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

CM131 Chemistry I   2   1   2   4

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.

6.   PRACTICALS   30

I. Water Analysis : Determination of hardness, alkalinity , DO, Fe(spectrophotometry) and Na and K (Flame photometry).
II. Electrochemistry and corrosion experiments.
III. Polymer experiments.

Total No of periods: 75

CM131 Chemistry I   2   1   2   4

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   4

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   4**

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   4**

.   (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   4**

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.

PH131 Physics I   2   1   2   4

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 and lasers-laser characteristics-Ruby-NdYAG, He-Ne, CO2 and semiconductor lasers-propagation of light through optical fibers-types of optical fibre-Applications of optical fibres as optical waveguides and sensors.

6.   PRACTICALS   30

1. Young's modulus by nonuniform 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: 75

PH131 Physics I   **2   1   2   4**

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.

GE132 Computer Practice I   1   0   3   3

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   2

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   2

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.

CE151 Solid Mechanics   2   0   0   2

1.   **ANALYSIS OF PLANE TRUSSES:**   8

Stability and Equilibrium of plane frames - Perfect frames - types of trusses - analysis of forces in truss members - method of joints - method of joints - method of tension coefficients - method of sections.

2.   **STRESS, STRAIN AND DEFORMATION OF SOLIDS:**   5

Rigid bodies and deformable solids - Stability strength and stiffness - Tension, compression and sheer stresses - Deformation of simple and compound bars - Elastic constants - stresses at a point stresses on inclined planes - principal stresses and principal planes.

3.   **TRANSVERSE LOADING ON BEAMS**   6

Beams - Types and Transverse loading on beams - sheer force and bending moment in beams - Cantilevers - Simply supported beams and over-hanging beams.

4.   **STRESSES IN BEAMS**   6

Theory of simple bending - Analysis of stresses - load carrying capacity - Proportioning sections - leaf springs - Sheer stress distribution.

5.   **TORSION**   5

Stresses and deformation in circular and hollow shafts - stresses in helical springs - Deflection of springs - Design of buffer springs.

Total No of periods: 30

CE151 Solid Mechanics   2   0   0   2

Text Books:

1. Junarkar S.B., " Mechanics of Structures ", Vol.I, 21st Edition, Charotar Publishing
*   House, Anand, India, 1995.*
2. Kazimi S.M.A., " Solid Mechanics ", Tata McGraw Hill Publishing Company,
*   New Delhi, 1981.*

References:

1. Laudner T.J. and Archer R.R., " Mechanics of Solids and Introduction ", McGraw Hill
*   International Editions, 1994.*
2. William A.Nash, " Theory and problems of strength of materials ", Schaum's Outline
*   Series, McGraw Hill International Editions, Third Edition, 1994.*
3. Elangovan A., " Thinmavisaiyiyal ", (Mechanics of Solids in Tamil), Anna University,
*   Madras, 1995.*

EE131 Electric Circuit Analysis   3   1   0   4

1.   **BASIC CIRCUIT CONCEPTS**   9

Lumped circuits - Kirchhoff's Laws - V-I relationships of R, L and C - independent sources - dependent sources - simple resistive circuits - network reduction - voltage division - current division - source transformation.

2.   **SINUSOIDAL STEADY STATE ANALYSIS**   9

Phasor - sinusoidal steady state response - concepts of impedance and admittance - analysis of simple circuits - power and power factor - series resonance and parallel resonance - bandwidth and Q factor. Solution of three-phase balanced circuits - power measurements by two-wattmeter methods - solution of three-phase unbalanced circuits.

3.   **MESH-CURRENT AND NODE-VOLTAGE METHODS**   9

Formation of matrix equations and analysis of complex circuits using mesh-current and nodal-voltage methods - mutual inductance - coefficient of coupling - ideal transformer.

4.   **NETWORK THEOREMS AND APPLICATIONS**   9

Superpostion theorem - reciprocity theorem - compensation theorem - substitution theorem - maximum power transfer theorems - Thevenin's theorem - Norton's theorem and Millman's theorem with applications.

5.   **TRANSIENT ANALYSIS**   9

Forced and free response of RL, RC and RLC circuits with D.C. and Sinusoidal excitations.

