MM 50 *Sessional 15*
Time 2 Hrs *Theory 35*
L T P *Pass Marks 20*
2 0 0

EHU 101
Vedic Engineering

Objective: To acquaint students with reservoir of knowledge available in Vedas. And their utilities in all round of human life. It also aims to show some of the concepts of Engineering available in Vedas.

NOTE : **Ten** questions are to be set taking two questions from each unit. The student has to attempt **FIVE** questions selecting ***one question from each unit***. The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I Definition of Vedic literature, Importance of Vedic Literature, Brief overview of the subject matter of four Vedas. Spiritual education in Vedic literature(40th chapter of Yajurveda)

Unit II Geometry according to Sulba Sutra, Geometry before Sulba Sutra, Vedic Mathematics (Ekadhiken Pooren, Nikhil Navtascharaman Dashatah, Oordhavatriyagyabhyam)

Unit III Concepts of Agricultural, Textile, Mechanical and Aeronautical Engg. in Vedic literature

Unit IV Concepts of Chemical, Civil, Architectural and Earth Science Engg. In Vedic Literature

Unit V Concepts of Electrical, Electronics and Computer Engg. In Vedic literature

Prerequisite: Nil

References:

1 Mehta D.D., Positive Sciences in the Vedas, Arnold Heinemann Publishers, Delhi 1994
2 Acarya Vaidyanath Sshastri, Sciences in the Vedas, Sarvdeshik Arya Pratinidhi Sabha, Ramlila Ground, Ansari road, Delhi
3 Hansaraj, Sciences in the Vedas, Shakti Publications, Ludhiana
4 Geal,B.N., The positive Science of the ancient Hindus, Motilal Banarasi Das, New Delhi
5 Kulkarni R.P.,Geometry according to Sulba Sutra, Sansodhan Mandal Pune 1989
6 Swamisri BharatiKrishna Teeratha ji, Vedic Mathematics, Motilal Banarasidas,Delhi
7 Dr. Roop Kishore Shastri, Dharm Darshan Sanskrity
8 Kshemkaran Vedalankar ,Vedic Bhasya

MM 100 *Sessional 30*
Time 3 Hrs *Theory 70*
L T P *Pass Marks 40*
3 1 0

ECH101/ ECH201
Engineering Chemistry

Objective: To acquaint students with fundamental concepts of Chemistry and to provide information about various application of it in human life in the form of Fuels, Lubricants and water treatment etc.

NOTE : **Ten** questions are to be set taking two questions from each unit. The student has to attempt **FIVE** questions selecting ***one question from each unit***. The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **Chemical Bonding & Periodic properties:** Hybridization & shape of molecules involving s, p & d orbitals, partial ionic character dipole moment and its application, H-bond and Vander Waals forces. M.O Theory & its application to di atomic molecules of 1^{st} & 2^{nd} period elements, lattice energy and born haber cycle.

Atomic radii, ionization potential, electro negativity, electropositive, electronaffinity & their Periodicity.

Solid State and Phase rule: Elements of Symmetry, space lattice and unit cells (for cubic systems only). Types of crystals (Covalent molecular, ionic and metallic).Phase, component and degree of freedom. Applications of phase rule to one component systems (H_2O and S) and two component systems (KI-H_2O system).

Unit II **Chemical Kinetics & Photochemistry :** Rate, specific rate, molecularity and order of reactions. Pseudo order reactions. Zero and first order reaction. Determination of order, factors influencing rate, rate constant and order, effect of temperature, Arrhenius equation.

Laws of Photochemistry, Quantum yield, Fluorescence, Phosphorescence Chemiluminescence.

Surface Chemistry: Homo and Heterogeneous catalysis and its industrial applications, adsorption of gases on solids, Freundlich adsorption isotherm.

Unit III **Lubricants:** Principle of lubricants, Types, Lubricanting oil, Fraction of crude oil, de-waxing of oil fraction, acid and solvent, refining of lubricating oils, Properties of refined oils (Viscosity, viscosity index, acid value, saponification value, iodine value, pour point, and cloud point, flash point, fire point, slide oxidization number, specific gravity) and their determination, Lubricating greases (semi solids) and their penetration and drop point tests, solid lubricants

Corrosion: Definition and type of corrosion, law of oxide film, growth,

Different theory of corrosion, Atmospheric corrosion, stress corrosion, soil corrosion

Unit IV **Water and Water analysis**: Specification of water, Analysis of water alkalinity,

hardness (ETDA method only) of water for domestic use, Water softening-Soda-Lime Process, Ion exchanger (Cation and Anion Exchanger), Numerical problems on Alkalinity , hardness.
Turbidity, Conductance, Solids (filterable, nonfilterable, fixed and volatile) pH, B.O.D., C.O.D., D.O.
Environmental Chemistry: Water pollution, Pollution sources of water, effect of water pollution, air pollution, sources, important air pollutants and their effects. Industrial pollution: Pollutant and their effect, noise, radiation, thermal and agricultural pollution.

Unit V

Fuels: Definition and classification, Combustion and chemical principles involved in it. Calorific value, gross and net calorific value and their determination by Bomb calorimeter.
Solid Fuels: Coke-it's production by Otto Holfmann oven and uses.
Liquid Fuels: Conversion of coal into liquid fuels, Petroleum –it's chemical composition and fractional distillation, Cracking (Thermal and catalytic) , Knocking and antiknocking agent, Octane and cetane number.
Gaseous Fuels: Natural gas, Producer gas, water gas, Carburetted water gas, Coal gas, and oil gas.
Nuclear Fuels: Nuclear reactions, Nuclear fission and fusion, Nuclear reactor
Polymers, Plastics and Rubbers: Basic concept and terminology such as monomerse, polymers, functionality, thermoplastic, thermosetting plastic, linear, branched cross linked polymers etc. Different definition of molecular weights, industrial application of polymers, addition, condensation and ionic polymerizations.

