994.*
2. *Sze S.M., " Physics of Semiconductor Devices ", Wiley-Interscience, 1981.*
3. *Yang, " Fundamentals of semiconductor devices ", McGraw Hill International Edition, 1978.*
4. *Street Man, " Solid State Electronic Devices ", Prentice Hall of India, IV Edition, 1995.*

EC142 Circuit Theory   3   1   0   100

1.   **BASICS OF CIRCUIT ANALYSIS**   9

Kirchoff's laws, DC and AC excitation, Series and parallel circuits, Sinusoidal steady state analysis, Mesh current and node voltage method of analysis, Matrix method of analysis.

2.   **NETWORK THEOREMS**   9

Thevenin's and Norton's theorems, Super position theorem, Compensation theorem, Reciprocity theorem, Maximum power transfer theorem, Millman's theorem, Tellegen's theorem.

3.   **RESONANCE AND COUPLED CIRCUITS**   9

Series and parallel resonance, Quality factor and Bandwidth, Multi resonance circuits, Coupling co-efficient, Frequency response and bandwidth, Tuned circuit.

4.   **TRANSIENTS**   9

Transient response of RL, RC and RLC circuits to DC excitation, Natural and forced oscillations.

5.   **DUALITY AND TOPOLOGY**   9

Concept of duality, Dual network, Graphs of a network, Trees, Chords and branches, Tieset and cutset of a graph, Application to network analysis.

6.   **TUTORIAL**   15

Total No of periods: 60

EC142 Circuit Theory   3   1   0   100

Text Books:

1. *William H. Hayt and Jack E. Kemmerly, " Engineering Circuit Analysis ",
    McGraw Hill International Edition, 1993.*

References:

1. *Joseph Edminister and Mahmood Nahri, " Electric Circuits ", Third Edition,
    Tata McGraw Hill, New Delhi, 1999.*
2. *Soni ML. & Gupta J.C., " A Course in Electrical Circuit Analysis ", Dhanpath
    Rai and Sons, New Delhi, 1981.*
3. *Umesh Sinha, " Network Analysis ", Satayaprakasan, New Delhi, 1986.*
4. *Paranjothi S.R., " Electric Circuit Analysis ", New Age International Ltd.,
    New Delhi, 1996.*
5. *Chakrabati A., " Circuit Theory (Analysis and Synthesis) ", Dhanpath Rai &
    Sons, New Delhi, 1999.*
6. *Roland E. Thomas and Albert J. Rosa, " The Analysis and Design of Linear
    Circuits ", Prentice Hall International, 2nd Edition, 1988.*

MA132 Mathematics II   3   1   0   100

.   **(Revised Syllabus For B.E. / B.Tech. Programmes - Effective From June 2002)**

1.   **MULTIPLE INTEGRALS**   **9**

Double integration in Cartesian and polar coordinates - Change of order of integration - Area as a double integral - Triple integration in Cartesian coordinates - Change of variables - Gamma and Beta functions.

2.   **VECTOR CALCULUS**   **9**

Curvilinear coordinates - Gradient, Divergence, Curl - Line, surface & volume integrals - Statements of Green's, Gauss divergence and Stokes' theorems - Verification and applications.

3.   **ANALYTIC FUNCTIONS**   **9**

Cauchy Riemann equations - Properties of analytic functions - Determination of harmonic conjugate - Milne-Thomson's method - Conformal mappings : Mappings
$w = z + a$, az, $1/z$, $z2$ and bilinear transformation.

4.   **COMPLEX INTEGRATION**   **9**

Cauchy's theorem - Statement and application of Cauchy's integral formulae - Taylor's and Laurent's expansions - Singularities - Classification - Residues - Cauchy's residue theorem - Contour integration - Circular and semi Circular contours (excluding poles on real axis).

5.   **STATISTICS**   **9**

Moments - Coefficient of correlation - Lines of regression -   Tests based on Normal and t distributions, for means and difference of means - Chi Square test for goodness of fit.

                                        Total No of periods: 45

MA132 Mathematics II   3   1   0   100

Text Books:

1. *Kreyszig, E., " Advanced Engineering Mathematics " (8th Edition), John Wiley and Sons, (Asia) Pte Ltd.,Singapore, 2000.*
2. *Grewal, B.S., " Higher Engineering Mathematics " (36th Edition), Khanna Publishers, Delhi 2001*

References:

1. *Kandasamy, P., Thilagavathy, K., and Gunavathy, K., " Engineering Mathematics ", Volumes I & II (4th Revised Edition), S. Chand   & Co., New Delhi, 2001.*
2. *Narayanan, S., Manicavachagom Pillay, T.K., Ramanaiah, G., " Advanced Mathematics for Engineering Students ", Volumes I & II   (2ndEdition), S.Viswanathan (Printers & Publishers, Pvt, Ltd.), 1992.*
3. *Venkataraman, M.K. " Engineering Mathematics III - A ", National Publishing Company, Chennai, (13th Edition), 1998.*

PH135 Material Science   **3   0   0   100**

1. CRYSTAL PHYSICS 9

Crystalline and non-crystalline materials, Bravais lattices, Crystal systems, Symmetry elements, Simple crystal structures, Packing factor for sc, bcc, fcc, hcp structures, Miller Indices, Imperfections in Crystals, Bragg's law and x-ray diffraction methods to study crystal structures.