6.   **TUTORIAL**   15

                                                                Total No of periods: 60

EE131 Electric Circuit Analysis   **3   1   0   4**

Text Books:

1. Paranjothi S.R., " Electric Circuit Analysis ", New Age International Ltd.,
   Delhi, 2nd Edition, 2000.

References:

1. Hyatt, W.H. Jr. and Kemmerly, J.E., " Engineering Circuit Analysis ",
   McGraw Hill International Editions, 1993.
2. Edminister, J.A., " Theory and Problems of Electric Circuits ", Schaum's outline
   series, McGraw Hill Book Company, 2ndEdition, 1983.
3. Sudhakar, A.and Shyam Mohan S.P., " Circuits and Network Analysis and
   Synthesis ", Tata McGraw Hill Publishing Co.Ltd., New Delhi, 1994.

MA132 Mathematics II   3   1   0   4

.   **(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**   **4**

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.

PH133 Physics II   **3   0   0   3**

1.   ELECTROSTATICS AND ELECTROMAGNETISM: **9**

Electric field and potential - Gauss theorem - Applications - Dielectrics - Capacitance - Energy stored in a dielectric medium - Types of capacitors - Loss of energy due to sharing of charges by the capacitors - Electrical conductivity in conductors - Carey Foster's Bridge - Maxwell's Equations - Free space wave equation - Characteristic impedance.

2.   QUANTUM PHYSICS: **9**

Development of Quantum Theory - dual nature of matter and radiation - Compton effect - Pair Production - Uncertainty principle - Equivalence of mass and energy Schrodinger's Wave equation - Particle in a box - Electrons in a metal.

3.   ATOMIC AND NUCLEAR PHYSICS: **9**

Characteristics of atomic spectra - molecular spectra - vector atom model - Stern and Gerlach experiment - Raman effect and its applications - liquid drop model - explanation for nuclear fission - shell model - chain reaction - criticality - four factor formula - Q value - power reactors - Laser induced nuclear fusion.

4.   ELEMENTARY CRYSTALLOGRAPHY: **9**

Symmetry elements - Miller Indices for cubic crystals - Packing factor calculations for cubical structures - Bragg's Law and X-ray diffraction methods to study crystal structures - crystal imperfections - crystal growth (Basic ideas only.)

5.   NONDESTRUCTIVE TESTING: **9**

Liquid penetrant, magnetic particle and eddy current methods - X-ray radiography - fluoroscopy - Gamma ray radiography - ultrasonic scanning methods - ultrasonic flaw detector - thermography.

Total No of periods: 45

PH133 Physics II   **3   0   0   3**

Text Books:

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

References:

1. Tayal, D.S., " Nuclear Physcis ", Himalayan Publishers, 1998.
2. Rajam, J.B., " Atomic Physics ", S.Chand & Co., 1980.
3. Vasudeva, D.N., " Fundamentals of Electricity and Magnetism ",
   S.Chand and Co., 1985.

GE134 Engineering Graphics   1   0   3   3

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   3

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.   PRACTICALS   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.*

CE261 Fluid Mechanics   2   0   0   2

1.   **FLUID PROPERTIES**   6

Fundamental units - mass density - specific weight - viscosity - surface tension - capillary - compressiblity.

2.   **FLUID KINEMATICS AND DYNAMICS**   8

Streamline - streak line - pathline - continuity equation - stream and potential functions - Bernoulli's equation - Darcy's equation - Moody's diagram.

3.   **FLOW THROUGH PIPES**   8

Pipes in series and parallel - major and minor losses - hydraulic grade line - venturimeter - orifice meter - manometer.

4.   **HYDRAULIC MACHINERY**   8

Classification of turbines - efficiency and performance of turbines - specific speed - rotodynamic and positive displacement pumps - pumps in series and parallel.

Total No of periods: 30

References:

1. Modi, P.N. and Seth, S.M., " Hydraulics and Hydraulic Machinery ", Dhanbat Rai
   & Sons, 1994.
2. Kumar K.L., " Engineering Fluid Mechanics ", LUCE edition, New Delhi, 1994.

EC253 Electron Devices   **3   0   0   3**

1.   ELECTRON DYNAMICS   9

Concepts of electronic current in vacuum, gas and solid - effect of electric and magnetic field on electron and other charged particles - cathode ray tube - Electrostatic and magnetic deflection.

2.   SOLID STATE ELECTRONICS   9

Review of Energy band structure of Ge, Si and Ga As-electron, hole generation and recombination; drift and diffusion currents - continuity equation - hall effect - PN junction -current equation -junction capacitance - breakdown characteristics - Varactor, tunnel, fast recovery, Schottky and Zenar diodes.