References:

1. Puri & Sharma(38/e), Principles of Physical Chemistry, Shobhan Lal Nagin Chand & Co. , Jalandhar, 2001
2. Bahal & Tuli(24/e), Principles of Physical Chemistry, SChand, New Delhi, 2000
3. Samuel Glastone, Principles of Physical Chemistry
4. S.S.Dara(9/e), Engineering Chemistry, SChand, New Delhi,2001
5. S.K.Jain(13/e), Engineering Chemistry, Dhanpat Rai, 1999
6. S.S.Dara(3/e), Pollution Control & Environmental Science, SChand, New Delhi,

2 0 0 0

MM 100 *Sessional 30*
Time 3 Hrs *Theory 70*
L T P *Pass Marks 40*
3 1 0

EEE101
Fundamentals of Electrical Engineering

Objective: To acquaint students with fundamental concepts in Electrical Engineering and make them able to use these in later courses of Electronics engineering.

NOTE : Ten questions are to be set taking two questions from each unit. The student has to attempt **FIVE** questions selecting ***one question from each unit***. The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **Electrical Circuits**:
Kirchoff's Laws, Network Theorems (Thevenen, Norton, superposition, maximum power transfer), Sinusoidal voltage and currents average and rms value, form and peak factor. Phase or representation in different forms, concept of impedance , mesh and nodal analysis of D.C. and A.C. circuits, series and parallel resonance, introduction to balanced three phase circuits. Fourier series, analysis of simple circuits with non-sinusoidal excitation.

Unit II **Magnetic circuits:**
Ampere turns, magnetomotive force, permeability reluctance, composite magnetic circuits, comparison between magnetic and electric circuits. Single phase transformers-principle of working, constructional details, equivalent circuit, open circuit and closed circuit tests, losses regulation and efficiency.

Unit III **DC Machines**:
Generators and motors, production of voltage and torque, characteristics of dc generators and motors, speed control of dc shunt motors, application of dc generators and motors.

Unit IV **Induction motors:**
Principle of working, starting, torque-slip curve and applications of three phase induction motors, introduction to single phase induction motors, stepper motors, principles and applications.

Unit V **Electrical Instruments**:
Principle of working and constructional features of permanent magnet moving coil and moving iron ammeters and voltmeters, electrodynamic wattmeter, induction type single phase energy meter.

Prerequisite: Fundamental Knowledge of Physics up to +2 level.

References:

1 Deltro(2/e), Basic Electrical Engineering, PHI, New Delhi, 2001
2 W.H.Hayt, Engineering Circuit Analysis, TMH, New Delhi, 2001
3 Nagrath I.J., Basic Electrical Engineering , TMH, New Delhi, 20001
4 E.Huges, Electrical Technology
5 Cotton, Electrical Technology
6 P.Mukhopadhyay, A.K.Pant D.S.Chitore, and Vinod kumar, Elements of Electrical science

L T P
3 1 0

Pass Marks 40

EPH 101
Engineering Physics I

Objective: To acquaint students with fundamental concepts of Physics useful for engineering students.

NOTE : Ten questions are to be set taking two questions from each unit. The student has to attempt **FIVE** questions selecting ***one question from each unit***. The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **Thermodynamics:** First law of thermodynamics and its consequences, second law of thermodynamics, Reversible and irreversible processes, Carnot's theorem, Entropy, Conduction of heat, Conductivity of bad conductors, Maxwell-boltzmann statistics and its application, Bose-Einstein and Fermi-Dirac statistics (elementary idea only, no derivation).

Unit II **Optics I: Interference**: Interference of light, Coherence, Fresnel's Biprism, Interference in thin films & wedge shaped film, Newton's ring, Michelson interferometer.

Diffraction: Diffraction at single slit & Double slits, Plane diffraction grating, Resolving power of Telescope

Unit III **Optics-II Polarization:** Brewester's Law, Malus law, Double refraction, Nicol Prism, production and analysis of polarized light, Optical activity, Specific rotation, Lorantz Half Shade Polarimeter.

Laser: Spontaneous and stimulated emission of radiation, population inversion, Einstein's A and B coefficients, He-Ne laser.

Unit IV **Electromagnetics**: Gauss' law and its applications. Maxwell's equations, pointing theorem, electromagnetic wave equation. (elementary idea only, no derivation).

Magnetic induction, Magnetic field intensity, Magnetic permeability and susceptibility, Dia, Para, & ferromagnetic materials (Qualitative idea only) Langevins' theory of dia & paramagnetism, Hysteresis

Unit V **Motion of charged particles:** Field due to moving charge, Ampere's law, Magnetic force due to current carrying conductor, Motion of charged particle in electric and Magnetic field, Magnetic and electrostatic focusing, Function and block diagram of CRO, Mass spectrometer, Cyclotron.

Prerequisite: None

References:

1 Vasudeva AS ,Modern Engineering Physics SChand, New Delhi, 1998.
2 Ghatak Ajoy, Optics, TMH, New Delhi, 1999.
3 Satya Prakash, Optics, Ratan, New Delhi, 1999
4 Brijlal & Subramanayam, Text Books of optics SChand, New Delhi,2000.
5 Subramanyam N and Brij Lal(20/e), Text Book of Optics, SChand, New Delhi:, 2001
6 Brij Lal and Subramanyam N,(20/e) ,Heat and Thermodynamics, SChand, New Delhi, 2001.
7 O.P.Sinha, Text book of Electricity & Magnetism
8 Arthur Kip, Electricity & Magnetism
9 K.K.Tiwari, Text book of Electricity and Magnetism, S.Chand, New Delhi, 2001

ECS102
Introduction to Computers

Objective: To provide a base for computer literacy.

Note: **Ten** questions are to be set taking two questions from each unit. The student has to attempt **FIVE** questions selecting ***one question from each unit***. The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **Computer Basics:** A simple model of a computer, Characteristics of a computer, Input and output units of a Computer.

Unit II **Computer Memory:** Primary Memory, Secondary Memory: Magnetic Hard Disk, Floppy Disk, CDROM and Magnetic tape.