2. CONDUCTING MATERIALS 9

Classical free electon theory of metals, Electrical conductivity of Al, Draw backs of classical theory, Quantum free electron theory of metals and its importance, Density of states, Fermi, Dirac statistics, Calculation of Fermi energy and its importance, Concept of hole, Origin of bandgap in solids (qualitative treatment only), Effective mass of Electron, High resistivity alloys Super conductors, Properties and applications.

3. SEMICONDUCTING MATERIALS 9

Elemental and compound semiconductors and their properties, Carrier concentration in intrinsic semiconductors, Carrier concentration in n-type and p-type semiconductors, Variation of fermi level and carrier concentration with temperature, Hall effect, Experimental arrangement, Applications.

4. MAGNETIC AND DIELECTRIC MATERIALS 9

Different types of magnetic materials and their properties, Domain theory of ferromagnetism, Heisenberg criteria, Hysteresis, Energy product of a magnetic material, Ferrites and their applications, Magnetic recording materials, Metallic glasses, Active and passive dielectrics and their applications, Various polarization mechanisms in dielectrics and their frequency and temperature dependence, Internal field and deduction of Clausius Mosotti equation, Dielectric loss, Dielectric breakdown.

5. OPTICAL MATERIALS 9

Optical properties of metals, insulators and semiconductors, Phosphorescence and fluorescence, Excitons, traps and colour centers and their importance. Different phosphors used in CRO screens, Liquid crystal as display, LED materials, Working of LED, Thermography and its applications, Photoconductivity and photo conducting materials.

Total No of periods: 45

Text Books:

1. Arumugam M., " Materials Science ", AnuradhaTechnical Book Publishers, 1997.

References:

1. Pillai S.O., " Solid State Physics ", New Age Inc., 1998.
2. Van Vlack L.H., " Materials Science of Engineers ", Addison Wesley, 1985.
3. Sze S.M., " Physics of Semiconductor Devices ", Wiley Eastern, 1986.
4. Raghavan V., " Materials Science and Engineering ", Prentice Hall of India, New Delhi, 1993.
5. Allison J., " Electronic Engineering Materials and Devices ", Tata McGraw Hill, 1985.

EC143 Electric Circuit Lab   0   0   3   100

.   **45**

1. Verification of Kirchoff 's Laws
2. Verification of Network Theorem.
3. Resonance Circuits
4. Study of Transients
5. Coupled Circuits.
6. Study of Bridge Circuits.

Total No of periods: 45

GE134 Engineering Graphics   1   0   3   100

1.   PRINCIPLES OF GRAPHICS   16

Two dimensional geometrical construction - Conic sections, involutes and cycloids - Representation of three dimensional objects - Principles of projections - standard codes of principles.

2.   ORTHOGRAPHIC PROJECTIONS   28

Projections of points, straight line and planes - ' Auxiliary projections '- Projection and sectioning of solids - Intersection of surfaces - Development of surfaces.

3.   PICTORIAL PROJECTIONS   8

Isometric projections - ' Perspectives '- Free hand sketching.

4.   COMPUTER GRAPHICS   8

Hardware - Display technology - Software - Introduction to drafting software.

Total No of periods: 60

Text Books:

1. Narayanan, K.L., and Kannaiah, P., " Engineering Graphics ", Tata McGraw-Hill
   Publishers Co., Ltd., 1992.

References:

1. William M. Neumann and Robert F.Sproul, " Principles of Computer Graphics ",
   McGraw Hill, 1989.
2. Warren J. Luzzadder and John M. Duff, " Fundamentals of Engineering Drawing ",
   Prentice-Hall of India Private Ltd., Eastern Economy Edition, 1995.
3. Natarajan K.V., " A Text Book of Engineering Drawing ", Private Publication, Madras, 1990.
4. Mathur, M.L. and Vaishwanar, R.S., " Engineering Drawing and Graphics ", Jain Brothers,
   New Delhi, 1993.

GE135 Computer Practice II   1   0   3   100

1.   **MULTIUSER OPERATING SYSTEM**   4

Unix: Introduction - Basic Commands - Vi editor - filters - Input/output redirection - piping - transfer of data between devices - shell scripts.

2.   **FUNDAMENTALS OF NETWORKING**   3

Working on a networked environment - Accessing different machines from one node - concept of E-mail - Uses of Internet.