3.   BIPOLAR JUNCTION TRANSISTOR   9

Ebers - Moll equation - inut output characteristics - switching characteristics - 'h' parameters - Low frequency and high frequency equivalent circuits - RF transistors - Power transistors.

4.   FET, UJT AND SCR   9

Theory and characteristics of JFET and MOSFET - low frequency and high frequency equivalent circuits - Theory and characteristics of UJT, SCR and TRAIC.

5.   CCD AND OPTOELECTRONIC DEVICES   9

Charge transfers and charge coupled devices - theory and applications. Semiconductor Opto electronic devices - LED, LASER diode, LCD, Photo diode Solar Cell.

Total No of periods: 45

EC253 Electron Devices 3   0   0   3

Text Books:

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

References:

1. Sze, S.M., " Physics of Semiconductor Devices ", Wiley Eastern, 1981.
2. Boylestad and Nashelsky, " Electronic Device and Circuit theory ", Prentice Hall of India,
   6th Edition, 1999.
3. Mothersheed, " Electronic Devices and Circuits ", Prentice Hall of India, 1999.
4. Streetman, B., " Solid State Electronic Device and Circuits ", Prentice hall of India,
   4th Edition, 1995.
5. John D.Ryder, " Electronic Fundamentals and Application : Integrated and Discrete
   Systems ", 5th Edition, Prentice Hall of India, 1999.
6. David Neamen, " Semiconductor Physics and Devices - Basic Principles ", Tata McGraw
   Hill, 1999.

EE231 Electromagnetic Theory   3   1   0   4

1.   GENERAL PRINCIPLES   3

The field concept - sources of electromagnetic fields.

2.   ELECTROSTATICS   8

Charges - Coulomb's Law - electric field intensity - electric flux - Gauss's Law - potential - boundary value problems - Laplace and Poisson's equations - electrostatic energy - dielectrics - capacitance.

3.   MAGNETOSTATICS   8

Current density - magnetic field - magnetic flux - Biot-Savart Law - Ampere's law - torque - force - vector potential - boundary value problem.

4.   ELECTROMAGNETIC FIELDS   8

Faraday's Law - Lenz's Law - Maxwell's equations - displacement current - Eddy current - Relation between field theory and circuit theory.

5.   ELECTROMAGNETIC WAVES   9

Generation - Propagation of waves in dielectrics - conductors and transmission lines - Poynting vector - skin effect.

6.   FIELD MODELLING AND COMPUTATION   9

Problem formulation - boundary conditions - solutions - analytical methods - variables separable methods - conformal transformation - method of images - numerical methods - finite difference method - finite element method - charge Simulation Method.

7.   TUTORIAL PROBLEMS   15

Field plotting of electrostatic, magnetostatic and electromagnetic configurations using standard software.

Total No of periods: 60

EE231 Electromagnetic Theory   **3   1   0   4**

Text Books:

1. John D.Kraus, " Electromagnetics ", McGraw Hill Book Co., New York, Third Edition, 1989.
2. Joseph A. Edminister, " Theory and Problems of Electromagnetics ", Schaum's Outline
   Series, McGraw Hill Book Co., NewYork, 1986.
3. William H.Hayt, Jr., " Engineering Electromagnetics ", Tata McGraw Hill Edition,
   New Delhi, 1998.

References:

1. David J.Griffth, " Introduction to Electrodynamics ", Prentice Hall of India Pvt.,
   New Delhi, Second Edition, 1997.
2. Richard E.Dubroff, Marshall S.V., Skitek G.G., " Electromagnetic Concepts and
   Applications ", Fourth Edition, Prentice Hall of India Pvt. Ltd., New Delhi, 1996.
3. Kraus and Fleish, " Electromagnetics with Applications ", McGraw-Hill
   International Editions, Fifth Edition, 1999.

EE232 Electrical Machines - I   **3   1   0   4**

1.   INTRODUCTION   6

Electrical machine types - magnetic circuits - inductance - induced EMF and force - core losses - AC operation of magnetic circuits.

2.   TRANSFORMERS   10

Construction - principle of operation - equivalent circuit - losses - testing - efficiency and voltage regulation - auto transformer - three-phase connections - parrellel operation of transformers - phase conversion - tap-changing.