Unit III **Number System:** Decimal, Binary, Octal, and Hexadecimal numbers and their arithmetic (addition, subtraction, multiplication, and division): 1's and 2's complements.

Unit IV **Concept of Computing,** contempory OSs such as DOS, Window, MAC-OS , UNIX (only brief user level description); Files & Directories and their use in different operating system environments
Introduction to the typesetting softwares such as Microsoft office.

Unit V **Introduction to Internet:** Getting familiar with Browser programme netscape & explorer, Sending and receiving mail over Internet, Introduction to PINE and/ or ELM

References:

1 Rajaraman V.(3/e), Fundamental of Computers, PHI, New Delhi, 1999
2 Sanders,D.H., Computers Today, Mcgraw Hill, 1998
3 Kris Jamsa, DOS the complete reference, Tata McGraw Hill
4 J.Peek Tim O'reilly & M.Locekides, UNIX POWER TOOLS, BPB Publication

MM 100 *Sessional 30*
Time 3 Hrs *Theory 70*
L T P *Pass Marks 40*
3 1 0

EMA 101
Engineering Mathematics I

Objective: To provide essential Mathematical tools of Calculus to Engineering Students.

NOTE : Ten questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit***. The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **Differential Calculus**: Successive differentiation, Leibnitz theorem, taylor's & Maclaurin's Expansion, Indeterminate forms, Radius of curvature, Asymptotes, Double points and their classification, Tracing of curves.

Unit II **Partial Differentiation**: Normal to surfaces and tangent plane, Partial Differentiation of functions, Truncation errors, Change of variables, Chain rule, Jacobian , Extrema of function of two and more variables, Method of Lagrange's multipliers.

Unit III **Integral Calculus**: Fundamental Theorem of integral calculus, Differentiation under the integral sign, Double and triple integrals, Change of order of integration, change of variables. Application to arc length, area , volume, centroid and moment of inertia. Gamma and Beta functions, Dirichlet's integral

Unit IV **Differential Equation I**: Review of solution of First order differential equations, orthogonal trajectories, linear differential equations with constant coefficients, Euler- Cauchy equations, Equations of the form y''= f(y).

Unit V **Differential Equation II**: Solution of second order differential equations by change of dependent and independent variables, Method of variation of parameters for second order differential equations. Simple applications.

Prerequisite: Adequate knowledge of Mathematics of 10+2 level

References:

1 Prasad C., A first course in mathematics for Engineers, Prasad Mudranalaya
2 Kreyszig E., Advanced Engineering Mathematics, John Wiley, New York, 1999
3 Grewal B.S., Higher Engineering Mathematics, Khanna, New Delhi, 2000
4 Gorakh Prasad, Differential Calculus, Pothishala, Allahabad, 1997
5 Gorakh Prasad , Integral calculus, Pothishala, Allahabad,1997
6 Piaggio H.T.H., Differential Equations, CBS, New Delhi, 2000
7 Shanti Narayan, Differential Calculus, Shyamlal, New Delhi,1999
8 Srivastava R.S.L., Engineering Mathematics Vol.I

L T P *Pass Marks 20*
2 0 0

EHU 103/ EHU 203
Technical Communication & English

Objective: To provide a base for technical communication.

NOTE : Ten questions are to be set taking two questions from each unit. The student has to attempt **FIVE** questions selecting ***one question from each unit***. The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I Study of Selected literacy texts:

Group A		Group B	
Science & Human Life	J.B.S. Haldane	Of Studies	Bacon
The Heritage of India	A.L.Basham	The civilization of today	C.E.M. Joad
Water	C.V.Raman	Making Writing Simple	J.B. Priestley

Process of communication; Technical Written communication, Nature, origin and development of technical written communication, Salient features, Difference between technical writing and general writing.

Unit II **Common Errors:**

(I) Articles (II) Prepositions (III) Tenses (IV) Word order (V) Adjectival degrees (VI) Conjunction (VII) Subject Verb agreement

(Note: The question shall have ten sentences. The students shall attempt all the ten with minimum changes. One sentence will have only one error.)

Spoken English:

(1) Phonetic transcription of common English words
(Five words to be attempted out of eight)

(2) Primary stress placement on words
(10 words to be given, No choice, half a mark for each word)

Unit III Prerequisite of Scientific and Technical Communication; Fragmented sentences, Parallel construction, element of a series, squinting construction and split infinitive, Modifiers, connectives, antecedents and clause subordination, Dangling participles, gerunds and infinitives, Ellipsis, Coherence, Unity, chronological method, spatial method, inductive method, Linear method, deductive method, interrupted method.

Unit IV Business Correspondence: General principles of business correspondence, Ramification of business letters, Letters giving instructions, inquiries and answers to enquiry's, complaints and adjustments, letters urging action, employment letters, applications and resume

Unit V Proposal Writing: Proposal: Definition and kinds; Division of formal proposals (front matter, title page, summary/ abstract, table of contents); Statement of request, body statement of problem, background, scope, methodology, advantages and disadvantages; Writing of Scientific and Semi technical articles.

References:

1 An Anthology of English Essays — R.P.Singh (Oxford University Press)
2 Modern Technical Writing — Sherman, Theodore A.(New Jersy)
3 Essentials of Grammar and Composition — Legget, Glenn (Macmillan)
4 The elements of Style — Strunk Jr. (Macmillan)
5 A Text book of Scientific and Technical writing — Sharma S.D.(Vikas)
6 English Pronouncing Dictionary — Daniel Jones
7 Technical Writing Process and Product — Sharon J.Gerson, Steven M.Gerson
8 Business Correspondence and Report writing — R.C.Sharma, Krishna Mohan

Time 3 Hrs *Viva Voce 35*
L T P *Pass Marks 25*
0 0 3

EME 151
Engineering Graphics I

Objective: To acquaint students with fundamental concepts in Engineering Graphics to develop the power of imagination leading to understanding of Detailed machine drawings. Also aimed to demonstrate use of Computers in the field of Graphics.