3.   **HIGH LEVEL LANGUAGE PROGRAMMING**   8

C Language: Introduction - Operator - Expressions - Variables - Input/output statements - control statements - function arrays - pointer - structures - unions - file handling - case studies.

4.   **TUTORIAL**   45

Total No of periods: 60

Text Books and References:

1. *Stephan J. Kochen & Patrick H. Wood, " Exploring the UNIX System ", Techmedia, 1999.*
2. *Maurice J. Bach, " The design of UNIX Operating Systems ", Prentice Hall of India, 1999.*
3. *Ramos, " Computer Networking Concepts ", Prentice Hall International, 1999.*
4. *Balagurusamy, " Programming in ANSI C ", Tata McGraw Hill, 1999.*
5. *Kernighan and Ritchie, " The C Programming Language ", Prentice Hall of India, 1999.*
6. *Gottfried, " Programming with C ", Tata McGraw Hill, 1999.*
7. *Kutti, " C and UNIX Programming: A Conceptual Perspective ", Tata McGraw Hill, 1999.*
8. *Eric Nagler, " Learning C++ ", M/s. Jaico Publishing Co., 1998-99.*

EC231 Network Analysis and Synthesis   3   1   0   100

1.   **ANALYSIS OF NETWORKS IN 'S' DOMAIN**   10

Network elements, Transient and sinusoidal steady state analysis, Network analysis using Laplace transformation, Network functions, Two port networks: Parameters and transfer function, Interconnection of two ports.

2.   **METHODS FOR COMPUTER AIDED NETWORK ANALYSIS**   8

State variable method, Analytic and numerical solutions, Graph theoretic analysis for large scale networks, Formulation and solution of network graph of simple networks, State space representation, Analysis using PSPICE.

3.   **ELEMENTS OF NETWORK SYNTHESIS**   12

Network realizability, Hurwitz Polynominals, Positive real functions, Properties of RC, RL & LC networks, Foster and Cauer forms of realization, Transmission zeroes, Synthesis of transfer functions.

4.   **PASSIVE FILTER DESIGN**   8

Butter worth and Chebyshev approximations, Normalized specifications, Frequency transformations, Frequency and impedance denormalisation, Types of frequency selective filters, Linear phase filters.

5.   **ACTIVE FILTER DESIGN**   7

Controlled sources, Op-amp as a controlled source, Sallen and key structure, Single amplifier LP, HP, BP & BR
 filters, Principle of design, Sensitivity.

Total No of periods: 45

EC231 Network Analysis and Synthesis   3   1   0   100

Text Books:

1. Someshwar C. Gupta, Jon W. Bayless, Behrouz Peikari ",
    Circuit Analysis - with computer   applications to problem-
    sovling", Wiley-Eastern Ltd., 1991.
2. Louis Weinberg, " Network Analysis and Synthesis ",
    McGraw Hill Book Company Inc., 1962.
3. Vasudev K. Aartre," Network Theory and Filter Design ",
    Wiley-Eastern Ltd., Second Edition, 1993.

References:

1. Franklin F. Kuo, " Network Analysis and Synthesis ", John Wiley.
2. Vanvalkenburg, " Network Analysis ", Printice Hall of India Pvt. Ltd., New Delhi, 1994.
3. Lawrence P. Huelsman, " Active and Passive Analog Filter Design ", McGraw Hill, 1993.

EC232 Signals and Systems   3   1   0   100

1.   **CLASSIFICATION OF SIGNALS AND SYSTEMS**   9

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 singals, CT systems and DT systems, Classification of systems - Linear Time invariant Systems.

2.   **ANALYSIS OF C.T. SINGALS**   9

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

3.   **LTI-CT SYSTEMS**   9

Differential equation, Block diagram representation, Impulse response, Convolution integral, Frequency response, Fourier Methods and Laplace transforms in analysis, State equations and Matrix.

4.   **ANALYSIS OF D.T. SIGNALS**   9

Spectrum of D.T. signals, Discrete Time Fourier Transform (DTFT), Discrete Fourier Transform (DFT), Properties of Z-transform in signal analysis.

5.   **LTI-DT SYSTEMS**   9

Difference equations, Block diagram representation, Impulse response, Convolution SUM, Frequency response, FFT and Z-transform analysis, State variable equation and Matrix.

Total No of periods: 45

References:

1. *Allan V. Oppenheim et al, " SIGNALS AND SYSTEMS ", Prentice Hall of India Pvt. Ltd., 1997.*
2. *Douglas K. Lindner, " Signals and Systems ", McGraw Hill International, 1999.*
3. *Simon Haykin and Barry Van Veen, " Signals and Systems ", John Wiley & Sons Inc., 1999.*
4. *Robert A. Gabel and Richard A. Roberts, " SIGNALS AND LINEAR SYSTEMS ", John Wiley, 3rd Edition, 1987.*
5. *Roger E. Zeimer et al, " SIGNALS AND SYSTEMS : Continuous and Discrete ", McMillan, 2nd Edition, 1990.*

EC233 Electromagnetic Fields   3   1   0   100

1.   STATIC ELECTROMAGNETIC FIELDS   12

Introduction to co-ordinate system, Gradient, Divergence, Curl, Divergence Theorem, Stoke's Theorem, Coulomb's Law, Electric field Intensity, Principle of superposition, Electric Scalar potential, Line charge distribution by Moment method, Electric flux Density, Gaus's Law and its applications, Field Computations and Problems.