3.   ELECTROMECHANICAL ENERGY CONVERSION   6

Energy in magnetic systems - field energy and mechanical force - single and multiply excited systems.

4.   BASIC CONCEPTS IN ROTATING MACHINES   8

MMF of distributed windings - magnetic fields in rotating machines - roating MMF waves in AC machines - generated voltages - torque.

5.   DC MACHINES   15

Construction - EMF and torque - circuit model - armature re-action - commutation - methods of excitation - characteristics of generators - characteristics of motors - starting and speed control   -testing and efficiency - parallel operation.

6.   TUTORIAL   15

Total No of periods: 60

EE232 Electrical Machines - I   **3   1   0   4**

Text Books:

1. Nagrath, I.J. And Kothari, D.P., " Electric Machines ", Tata McGraw Hill
   Publishing Company Ltd., 1980.

References:

1. Fitzgerald. A.E., Charles Kingsely Jr., Stephen D.Umans, " Electric Machinery ",
   McGraw Hill Books Company, 1992.
2. Syed A. Nassar, " Electric Machines and Power Systems ", Volume - I, " Electric
   Machines ", McGraw Hill Inc., New York, 1995.

MA231 Mathematics III   **3   1   0   4**

.   (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   4**

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

ME251 Thermodynamics   **3   0   0   3**

1.   SYSTEMS AND LAWS OF THERMODYNAMICS   9

Closed and open systems - Equilibrium - First Law - Second law - Reversibility - entropy - Processes - Heat and work transfers - Entropy change - Carnot cycle.

2.   POWER CYCLES AND INTERNAL COMBUSTION ENGINES   9

Carnot cycle - Otto cycle - Diesel cycle - Dual cycle - Brayton cycle - Air standard efficiency - Two stroke and Four-stroke engines - S.I. and C.I. Engines - Gas Turbine Operation.

3.   STEAM BOILERS AND TURBINES   9

Steam properties - Use of steam tables and charts - steam power cycle - boilers and accessories - Boiler testing - layout of thermal power station - steam turbines - impulse and reaction turbines - compounding of turbines - Simple velocity diagrams.

4.   AIR COMPRESSORS, REFRIGERATION AND AIR CONDITIONING   9

Reciprocating and Rotary compressors - Staging compressor work - Vapour Compression - Refrigeration cycle - Applications - Air-conditioning system - Layout selection.

5.   HEAT TRANSFER   9

Conduction - Plane wall, cylinder, sphere, composite walls - critical insulation thickness - simple fins - convection and free convection - forced convection - flow over flat plates and flow through pipes - empirical relations - radiation - black body, Grey body radiation exchanges - cooling of machines.

Total No of periods: 45

ME251 Thermodynamics   **3   0   0   3**

Text Books:

1. Nag, P.K., " Engineering Thermodynamics ",Tata McGraw Hill, 1995.
2. Kothandaraman and Domkundwar, " Applied Thermodynamics ", Dhanpat Rai
   and Sons, 1988.
3. Sachdeva, R.C., " Heat Transfer ", Wiley Eastern Ltd., 1992.
4. Roy Choudhury T., " Basic Engineering Thermodynamics ", Tata McGraw
   Hill Publishing Co. Ltd., 1997.

References:

1. Ballancy, P.L., " Applied Thermodynamics ", Khanna Publishers.
2. Rai and Sorao, " Applied Thermodynamics ", Satya Prakasam, 1985.

PH231 Material Science   3   0   0   3

1.   CONDUCTING MATERIALS   9

Classical free electron theory of metals - electrical conductivity expression - drawbacks of classical theory, quantum theory, free electron theory of metals - its importance density of states - Fermi-Dirac Statistics - Calculation of Fermi energy and its importance - elective mass of electron - concept of hole - origin of bandgap in solids (qualitative treatment only). Conductors, copper and aluminum - high resistivity alloys - superconductors - properties and applications.

2.   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 carrier concentration with temperature - variation of fermi level with carrier concentration and temperature and its influence - Hall effect - experimental arrangement - applications of Hall effect.

3.   MAGNETIC AND DIELECTRIC MATERIALS   9

Different types of magnetic material and their properties - Heisenberg and domain theory of ferromagnetism - Hysteresis - energy product of a magnetic materials - Ferrite and their applications - magnetic recording materials - tapes and disks - metallic glasses - active and passive dielectrics and their frequency and temperature dependence - internal field and deduction of Clausius Mosotti equation - dielectric loss - different types of dielectric breakdown - classification of insulating materials and their applications.