Graphics as a tool to communicate ideas, Lettering and dimensioning, Construction of geometrical figures.

Orthographic Projection: Principles of Orthographic projections, Principle and auxiliary planes, First and Third angle projections. Projections of points, Pictorial view, Projection of lines parallel to both the planes, parallel to one and inclined to other, inclined to both the planes, true length and traces of a line, Projection of planes, traces of planes, angles of inclinations of planes, parallel planes, Projection of solid in simple position, axis or slant edge inclined to one and parallel to other plane, solids lying on a face, Section of solids lying in various positions, true shape of the section, development of lateral surfaces.

Isometric Projection: Principle of isometric projection, Isometric projection using box and offset methods.

Computer aided drawing: Basic Concepts and application

Prerequisites: None

References:

1 N.D.Bhatt & V.M. Panchal (42/e), Engineering Drawing, Charotar, Anand, 2000
2 P.S.Gill(1/e), Engineering Graphics and Drafting, S.K. Kataria , New Delhi , 2001
3 Chandra & Chandra, Engineering Graphics, Narosa, New Delhi, 1999

MM 50
Time 2 Hrs
L T P
0 0 2

Sessional 15
Practical 35
Pass Marks 25

ECH151/ ECH251
Engineering Chemistry Lab

List of Practical

1. Find out surface tension/ viscosity of given liquid by Stalagmometer/ viscometer.
2. Find out percentage composition of Ethanol water mixture by Stalagmometer/ viscometer.
3. Find out critical solution temperature of water phenol system.
4. Determine the refractive index of given liquid by using Abbe's refractrometer.
5. Determine the angle of rotation by polarimeter.
6. Find out pH value / normality of given acid by pH meter.
7. Find out cell constant / normality of given acid/ base solution by conductivity meter.
8. Determine the turbidity of given solution / water sample by turbidity meter.
9. Determine the Na^+ and K^+ concentration using flame photometer.
10. Separate components of ink by column/T.L.C./Paper chromatography.
11. Determination of acid value, iodine value, saponoication value and specific gravity of oil.
12. Determination strength of Oxalic acid/ Mohr salt by $KMnO_4$/ $K_2Cr_2O_7$.
13. Determination of D.O. by Wrinkler's Method.
14. Determination of total, temporary and permenant hardness of water by EDTA.
15. Determination of the available chlorine in bleaching powder and to find out the chlorine demand in the given water sample.

MM 50 *Sessional 15*
Time 2 Hrs *Practical 35*
L T P *Pass Marks 25*
0 0 2

EPH151
Engineering Physics Lab I

List of Practical

1. To determine the surface tension of liquids by Jaeger's method.
2. To determine the coefficient of viscosity of liquid by Poiseuille's method.
3. To determine the value of mechanical equivalent of heat by Callendar and Barne's method.
4. To determine the thermal conductivity of a bad conductor by Lee's method.
5. To determine the value of Stefan's constant.
6. To determine the focal points, principal points, and focal length of a combination of lenses by Newton's method and its verification.
7. To determine the focal length of a combination of lenses by Nodal method and to locate the position of cardinal points.
8. To determine the dispersive power of the material of the given prism.
9. To determine the wavelength of spectral lines by plane transmission grating.
10. To determine the wavelength of monochromatic light with the help of Newton's ring method.
11. To determine the wavelength of monochromatic light with the help of Fresnel's Biprism.
12. To determine the specific rotation of cane sugar solution by Polarimeter.
13. To determine the resolving power of a telescope.
14. To study the variation of magnetic field along the axis of the current carrying coil and then to estimate the radius of the coil.
15. Calibration of Ammeter and Voltmeter by Potentiometer.
16. To determine resistance per unit length of a C.F. bridge wire and
    (i) To determine the specific resistance of the material of the given wire using C.F.bridge.
    (ii) To prepare one ohm coil.
17. To study the Hysteresis curve.

Note: (i) Addition or deletion in the above list may be made by laboratory in-charge with the approval of the Head of the Department / Principal in accordance with the facility available.

(ii) In practical examination the students shall be required to perform two experiments.

MM 50 *Sessional 15*
Time 2 Hrs *Practical 35*
L T P *Pass Marks 25*
0 0 2

EEE151
Basic Electrical Lab

List of Practical

1 Verification of network theorems.
Kirchoff's laws, Maximum power transfer theorem, Superposition theorem.
2 Study of Diode and transistor characteristics.
3 To study a half wave and full wave rectifier circuit with and without capacitor and filter and determine the ripple factor.
4 Measurement of power in three-phase circuit by two-wattmeter method.
5 Determination of efficiency of a single phase Xmer by load test.
6 Determination of parameters and losses in a single phase Xmer by OC and SC test.
7 DC generators characteristics.
(a) Shunt Generator
(b) Series Generator
(c) Compound Generator
8 Speed control of DC shunt motor.
9 Study running and reversing of a three-phase induction motor.
10 Study of a single-phase energy meter.
11 To study the various logic gates

MM 100 *Sessional 30*
Time 3 Hrs *Theory 70*
L T P *Pass Marks 40*
3 1 0

EEC 201
Basic Electronics

Objective: To acquaint students with fundamental concepts in Electronics prepare them for their effective uses in advanced courses.

NOTE : Ten questions are to be set taking two questions from each unit. The student has to attempt **FIVE** questions selecting ***one question from each unit***. The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I Conduction in semiconductors, Conductivity of a semiconductor, donor and acceptor, impurities, charge densities in a semiconductor, Fermi level in semiconductor having impurities, Diffusion, The continuity equation, Semiconductor diode characteristics, p-n junction as a diode, diode equation and its resistance and capacitance, Zener diode

Unit II Transistor Characteristics: the junction transistor, Common base, common emitter and common collector configurations and their various properties, Transistor Biasing and thermal stabilities, operating point, bias stability, various bias circuits to fix the operating point, compensation techniques

Unit III Small signal low frequency transistor models, two port devices and hybrid models of transistor analysis of transistor ampilifier circuits, using h- parameters.
Feedback amplifiers and oscillators, Feedback concept in amplifiers, effect of negative feedback on output, input resistance, and band width of an amplifier, Barkhausen criteria.
Oscillators, conditions of oscillations and various oscillator circuits

Unit IV Large signal amplifiers: Class A, Class B, Class C types, transformer coupled power amplified and push pull amplified class B type.