2.   STATIC MAGNETIC FIELD   12

Magnetic field of a current carrying element, Ampere's Force law, The Biot-Savart Law, Magnetic Flux density, Gauss law for magnetic fields, Torgue on a loop, Magnetic moment, Ampere's Law and Magenetic field intensity, Magnetomotive force, Field cells and permeability, Vector potential, Field computation and problems.

3.   ELECTRIC FIELD IN DIELECTRICS   7

Permittivity, Polarization, Boundary relation, Capacitance, Dielectric strength, Energy and energy density, Poisson's and Laplace equations and applications, Electric Current, Current Density, Ohms law at a point, Resistance and Conductance, Continuity relations for current problems.

4.   MAGNETIC FIELD IN FERROMAGNETIC MATERIALS   6

Magnetic materials, Magnetic dipoles, Loops and Solenoids, Magnetization, Inductance, Energy in an Inductor and Energy Density, Boundary relations, Ferro magnetism, Hysteresis, Reluctance and Permeance, Problems.

5.   TIME VARYING ELECTRIC AND MAGNETIC FIELDS   8

Faraday's Law, Transformer and Motional Induction, Maxwell's equation from Faraday's Law, Self and Mutual Inductance, Displacement current, Maxwell's equation from Ampere's Law and its in-consistency, Boundary relation, Poynting Vector, Comparision of field and circuit theory, Circuit Application of pointing Vector.

6.   TUTORIAL   15

                                                       Total No of periods: 60

EC233 Electromagnetic Fields   **3   1   0   100**

Text Books:

1. *John D. Krauss, " Electromagnetics ", McGraw Hill, 1992.*
2. *David K. Chang, " Field and Wave Electromagnetics ", Second edition,*
   Addison Wesley, New Delhi, 1999.

References:

1. *Hayt W.H., " Engineering Electromagnetics", McGraw Hill, 1995.*
2. *Narayana Rao N., " Basic Electromagnetics with applications ", Prentice*
   Hall of India, 1988.
3. *Harrington R.F., " Field computation by moment methods ", Macmillan, 1988.*
4. *Stanley V. Marshall, Richard DuBroff, Gabriel G.Skitek, " Electromagnetic*
   Concepts and Applications", Fourth Edition, Prentice Hall International Inc.,
   New Jersy, 1996.
5. *Narayana Rao N., " Elements of Engineering Electromagnetics ", Fourth Edition,*
   Second Printing, Prentice Hall of India Pvt. Ltd., New Delhi 1998.
6. *David J. Griffiths, " Introduction to Electrodynamics ", Third Edition, Fifteenth*
   Printing, Prentice Hall of India Pvt. Ltd., New Delhi, 1999.

EC234 Electronic Circuits I   3   1   0   100

1.   BASIC STABILITY AND DEVICE STABILIZATION   6

Biasing circuits for BJT, DC and AC Load lines, Stability factor analysis, Temperature compensation methods, biasing circuits for FET's and MOSFET's.

2.   SMALL SIGNAL LOW FREQUENCY ANALYSIS AND DESIGN   9

Transistor, FET and MOSFET Amplifiers, Equivalent circuit, input and output characteristics, calculation of midband gain, input and output impedance of various amplifiers, cascode amplifier, Darlington Bootstrapping, Differential amplifier, CMRR measurement, Use of current source in Emitter.

3.   LARGE SIGNAL AMPLIFIERS   10

Class A, AB, B, C and D type of operation, efficiency of Class A amplifier with resistive and transformer coupled load, efficiency of Class B, Complementry Symmetry amplifiers, MOSFET Power amplifiers, Thermal stability of Power amplifiers, heat sink design.

4.   FREQUENCY RESPONSE OF AMPLIFIERS AND ANALYSIS USING SPICE   11

High frequency equivalent circuits for BJT and FET amplifiers, Calculation of Lower and Higher cutoff frequencies, Bode plot of frequency response, relation bandwidth and rise time, Compensation to improve the low frequency and high frequency response of amplifiers, HF amplifiers, Video amplifiers, Optocouplers, BJT modelling, The sinusoidal and Pulse source modelling, Analysis of CE Amplifier using SPICE.

5.   RECTIFIERS AND POWER SUPPLIES   9

Half and Full wave rectifiers, Ripple factor calculation for C, L, L-C and -SYMBOL 112f "Symbol" filters, Switch mode power supplies, Linear electronic voltage regulators, Power control using SCR.