4.   OPTICAL MATERIALS   9

Optical properties of metals, insulators and semiconductors - excitons, traps, colour centres and their importance - phosphorescence and fluorescence - different phophors used in CRO screens - liquid crystal as display mateial - twisted nematic display - construction and working of LED - LED materials - thermography and its applications - photo conductivity and photo conducting materials.

5.   MODERN ENGINEERING MATERIALS   9

Metallic glasses as transformer core material - nanophase material - shape memory alloys - advance ceramic materials - polymers - biomaterials - non-linear materials and their applications.

Total No of periods: 45

Text Books:

*1. Arumugam, M., " Materials Science ", Anuradha Technical Book Publishers,
   Kumbakkonam, 1997.*

References:

1. Pillai. S.O., " Solid State Physics " , New Age Inc., 1998.
2. Van Vlac L., " Materials Science for Engineers ", Addison-Wesley, 1995.
*3. Kingery W.D., Bowen H.K. and Unimann D.R., " Introduction to Ceramics ",
   John Wiley and Sons, 2nd Ed., 1991.*
*4. Raghavan V., " Materials Science and Engineering ", Prentice Hall of India,
   New Delhi, 1993.*

EC254 Electronic Circuits   3   0   0   3

1.   AMPLIFIERS   10

Biasing circuits for transistors - FET and their analysis - CE, CC and CB amplifiers - FET amplifiers - frequency response - Cascade and Darlington connections - analysis of class A and B power amplifiers - complementary symmetry amplifiers - class C power amplifier.

2.   DIFFERENTIAL AND TUNED AMPLIFIERS   8

Differential amplifiers - common mode and difference mode analysis - Drift compensation - FET input stages - chopper stabilizer amplifier - Introduction to tuned amplifiers.

3.   FEEDBACK AMPLIFIERS AND OSCILLATORS   9

Advantages of negative feedback - voltage/current, series/shunt feedback - positive feedback - condition for oscillations: phase shift - Wien bridge, Hartley, Colpits and Crystal Oscillators.

4.   PULSE CIRCUITS   9

RC wave shaping circuits - Diode clampers and clippers - Multivibrators - Schmitt triggers - UJT and transistor sawtooth oscillators.

5.   RECTIFIERS AND POWER SUPPLIERS   9

Single and polyphase rectifiers and analysis of filter circuits - Design of Zener and Transistor series voltage regulators - switched mode power suppliers.

Total No of periods: 45

EC254 Electronic Circuits   **3   0   0   3**

Text Books:

1. Albert Paul Malvino, " Electronic Principles ", Tata McGraw Hill, 6th Edition, 1995.

References:

1. Millman and Halkias, " Integrated Electronics ", McGraw Hill, I SE, 1990.
2. Millman and Taub, Pulse, " Digital and Switiching Wave forms ", McGraw Hill, 1991.
3. David Bell, " Electronic Devices & Circuits ", 3rd Edition, 1999.

EC256 Communication Engineering   3   0   0   3

1.   RADIO COMMUNICATION SYSTEMS   15

Frequency spectrum - Principle of AM and FM - AM and FM transmitters and receivers - introduction to microwave communication systems - principle of satellite communication.

2.   PLUSE COMMUNICATION SYSTEMS   5

PAM, PPM, PDM, PCM - delta modulation - differential PCM - merit and demerits - comparison of pulse modulation schemes.

3.   DATA TRANSMISSION   10

Base band signal receiver - error probability - optimum and matched filter techniques coherent reception - digital modulation systems - FS, PSK - comparison of data transmission systems.

4.   TRANSMISSION MEDIUM   10

Characteristics of cables - optical fibers - effects of EM radiation - bandwidth and noise restrictions - statistical measurements of random noise - concept of multiplexing - FDM and TDM.

5.   TELEVISION   5

Scanning methods - B/W and Colour Systems - Camera and picture tubes - Synchronisation - transmitters and receivers.