Unit V Rectifiers and power supplies, Half wave and full wave rectifiers, bridge rectifier, ripple factor, Various measuring equipments, C.R.O. and Multimeters.

Prerequisite: Basic Knowledge of Physics up to +2 level.

References:

1 Millman J. and Halkins C.C., Electronic Devices and Circuits, McGraw Hill,1976
2 Boylstad and Neshalky, (6/e), Electronic Devices and Circuits Theory, PHI, New Delhi, 2000
3 Schilling D.L.and Belove C., Electronic Circuits, McGraw Hill

MM 100 *Sessional 30*
Time 3 Hrs *Theory 70*
L T P *Pass Marks 40*
3 1 0

EPH-201
ENGINEERING PHYSICS – II

Objective: To familiarize students with the basic principles of Quantum Mechanics and then apply them to areas such as atomic spectra, Laser, Solid state Physics.

NOTE : **Ten** questions are to be set taking two questions from each unit. The student has to attempt **FIVE** questions selecting ***one question from each unit***. The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **Special theory of Relativity**

Michelson-Morlay experiment, Inertial & non-inertial frames of reference,Postulates of special theory of relativity, Galilean transformation, Lorentz tranformation equation of space and time, length contraction, time dilation, Addition of velocity, Mass energy equivalence.

Quantam Theory : Quantam theory of radiations, Black body spectrum, Planck's law of radiation, Derivation of Wien's law and Rayliegh Jean's law from Planck's law, Photoelectric effect, de-Broglie concept of matter waves, Davisson and Germer experiment, Heisenberg uncertainty principle and its applications, Schroedinger wave equation and its solution for a particle in box.

Unit II **Atomic Models, X-rays**

Rutherford atomic model, Bohr's atomic model and energy level diagram, Vector atom model, Franck-Hertz experiment, Quantum numbers, Production and properties of X-ray absorption, characteristics of X-ray spectra, Moseley law.

Unit III **Nuclear Physics**

Radioactivity, nature of nuclear radiations, law of radioactive disintegration, half life period and mean life time, structure of nucleus, general properties of nucleus, mass defect and packing fraction, nuclear binding energy, semi-empirical mass formula.

Unit IV **Solid State Physics**

Crystal structure, miller indices, separation between lattice planes, different kind of crystal bonding, diffraction of X-rays, Bragg's law & Study of crystal structure by Bragg's spectrometer, formation of energy bands in solids (energy level approach), classification of solids, basic idea of conduction mechanism in semiconducters, fermi energy and origin of band gap (no derivation), Hall effect.

Unit V **Electronics**

Intrinsic and extrinsic semiconductors, characteristics of p-n junction and Zener diode, Diode as rectifier, transistor (NPN and PNP) characteristics, transistor amplifier, current and voltage gain, number systems and logic gates, binary to decimal conversion and vice versa, De-morgan's theorem, Boolean algebra.

Prerequisite: EPH101

References:

1 Rajam JB., Atomic Physics, SChand, New Delhi:, 2000.
2 Theraja BL ,Basic Electronics Solid State, SChand, New Delhi:,2000
3 Beiser Arthur, Concepts of Modern Physics, TMH New Delhi:,1999
4 Mani HS, Modern Physics, New Delhi, 1999
5 Kittel Charles (7/e) Introduction to Solid State Physics, John Wiley, Singapore, 1996
6 Murugeshan R(8/e), Modern Physics SChand, New Delhi, 2001
7 Kalpan Irving , Nuclear Physics, Narosa, New Delhi, 1998
8 Schiff(3/e), Quantum Mechanics, McGraw, Auckland
9 P.W.Anderson, Elements of Quantum Mechanics

MM 100 *Sessional 30*
Time 3 Hrs *Theory 70*
L T P *Pass Marks 40*
3 1 0

EME 101/ EME 201
Fundamentals of Mechanical Engineering

Objective: To acquaint students with fundamental concepts in Mechanical Engineering as fundamental course. This includes knowledge about thermal Science and Engineering Mechanics.

NOTE : **Ten** questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit***. The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **Thermodynamics:** Introduction to SI units, Definition of thermodynamic system, Surrounding and Universe, Quasi static process, Energy interaction
Zeroth law, Concept of temperature First law of thermodynamics, Application to closed and open system, Concept of Enthalpy, steady flow energy equation, Throttling process.

Unit II **Thermodynamics:** Second law, reversible and irreversible process, Thermal reservoir, heat engines and thermal efficiency, COP of heat pump and refrigerator, Carnot cycle, Clausius inequality, Concept of entropy, Entropy change for ideal gases.

Unit III **Thermodynamics:** Generation of steam at constant pressure, Properties of steam, Use of property diagram, Process of vapor in closed and open system, Rankine cycle.
Stroke clearance ratio, Compression ratio, Definition and calculation of mean effective pressure (no proof) for air standard cycles (Otto and diesel cycles)

Unit IV **Mechanics:**
Trusses: Plane structure, (Method of Joints and Sections only)
Beams: Bending moment and shear force diagram for statically determinate beams.