6.   TUTORIAL   15

                                                      Total No of periods: 60

EC234 Electronic Circuits I   **3   1   0   100**

Text Books:

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

References:

1. David A.Bell, " Electronic Devices and Circuits ", Prentice Hall of India, 1998.
2. Donal L. Schilling Charles Beloue, " Electronic Circuits ", Third Edition, 1989.

EE253 Electrical Engineering   3   0   0   100

1.   CIRCUITS AND TRANSFORMERS   9

Three phase circuits and transformers, Three phase balanced circuits with R-L-C loads, Power measurement in 3 Phase circuit, Two watt meter method, Principle of operation of Transformers, Equivalent circuit, Voltage regulation, Efficiency, Transformer connections.

2.   DC MOTORS   9

Construction, Operating principle of motor, Types, Characteristics, Starting, Speed control, Testing.

3.   INDUCTION MOTORS   9

Construction, Types, Principle of operation of 3 phase induction motors, Equivalent circuit, Performance calculation, Starting and Speed control.

4.   SYNCHRONOUS AND SPECIAL MACHINES   9

Construction of synchronous machines, Types, Induced EMF, Voltage regulation of round rotor alternators. Brushless Alternators, Permanent magnet Synchronous machines, Reluctance machines, Hysteresis motors, Stepper motor.

5.   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.

Total No of periods: 45

EE253 Electrical Engineering   3   0   0   100

Text Books:

1. *Nasar S.A., " Electric Machines and Power Systems ", Vol. 1, McGraw Hill Inc., New Delhi, 1995.*
2. *Wadhwa C.L., " Electrical Power Systems ", Wiley eastern Ltd., India, 1985.*

MA231 Mathematics III   **3   1   0   100**

.   **(Revised Syllabus For B.E. / B.Tech. Programmes - Effective From June 2002)**

1.   PARTIAL DIFFERENTIAL EQUATIONS   **9**

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

2.   FOURIER SERIES   **8**

Dirichlet's conditions - General Fourier series - Half-range Sine and Cosine series - Parseval's identity - Harmonic Analysis.

3.   BOUNDARY VALUE PROBLEMS   **9**

Classification of second order linear partial differential equations - Solutions of one - dimensional wave equation, one-dimensional heat equation - Steady state solution of two-dimensional heat equation - Fourier series solutions in Cartesian coordinates.

4.   LAPLACE TRANSFORMS   **9**

Transforms of simple functions - Basic operational properties - Transforms of derivatives and integrals - Initial and final value theorems - Inverse transforms - Convolution theorem - Periodic functions - Applications of Laplace transforms for solving linear ordinary differential equations upto second order with constant coefficients and simultaneous equations of first order with constant coefficients.

5.   FOURIER TRANSFORMS   **10**

Statement of Fourier integral theorem - Fourier transform pairs - Fourier Sine and Cosine transforms - Properties - Transforms of simple functions - Convolution theorem - Parseval's identity.

Total No of periods: 45

MA231 Mathematics III   3   1   0   100

Text Books:

1. Kreyszig, E., " Advanced Engineering Mathematics " (8th Edition),
   John Wiley and Sons, (Asia) Pte Ltd.,Singapore, 2000.
2. Grewal, B.S., " Higher Engineering Mathematics " (35th Edition),
   Khanna Publishers, Delhi 2000.

References:

1. Kandasamy, P., Thilagavathy, K., and Gunavathy, K., " Engineering Mathematics ",
   Volumes II & III (4th Revised Edition), S. Chand   & Co., New Delhi, 2001.
2. Narayanan, S., Manicavachagom Pillay, T.K., Ramanaiah, G.,
   " Advanced Mathematics for Engineering Students ", Volumes II & III
    (2ndEdition), S.Viswanathan (Printers & Publishers, Pvt, Ltd.) 1992.
3. Venkataraman, M.K. " Engineering Mathematics " Volumes III - A & B,
   13th Edition National Publishing Company, Chennai, 1998.
4. Shanmugam, T.N. : http://www.annauniv.edu/shan/trans.htm

EC236 Electronic Devices and Circuits Lab   0   0   3   100

 .   **60**

1. CE Transistor Characteristics
2. UJT Characteristics
3. FET Characteristics
4. SCR Characteristics
5. Power Supplies
6. Frequency Response of CE, CB and CC Amplifiers with self bias, fixed bias and Collector to Base feedback bias.
7. Source Follower with gate resistance, Bootstrapped.
8. Class A and Class B Power amplifiers
9. Differential Amplifiers, CMRR measurements

Total No of periods: 60

EE254 Electrical Engineering Lab   0   0   3   100

  .   45

Power Measurements in 3-phase circuits.

Swinburne's Test.

Speed control of DC motors

Load Test on DC shunt generator

OCC and Load Test on DC shunt generator

OC and SC tests on Transformers.

Load Test on Transformer.