Total No of periods: 45

EC256 Communication Engineering   3   0   0   3

Text Books:

1. Kennedy,G., " Electronic Communication Systems ", McGraw Hill , 4th Edition, 1987.
2. Taub and Schilling, " Principles of Communication Systems ", Second Edition,
   McGraw Hill, 1987.
3. Simon Haykins, " Communication Systems ", 3rd Edition, John Wiley Inc., 1995.
4. Bruce Carlson, A., " Communication Systems ", 3rd Edition, Tata McGraw Hill, 1986.
5. Roddy and Coolen, " Electronic Communication ", 4th Edition, Prentice Hall of
   India, 1999.

EE234 Electrical Machines - II   3   1   0   4

1.   **SYNCHRONOUS MACHINES**   15

Construction - types - circuit model - synchronous reactance - voltage regulation - EMF, MMF, POTIER and ASA methods - armature reaction - Synchronising - Parallel   operation - operating characteristics - capability curves - salient pole synchronous machines - hunting - short circuit transients.

2.   **THREE PHASE INDUCTION MACHINES**   15

Construction - types - principle of operation - equivalent circuit - torque and power output - testing - circle diagram - cogging and crawling - starting and speed control - double cage rotor - induction generator - synchronous induction motor.

3.   **FRACTIONAL HORSEPOWER MOTORS**   15

Single phase induction motor - double revolving field theory - equivalent circuit - performance analysis - load characteristics - starting methods - shaded-pole induction motor - variable reluctance motor - stepping motor - hysteresis motor - AC series motor - repulsion motor - linear motor - permanent magnet DC and AC motors.

4.   **TUTORIAL**   15

                                                              Total No of periods: 60

Text Books:

1. Nagrath, I.J. and Kothari D.P., " Electric Machines ", T.M.H. Publishing Co. Ltd.,
   New Delhi, 1990.

References:

1. Fitzgerald, A.E., Charles Kingsley Jr., Stephen D. Umans, " Electric Machinery ",
   McGraw Hill Book Company, 1992.
2. Syed A. Nasser, " Electric Machines and Power Systems ", Volume I, McGraw Hill
   Inc., New York, 1995.

EE235 Control Systems   3   1   0   4

1.   BASIC CONCEPTS AND SYSTEM REPRESENTATION   12

Terminology and basic structure - feedback control theory - multivariable systems - dynamic models - state variable models - impluse response models and transfer function models - application to mechanical, thermal, hydraulic, pneumatic and electromechanical systems. Block diagram representation and signal flow graphs - control system components.

2.   TIME RESPONSE ANALYSIS AND DESIGN   9

I and II order systems - performance specifications - feedback analysis - P, PI, PID controllers design - effect of pole, zero addition - desired closed loop pole location - root locus plot and applications - steady state and dynamic error coefficients - robust control.

3.   FREQUENCY RESPONSE ANALYSIS AND DESIGN   9

Performance specifications - correlation to time domain specifications - bode plots and polar plots - gain and phase margin - constant Mand N circles and Nichols chart - all pass and non-minimum phase systems.

4.   STABILITY   9

BIBO stability - Routh-Hurwitz criterion - stability ranges for a parameter - Nyquist stability criterion - relative stability assessment using Routh and Nyquist criterion and bode plots.

5.   COMPENSATION DESIGN   6

Design concepts - realization of basic compensation - cascade compensation in time domain and frequency domain (Simple MATLAB applications to analysis and compensators design problems.)

6.   TUTORIAL   15

                                                    Total No of periods: 60

EE235 Control Systems   **3   1   0   4**

Text Books:

1. Gopal M. " Control System Principles and Design ", Tata McGraw Hill, 1998.

References:

1. Ogatta, " Modern Control Engineering ", Tata McGraw-Hill, 1997.[MATLAB reference]
2. Chesmond C.J., " Basic Control System Technology ", Viva Low Priced Student
   Edition, 1998.
3. Nagarath I.J. and Gopal M., " Control System Engineering ", Wiley Eastern Ltd.,
   Reprint, 1995.
4. Datton K., Banaclough W. and Thompson S., " The Art of Control Engineering ",
   Addision Wesley.
5. Dorf R.C. and Bishop R.H., " Modern Control systems ", Addison-Wesley,
   1995 (MATLAB reference)
6. Leonard N.E. and William Levine, " Using MATLAB to Analyse and Design
   Control Systems ", Addision Wesley, 1995.

EE236 Network Analysis and Synthesis   3   1   0   4

1.   S- DOMAIN ANALYSIS   6

s-domain network -driving point and transfer impedances and their properties - transform network analysis - poles and zeros of network functions - time response from pole-zero plots.