Unit V **Strength of Materials:** Simple stresses and strain, strain energy, stress- strain diagram, elastic constants.
Compound stress and strain: state of stress at a point, Simple tension, pure shear, general two dimensional stress system, principal planes, principal stresses and strains, Mohr's stress circle, Poisson's ratio, maximum shear stress

Prerequisite: Fundamental Knowledge of physics up to 10+2 level

Reference:

1 Kumar DS (2/e), Thermal Science and Engineering, S.K.Kataria, New Delhi,2001
2 P.K.Nag (2/e), Engineering Thermodynamics, TMH, New Delhi,2001
3 R.Yadav(7/e), Thermal Engineering, Central Publishing House, Allahabad, 2000
4 Shames Irving H.(4/e), Engineering Mechanics, PHI, New Delhi, 1994
5 Hibler (1/e), Statics and Dynamics, Pearson Education, Singapore, 2000
6 Pytel & Singer (1/e), Strength of Materials, Addison Wesley, 1999
7 Egor P. Popov(2/e), Strength of Material, Pearson Education, Singapore,2001

MM 100 *Sessional 30*
Time 3 Hrs *Theory 70*
L T P *Pass Marks 40*
3 1 0

ECS 202
Programming in C

Objective: To introduce the students to the basics of programming with the help of C language.

NOTE : **Ten** questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit***. The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **Programming Language**: Classification machine code, assembly language, higher level language, fourth generation languages. Importance of C; Basic structure of C programs

Constants, Variables and Data Types: Character set, Keyword and identifiers, constants, data types variables its declaration and assignment, defining symbolic constants.

Unit II **Operators and Expressions**: Arithmetic, Relation, Logical, assignment, Increment and Decrement, Conditional, Comma, Size of operators, Arithmetic Expression and evaluation, Type Conversion, Operator precedence.

Input and Output operation: Reading a character, Writing a character, formatted input, formatted output

Unit III **Decision Making and Branching and Looping:** IF Statement, IF ELSE Statement, Nesting of IF ELSE, SWITCH Statement, GOTO Statement, WHILE Statement, DO Statement, FOR Statement.

Arrays: One-dimensional arrays: declaration, initialization and application. Two-dimensional array: declaration, initialization and application, Multidimensional arrays.

Unit IV **Handling of Character Strings:** Declaring and initializing string variables, Reading strings, Writing strings, Arithmetic operation on strings, comparison of two strings and string handling functions. **Structures:** Structures definition, giving value to members, structure initialization, array of structures, array within structures, structures within structures, structures and functions. **User Defined Functions:** Need for user defined function, Return value and its type, function calls, No argument and No return values function, Argument and No return values functions, argument and return value functions. Handling of non integer function, Recursive, Scope and life time of variable in functions.

Unit V **Pointers**: Accessing the address of the variable, Declaring and initializing pointers, accessing a variable through its pointer expression, pointer increment and scale factor, pointers and array, pointers and character strings. **Preprocessor:** Introduction, Macro Substitution, File inclusion. **File Management in C:** Defining and opening a file, Closing a file, Input/ operation on files, error handling during I/O Operation.

Prerequisites: ECS102

References:

1 Byron S.Gottfried , Programming with "C", TMH, New Delhi, 1997
2 Kerighan and Ritchie (2/e),The C Programming language, PHI, New Delhi, 2000

3 E.Balagurusamy , Programming in ANSI C,TMH

MM 50 ***Sessional 15***
Time 2 Hrs ***Theory 35***
L T P ***Pass Marks 20***
2 0 0

EME 102/ EME 202
Basic Manufacturing Process

Objective: To acquaint students with fundamental manufacturing concepts and to make them understand the utility of this subject as a core course for Engineering graduates.

NOTE : **Ten** questions are to be set taking two questions from each unit. The student has to attempt **FIVE** questions selecting ***one question from each unit***. The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I Classification of Manufacturing Process, Composition , Properties and uses of wrought iron , cast iron, Malleable iron ,Carbon and alloy steels, Copper, Aluminum, lead, brass, bronze, duralumin, bearing metals, high temperature metals , Properties of metals: Strength , Elasticity , Stiffness , Plasticity, Malleability , Ductility, Brittleness, Toughness, Hardness, Impact Strength, Fatigue.

Unit II **Metal Casting** : Scope of moulding, moulding sands, Principles of metal casting, pattern materials, types and allowances: classification of moulds, roles of gate, runner and riser, core, core box, and core print. Introduction of dicasting, permanent mould casting, investment casting, casting defects.

Unit III **Metal Joining**: Welding Principles, Classification of welding techniques, oxy-acetylene gas welding, Arc welding, submerged and atomic hydrogen arc welding, Electric resistance welding, Spot, Seam, Butt welding, Flux: composition, properties and function,
Brazing and soldering, types of joints

Unit IV **Machine Shop and Metal Cutting**: Brief description of Lathe, drilling, shaping, planning, milling machines, Cutting tools used and their materials and geometry. Introduction to CNC machines.

Unit V **Metal forming**: Hot and Cold working principles, forging operations, Press forging

Prerequisite: None

Reference:

1 Hazra and Chowdhary (11/e), Workshop Technology (Vol 1 and 2), Media, Mumbai, 2000
2 B.S.Raghuvanshi (9/e),Workshop Technology (Vol 1 and 2), Dhanapat Rai, Delhi, 2001 3
Lindeberg Ray A, (4/e), Process & Materials of Manufacturing, PHI, New Delhi, 1995
4 Degarmo, Materials and Processes in Manufacturing, PHI, New Delhi, 2000
5 Begmen , Manufacturing Processes

MM 100 *Sessional 30*
Time 3 Hrs *Theory 70*
L T P *Pass Marks 40*
3 1 0

EMA 201
Engineering Mathematics II

Objective: To provide essential Mathematical tools of three Dimensional Geometry, Vector Spaces and Infinite series to Engineering Students.

NOTE : Ten questions are to be set taking two questions from each unit. The student has to attempt **FIVE** questions selecting ***one question from each unit***. The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **Three Dimensional Gemetry**: Equation of plane, Straight line, Intersection of planes(two and three palnes), Equation of sphere, cylinder, cone, and central conicoids and their simple properties (as far as possible vectors may be used).

Unit II **Vector Spaces and Matrices I**: Definition and elementary properties of vector spaces, Linear dependence and linear independence, bases, subspaces, elementary row/ column operations, Rank of a matrix and its applications.