Regulation of alternator by EMF and MMF methods.

Equivalent circuit on 3-phase induction motor.

Load Test on 3-phase induction motor.

Equivalent circuit of single-phase induction motor.

Study of DC motor starters.

Study of AC motor starters.

                                                             Total No of periods: 45

EE254 Electrical Engineering Lab   0   0   3   100

EC241 Electronic Circuits II   3   1   0   100

1.   FEEDBACK AMPLIFIERS   9

Types of feedback, Effect of feedback on noise, distortion, gain, input and output impedance of the amplifiers, Analysis of Voltage and Current feedback amplifiers.

2.   OSCILLATORS   9

Negative Resistance Oscillator, Barhausen Criterion for oscillation in feedback oscillator, Mechanism for start of oscillation and stabilization of amplitude, Analysis of RC Oscillators using Cascade connection of Lowpass and Highpass filters, Wein Phase shift and twin-T network, Analysis of LC Oscillators, Colpitts, Hartley, Clapp, Franklin, Armstrong and Miller Oscillator, Frequency range of RC and LC Oscillator, Frequency range of RC and LC Oscillator, Quartz Crystal Construction Electrical equivalent circuit of Crystal, Crystal Oscillator circuits, use of Logic Gates as linear amplifiers, osciallator and clock generator circuits using logic gate amplifiers.

3.   TUNED AMPLIFIERS   9

Coil losses, unloaded and loaded Q of tank circuits, Analysis of single tuned amplifier, Double tuned, stagger-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.

4.   MULTIVIBRATOR CIRCUITS   9

Collector coupled and Complementary collector coupled astable multivibrators, Emitter coupled astable multivibrator, monostable and bistable multivibrator using similar and complementary transistors, triggering methods, storage delay and calculation of switching times, speed up capacitors, Schmitt trigger circuits.

5.   BLOCK OSCILLATORS AND TIMEBASE GENERATORS   9

Monostable and Astable Blocking Oscillators using Emitter based timing, frequency control using core saturation, pushpull operation of astable blocking oscillator i.e., inverters, pulse transformers, RC and RL wave shaping circuits, UJT sawtooth generators, Linearization using constant current circuit, Bootstrap and Miller saw tooth generators, current timebase generators.

6.   TUTORIAL   15

Total No of periods: 60

EC241 Electronic Circuits II   **3   1   0   100**

Text Books:

1. *David A. Bell, " Solid State Pulse Circuits ", Prentice Hall of India, 1992.*
2. *John D. Ryder, " Electronic Fundamental and Applications - Integrated and Discrete system ", Prentice Hall of India, 1999.*

References:

1. *Millman J. and Taub H., " Pulse Digital and Switching waveform ", McGraw Hill International*

EC242 Digital Electronics   3   0   0   100

1.   BASIC CONCEPTS AND BOOLEAN ALGEBRA   9

Number systems - Binary, Octal, Decimal, Hexadecimal, conversion from one to another, complement arithmatic, Boolean theorems of Boolean algebra, Sum of products and product of sums, Minterms and Maxterms, Karnaugh map, Tabulation and computer aided minimization procedures.

2.   LOGIC GATES   9

RTL, DTL, TTL, ECL, ICL, HTL, NMOS & CMOS logic gates, Circuit diagram and analysis characteristics and specifications, tri-state gates.

3.   COMBINATIONAL CIRCUITS   9

Problem formulation and design of combinational circuits, Adder / Subtractor, Encoder / decoder, Mux / Demux, Code-converters, Comparators, Implementation of combinational logic using standard ICs, ROM, EPROM, EEPROM, PAL, PLA and their use in combinational circuit design.

4.   SEQUENTIAL CIRCUITS   9

Flipflops - SR, JK, T, D, Master/Slave FF, Triggering of FF, Analysis of clocked sequential circuits - their design, State minimization, state assignment, Circuit implementation, Registers-Shift registers, Ripple counters, Synchronous counters, Timing signal, RAM, Memory decoding, Semiconductor memories.

5.   FUNDAMENTAL MODE SEQUENTIAL CIRCUITS   9

Stable, Unstable states, Output specifications, Cycles and Races, Racefree Assignments, Hazards, Essential hazards, Pulse mode sequential circuits.

Total No of periods: 45

EC242 Digital Electronics   3   0   0   100

Text Books:

1. *Morris Mano, " Digital logic and Computer Design ", Prentice-Hall of India, 1998.*
2. *William I. Fletcher, " An Engineering Approach to Digital Design ", Prentice-Hall of India, 1980.*
3. *Floyd T.L., " Digital Fundamentals ", Charles E. Merrill publishing Company, 1982.*
4. *Tokheim R.L., " Digital Electronics - Principles and Applications ", Tata McGraw Hill, 1999.*
5. *Jain R.P., " Modern Digital Electronics ", Tata McGraw Hill, 1999.*

EC243 Programming and Data Structures   3   1   0   100

1.   PROGRAMMING CONCEPTS   5

Top down design, Modularity, Pseudocode, structured programming concepts, procedures and functions (parameter passing).