2.   FREQUENCY DOMAIN ANALYSIS   6

Immittance - loci of RLC networks - Frequency response of RLC networks - frequency response from pole-zero-Bode plots.

3.   NETWORK TOPOLOGY   8

Network graph, tree and cut-sets - tie set and cut-set schedules - v-shift and I-shift-Primitive impedance and admittance matrices - Application to network solutions.

4.   TWO-PORT NETWORKS   9

Characterisation of two-port networks in terms of z, -y, h - and T-parameters - Network Equivalents - Relations between network parameters - Analysis of T, ladder, bridged - T and lattice networks - Transfer function of terminated two-port networks.

5.   ELEMENTS OF NETWORK SYNTHESIS   8

Realisability of one-port network - Hurwitz polynomials and properties - p.r. functions and properties - synthesis of RL, RC and LC one-port networks.

6.   DESIGN OF FILTERS   8

Filters and attenuators - Design of constant -k, m-derived and composite filters - qualitative treatment of active filters - Butterworth and Chebyshev filters.

7.   TUTORIAL   15

                                                        Total No of periods: 60

EE236 Network Analysis and Synthesis   3   1   0   4

Text Books:

1. Kuo, F.F., " Network Analysis ", New age International Publishers, Second Edition, 2000.

References:

1. Paranjothi,.S.R., " Electric Circuit Analysis ", New age International Publishers,Second Edition, 2000.
2. Van Valkenburg, M.E., " Network Analysis ", Prentice-Hall of India Private Ltd., New Delhi, Third Edition, 1974.
3. Sudhakar, A. and Shyammohan, " Circuits and Networks Analysis and Synthesis ", Tata McGraw Hill Publishing Co. Ltd., New Delhi, 1994.

EE237 Object Oriented Programming   2   0   2   3

1.   OBJECT ORIENTED PROGRAMMING PARADIGM   2

Introduction - reusability - security - object oriented programming fundamental - abstraction - encapsulation - derivation - object oriented languages and packages.

2.   CLASSES AND OBJECTS   7

Introduction to C++ - procedural oriented approach to C++ - data types - control structures - problem solving - standard input output streams - C++ enchancements - function proto-types - default reference variables - constants - classes - construction - distracts - constraint objects - member objects - member functions.

3.   ADVANCED FEATURES   7

Dynamic memory allocation pointers - new and delete operators - classes with pointers - copy constructor - static members - friend classes - friend functions - operator overloading.

4.   POLYMORPHISM AND INHERITANCE   7

Function overloading - connection classes - derived classes - class conversation - protected members - virtual function - dynamic binding - abstract classes - multiple inheritance - templates - error handling.

5.   CASE STUDIES   7

Overview of typical object oriented systems - case studies - application to electrical engineering.

6.   PRACTICALS   30

                                        Total No of periods: 60

EE237 Object Oriented Programming   **2   0   2   3**

Text Books:

1. Stanley B. Lipman, " C++ Primer ", Addison Wesley, 1998.
2. Dittrich et al K.R., " On Object Oriented Database System ", Springer Verlag, 1991.

References:

1. Bertrand Meyer, " Object Software Construction ", Prentice Hall, 1988.
2. Baarkakati, N., " Object Oriented Programming in C++ ", Prentice Hall of India, 1997.

EC258 Electronics Laboratory   0   0   3   2

1.   **45**

1. Common Emitter and common collector amplifier
2. FET amplifier
3. Class B amplifier
4. Differential amplifier
5. Feed back amplifier
6. Phase shift and Wein bridge Oscillator
7. Hartley and Colpit Oscillator
8. Astable Multivibrator
9. Monostable and Bistable Multivibrator
10. Series voltage regulator

Total No of periods: **45**

EE242 Electrical Machines Lab-II   0   0   3   2

.   45

1. Regulation of 3 Phase alternator by EMF and MMF methods.
2. Regulation of 3 Phase alternator by ZPF and ASA Method.
3. Slip Test
4. Load characteristics of 3 Phase alternator by busbar loading.
5. Vand Inverted V curves of synchronous motor.
6. Load test on 3 phase induction motor.
7. No Load and blocked rotor test on three-phase induction motor.
8. Synchronous induction motor
9. Study of induction motor starters.
10. Separation of losses in three-phase induction motor.
11. Equivalent circuit and pre-determination of performance characteristics of single-phase induction motor.

Total No of periods: 45