Unit III **Vector Spaces and Matrices II**: Eigen-values and Eign vectors, Cayley-Hamilton theorem, Diagonalisation of Matrices, Reduction to diagonal form, Reduction of quadratic form to canonical form, Orthogonal, Hermitian, Skew-Hermitian, and Normal matrices.

Unit IV **Solution in Series**: solution in series of second order linear differential equations with polynomial coefficients, Bessel's and Legendre's equations and their solutions, Properties of Bessel function and Legendre's polynomials, Recurrence relations, Generating functions, Jacobi series, Integral representation of Bessel's functions.

Unit V **Convergence of Series**: Ratio, Integral, comparison, Root, Raabe's, Logarithmic, Demorgan, Bertrand and Leibnitz's tests, Absolute and uniform convergence (Weirstrass', Abel and Dirichlet- Abel test). Continuity, Differentiation and Integration of infinite series.

Prerequisite: Adequate knowledge of Mathematics of 10+2 level.

References:

1 Grewal B.S., Higher Engineering Mathematics, Khanna, New Delhi, 2000
2 Kreyszig E., Advanced Engineering Mathematics, John Wiley, New York, 1999
3 Prasad C., Mathematics for Engineers
4 Prasad C.,Advanced Mathematics for Engineers
5 Shanti Narayan , Text Book of Matrices
6 Thomas and Finney, Calculus & Analytical Geometry, Addison Wesley, New York 1998
7 Ayres F, Vector Analysis

MM 50 *Sessional 15*
Time 3 Hrs *Viva Voce35*
L T P *Pass Marks 25*
0 0 3

EME 251
Engineering Graphics II

Objective: To apply the concepts of graphics for understanding of machine parts.

1 Introduction: Graphic language, classification of drawings, Principles of Drawing: IS codes for machine drawing
2 Orthogonal Projections: Drawing and sketching of machine element in orthographic projections, Spacing of views
3 Screwed fastners: Introduction, screw thread nomenclature, Forms of threads, Representation of threads, Bolted joints, Locking arrangements for nuts, Foundation bolts.
4 Keys and cotters: Keys, cotter joints
5 Shaft Coupling: Rigid and flexible coupling.
6 Riveted Joints: Rivets and riveting, Rivet heads, classification of riveted joints
7 Conventional Representation: Representation and identification of common machine elements and features. Materials specification
8 Blue print reading
9 Assembly Drawing: Simple machine assembly, 2 examples
10 Computer aided drawing: Drawing of various views and Isometric views

Prerequisites: EME151

References:

1 N.Siddeshwar, P.Kannaiah, V.V.S. Shastry, Machine Drawing, TMH, New Delhi, 2001
2 K.L.Narayana, P.Kannaiah, K.Venkat Reddy, Machine Drawing, New Age, New Delhi, 1999

MM 50 *Sessional 15*
Time 2 Hrs *Practical 35*
L T P *Pass Marks 25*
0 0 2

EPH 251
Engineering Physics lab II

List of Practical

1. To determine the mechanical equivalent of heat by Joule's calorimeter.
2. To determine ECE of Cu using Tangent / Helmholtz galvanometer and reduction factor of the Tangent / Helmholtz galvanometer.
3. To study the series and parallel LCR resonant circuits.
4. To determine the Ultrasonic velocity in liquid.
5. To determine the e/m by magnetron method.
6. To determine the Susceptibility measurement by Quink's method.
7. To study the characteristics of a photocell.
8. To determine the value of Planck's constant by photoelectric effect.
9. To study the Energy band gap.
10. To study the Hall effect.
11. To study the characteristics of PN junction and Zener diode.
12. To study the half wave and fullwave rectifier.
13. To study the regulated power supply.
14. To study the Transistor (PNP and NPN) characteristics.
15. To study the single stage RC coupled amplifier (with and without feedback).
16. To study the nature of polarization of laser light and to verify Malus law.
17. To determine the wavelength of laser light.

Note: (i) Addition or deletion in the above list may be made by laboratory in-charge with the approval of the Head of the Department / Principal in accordance with the facility available.

(ii) In practical examination the students shall be required to perform two experiments.

MM 50
Time 2 Hrs
L T P
0 0 2

Sessional 15
Practical 35
Pass Marks 25

ECS252
Basic Computer Lab

List of Practicals

1. Practice of all internal and external DOS commands.
2. Write simple batch programme.
3. Giving exposure to Windows environment.
4. File and program management in windows.
5. Practice of all UNIX commands.
6. Write simple shell script
7. Introduction to text editing and word processing.
8. Exposure to advance features supported by some editors.
9. Write small program using C language like
   a. Roots of quadratic and cubic equations
   b. Summation of N natural numbers
   c. Arranging numbers in ascending and descending orders
   d. Separation of odd and even numbers etc.

Note: List may be modified according to new software available.

MM 50 *Sessional 15*
Time 2 Hrs *Practical 35*
L T P *Pass Marks 25*
0 0 2

EME 152/ EME 252
Mechanical Workshop

List of Practical

Carpentry Shop

1 To prepare a half T joint of given dimensions.

2 To prepare a square pulley of given dimensions.

Moulding Shop

3 To prepare a mould of half bearing.

4 To prepare a mould using core.

Metal Joining.

5 To prepare a butt joint of MS strips using Arc welding.

6 To prepare a T joint of MS strips using Oxy Acetylene gas welding.

Fitting Shop

7 To prepare a rectangular piece with slant edge of given size from MS flat.

Machine Shop

8 To prepare a job on Lathe machine of given shape and size.

9 To prepare a job on Shaper machine of given shape and size.

10 To prepare a job on Milling machine of given shape and size.

11 To prepare a job on CNC train master of given shape and size.

MM 100 *Sessional 30*
Time 3 Hrs *Theory 70*
L T P *Pass Marks 40*
3 1 0

EMA301
Engineering Mathematics III

Objective: To provide essential Mathematical tools of Fourier Series, Integral Transforms, Discrete Transforms, Vector Calculus and Statistics to Engineering students.