2.   ALGORITHMS   6

Algorithm analysis, Algorithmic techniques, Brute Force algorithm, Divide and conque algorithm, recurssion and dynamic programming, Greedy algorithm, Concepts of back tracking.

3.   PASCAL / C   12

Expression, User defined data types, Control statements, Functions, Arrays, Records, Files, Sets, Lists and Pointers, Structures, Unions, Operation on bits, File processing.

4.   DATA STRUCTURE   11

Stack and Queue, Circular and Doubly linked lists, Trees and their implementation.

5.   ADVANCED TOPICS ON DATA STRUCTURE   11

Sorting - Bubble sort, Tree sort, Insertion sort, Sequential and Indexed files, Searching, Graphs, Applications, Storage management

6.   TUTORIAL   15

Total No of periods: 60

EC243 Programming and Data Structures   3   1   0   100

Text Books:

1. Byron S. Gottfried, " Schaum's outline of theory and problems of programming
   with Pascal ", Tata McGraw Hill publishing Co. Ltd., New Delhi, 1994.
2. Byron S. Gottfried, " Schaum's outline of theory and problems of programming
   with C ", Tata McGraw Hill publishing Co. Ltd., New Delhi, 1993.
3. Gregory L. Heileman, " Data Structures, Algorithms and Object Oriented
   Programming ", McGraw Hill Companies Inc., 1996.
4. Kruse, Leung and Tondo, " Data Structures and Program Design in C", Prentice Hall of India, 1997.

References:

1. Sara Baase, "Computer algorithms: Introduction to design and analysis", Addison-Wesley Publishing Company, 1989.
2. Giller Brass and Paul Bratley, "Fundamentals of Algorithms", Prentice Hall, 1996.
3. Ellis Horourity, Sartaj Sahne, Sanguthevan Rajasekaran, "Computer Algorithms", Galgotia Publications Pvt.Ltd., 1999.
4. Niklaus Wirth, "Algorithms and Data Strcutres-Programs", Prentice Hall of India Pvt.Ltd., 1994.
5. Alfred V.Aho, John E.Hoperoft and Jeffrey D.Ullman, "Data Structures and Algorithms", Addison-Wesley Publishing
     Company, 1985.
6. G.Michael Schneider, Steven W.Weingart, David M.Perlman, "An introduction to programming and problem solving with
     Pascal", Second edition, John Wiley & Sons, 1996.
7. Ira Pohl, "Object Oreinted Programming using C++", Second Edition, Addison-Welsley, Delhi 1999.
8. Stanley B.Lippman, Josee Lajoie, "C++ Primer" Third Edition, Addison-Wesley, Delhi 1999.

EC244 Linear Integrated Circuits   3   0   0   100

1.   **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.

2.   **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 convertor, Instrumentation amplifier, Sine wave Oscillators, Low pass and band pass filters, comparator, Multivibrator and Schmitt trigger, Triangle wave generator, Precision rectifier, Log and Antilog amplifiers, Non-linear function generator.

3.   **ANALOG MULTIPLIER AND PLL**   9

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

4.   **ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTORS**   9

Analog switches, High speed sample and hold circuits and sample and hold IC's, Types of D/A converter Current driven DAC, Switches for DAC, A/D converter, Flash, Single slope, Dual slope, Successive approximation, DM and ADM, Voltage to Time and Voltage to frequency converters.

5.   **SPECIAL FUNCTION ICS**   9

Timers, Voltage regulators - linear and switched mode types, Switched capacitor filter, Frequency to Voltage converters, Tuned amplifiers, Power amplifiers and Isolation Amplifiers, Video amplifiers, Fiber optics ICs and Opto couplers, Sources fo Noises, Op Amp noise analysis and Low noise OP-Amps.

Total No of periods: 45

EC244 Linear Integrated Circuits   **3   0   0   100**

Text Books:

1. *Sergio Franco, " Design with operational amplifiers and analog integrated circuits ", McGraw Hill, 1997.*

References:

1. *Gray and Meyer, " Analysis and Design of Analog Integrated Circuits ", Wiley International, 1995.*
2. *Michael Jacob J., " Applications and Design with Analog Integrated Circuits ", Prentice Hall of Inida, 1996.*
3. *Ramakant A. Gayakwad, " OP - AMP and Linear IC's ", Prentice Hall, 1994.*
4. *Botkar K.R., " Integrated Circuits ", Khanna Publishers, 1996.*
5. *Taub and Schilling, " Digital Integrated Electronics ", McGraw Hill, 1977.*
6. *Caughlier and Driscoll, " Operational amplifiers and Linear Integrated circuits ", Prentice Hall, 1989.*
8. *Millman J. and Halkias C.C., " Integrated Electronics ", McGraw Hill, 1972.*

WEBSITES:

1. *http://www.mhhe.com/franco*
2. *http://www.analog.com*
3. *http://www.microlinear.com*
4. *http://www.maxim-ic.com*
5. *http://www.linear-tech.com*

EC245 Measurements and Instrumentation   3   0   0   100

1.   **TRANSDUCERS**   9

Measurements, Instrumentation, Errors in measurements, Calibration and standard, Classification and characteristics of Transducers, Digital, Electrical, Electronic Weighing System, AC / DC Bridge measurement and their applications.

2.   **SIGNAL GENERATOR AND SIGNAL ANALYZERS**   9

A.F. Generator, Pulse Generator, AM/FM Signal generator, Function generator, Sweep frequency generator, wave analyzers, Spectrum Analyzers, Logic Analyzers, Distortion Analyzers.

3.   **DIGITAL INSTRUMENTS**   9

Digital Voltmeters and Multimeters, Automation in Voltmeters, Accuracy of DVM, Guarding Techniques, frequency, period, time interval and pulsewidth measurements, automatic vector voltmeter.

4.   **DATA DISPLAY AND RECORDING SYSTEM**   9

CRO, single beam, dual trace, double beam CRO, Digital storage and Analog storage Oscilloscope, sampling Oscilloscope, Power scope, Curve Tracer, Analog, Digital Recorders and Printers.

5.   **COMPUTER CONTROLLED TEST SYSTEM**   9

Testing and Audio amplifier, Testing a Radio Receiver, Instrument used in Computer Controlled Instrumentation, Digital Control Description, Microprocessor based measurements, Case studies in Instrumentation.

                                                           Total No of periods: 45

EC245 Measurements and Instrumentation   3   0   0   100

Text Books:

1. *Rangan C.S., " Instrumentation Devices and Systems ", Tata McGraw Hill, 1998.*
2. *Cooper, " Electronic Instrumentation and Measurement Techniques ", Prentice Hall of India, 1988.*

References:

1. *Bouwels A.J., " Digital Instrumentation ", McGraw Hill, 1986.*
2. *Barney C., " Intelligent Instrumentation ", Prentice Hall of India, 1985.*
3. *Oliver and Cage, " Electronic Measurements and Instrumentation ", McGraw Hill, 1975.*
4. *Deobelin, " Measurements Systems ", McGraw Hill, 1990.*

MA034 Random Processes   **3   1   0   100**

1.   PROBABILITY AND RANDOM VARIABLES   9

Probability concepts, Random variables, Moments, Moment Generating function, Binomial, Poisson, Geometric, Negative binomial, Exponential, Gamma, Weibull distributions, Functions of random variable, Chebychev inequality.

2.   TWO-DIMENSIONAL RANDOM VARIABLES   9

Marginal and conditional distributions, Covariance, Correlation and regression, Transformation of random variables, Central limit theorem.

3.   RANDOM PROCESSES   9

Classification, Stationary and Markov processes, Binomial process, Poisson process, Sine-wave process, Ergodic processes.

4.   CORRELATION FUNCTION   9

Auto correlation for discrete and continuous processes, Cross correlation functions, Correlation integrals, Applications, Linear systems with random inputs.

5.   SPECTRAL DENSITIES   9

Power spectral density, Cross spectral density, Applications to linear systems with random inputs.

6.   TUTORIAL   15

Total No of periods: 60

Text Books:

1. *Kapur J.N. and Saxena H.C., " Mathematical statistics ",*
    S.Chand & Company Ltd, New Delhi, (1997).
2. *O Flynn M., " Probability, Random variables and random processes ",*
    Harper and Row Publishers, New York, (1982).

References:

1. *Peebles Jr., " Probability, Random variables and random signal Principles ",*
    McGraw Hill Publishers, (1987).
2. *Ochi M.K., " Applied probability and stochastic processes ", John Wiley & Sons, New York, (1990).*

EC246 Computer Programming Lab   0   0   3   100

1.   **DESIGN AND DEVELOPMENT OF C AND PASCAL PROGRAMS USING THE**   **45**
      FOLLOWING CONCEPTS

Greedy algorithm
Back Tracking
Recursion
Brute force algorithm
Divide and conquer
Dynamic Programming
Stack, queue, searching, tree and graph
Computer graphics
File handling

2.

Development of a C / Pascal based menu driven, interactive and user friendly software package.

Total No of periods: 45

EC247 Electronic Circuit Design Lab   0   0   3   100

.   **45**

1. Feedback amplifier
2. Transistor phase shift oscillator
3. Class A single tuned amplifier
4. LC Oscillators
5. Collector coupled and Emitter coupled Astable multivibrator
6. Wein bridge oscillator
7. Schmitt Trigger
8. Emitter coupled bistable multivibrator
9. Monostable multivibrator
10. Class C tuned amplifier

Total No of periods: **45**