NOTE : **Ten** questions are to be set taking two questions from each unit. The student has to attempt **FIVE** questions selecting ***one question from each unit***. The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **Fourier Series**: Fourier series, Dirichlet's condition and convergence. Half range series, Harmonic analysis. Laplace Transform: Laplace transform of elementary functions. Shifting theorems. Transform of derivatives. Differentiation and Integration of transforms. Heavisides' unit step and Dirac Delta functions. Convolution theorem. Solution of ordinary linear differential equations used in Mechanics, Electric circuits and Bending of beams.

Unit II **Fourier Transforms:** Definition of Fourier transform, Fourier sine and cosine transforms. Fourier integral formula. Applications to solutions of boundry value problems.

Unit III **Z- transform:** Definition, Linearity property, Z-transform of elementary functions, Shifting theorems, Initial and final value theorem, Convolution theorem, Inversion of Z-transforms, Solution of difference equations by Z transforms.

Unit IV **Vector Calculus:** Differentiation of a vector. Scalar and vector fields. Gradient, Divergence, Curl and their physical meanings. Differential operator and identities. Line, Surface and Volume integral. Green's theorem in plane. Gauss and Stokes theorems. Simple applications.

Unit V **Statistics:** Axiomatic definition. Mathematical expectation. Moment generating functions. Binomial, Poisson and Normal distributions. Correlation and Regression.

Prerequisite: None

References:

1 Prasad C., A first course in Mathematics for Engineers,
2 Prasad C., Advanced mathematics for Engineers
3 Schaum outline Series, Integral Transform,TMH
4 Grewal B.S., Higher Engineering Mathematics, Khanna, New Delhi, 2000
5 Brancewel, Fourier Transforms and their applications, McGraw
6Kreyszig E., Advanced Engineering Mathematics, John Wiley, New York, 1999
7Ayres F., Vector Analysis
8Kapur & Saxena , Mathematical Statistics

MM 100 *Sessional 30*
Time 3 Hrs *Theory 70*
L T P *Pass Marks 40*
3 1 0

EEE302
ELECTRICAL MACHINES – I

OBJECTIVE : To know the construction, principle of operation and characteristics of d.c. machines and transformers.

Note : **Ten** questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit.*** The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **ELECTROMECHANICAL ENERGY CONVERSION AND ROTATING MACHINES :**

Principle of energy conversion- coupling field reaction – Energy storage in singly and multiply excited systems – stored energy and mechanical force- concept of co energy and the force equation – Faraday's law of electromagnetic induction and Ampere's law of force – electron mechanical transducers – rotating machines.

Unit II **D.C. MACHINES:**

Constructional features of d.c. machines – EMF equation – armature winding fundamentals – characteristics of different types of d.c. generators – commutation and armature reaction . D.C. motors – torque equation – characteristics – starters – speed control.

Unit III **TESTING, BRAKING AND PARALLEL OPERATION OF DC MACHINES**

Swinburne's test – Hopkinson's test – retardation test – load test – electric braking – parallel operation of d.c. generators.

Unit IV **TRANSFORMERS – PRINCIPLES AND CHARACTERISTICS**

Principle of operation, types and constructional features of single phase and three phase transformers – phasor diagram – equivalent circuit – regulation and efficiency – core loss reduction.

Unit V **CONNECTION AND TESTING OF TRANSFORMERS**

Three phase transformer connection – Scott connection – auto transformer – all day efficiency – Sumpner's test – parallel operation of transformers – no load and on- load tap changing transformers – in- rush phenomenon and its prevention.

TEXT BOOKS

1. Theraja, B.L. and Theraja, A.K., 'A text book of electrical Technology', Volume II, AC and DC machines, S.Chand & Co., Ltd., New Delhi, 1998.
2. Nagrath, I.J. and Kothari, D.P., Electrical Machines', Tata Mc Graw Hill Publishing Company Ltd., New Delhi, 1990.
3. Bhattacharya, S.K., 'Electrical machine', Tata McGraw Hill, New Delhi, Eighth reprint, 1997.

REFERENCES

1. Bimbhra, P.S., 'Electrical machinery', Khanna Publishers, New Delhi, 1984.

2. Deshpande, M.V., 'Electrical Machines', Wheeler Publishing Company, New Delhi, 1983.
3. Langsdorf, A.S. 'Theory of Alternating Current Machinery', Tata-McGraw Hill Book Company, 1990.
4. Sen, S.K. 'Rotaing electrical Machinery', Khanna Publishers, New Delh, 1984.
5. Say, M.G., 'Alternating Current Machines', ELBS & pitman, London IV edition, 1980.

MM 100 *Sessional 30*
Time 3 Hrs *Theory 70*
L T P *Pass Marks 40*
3 1 0

EEE303
CIRCUIT THEORY

OBJECTIVE : To teach all the circuit theorems and solution of d.c., single phase and three phase a.c. circuits.

Note : **Ten** questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit.*** The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **BASIC CIRCUIT CONCEPTS**

Review of Basic concepts – D.C. and A.C. circuits- R, L and C elements – phasor diagram – complex impedance – real and reactive power –series and parallel circuits – loop and nodal analysis.

Unit II **NETWORK THEOREMS AND TRANSFORMATIONS**

Voltage – current source transformation – star-delta transformation – superposition – reciprocity

Unit III **RESONANCE AND COUPLED CURCITS**

Series and parallel resonance – bandwidth – Q factor – inductively couple circuits – coefficient of coupling – dot convention – multi – winding coupled circuit – analysis of coupled circuit.

Unit IV **THREE – PHASE CICUITS**

Solution of balanced 3 phase circuits – power and power factor calculations by two wattmeter method – solution of unbalanced circuits.

Unit V **TIME RESPONSE OF CIRCUITS**

Time response of RL, RC and RLC circuits for zero input and step and sinusoidal inputs using laplace transform method.

TEXT BOOKS

1. Hayt, W.H. and Kemmerly, J.E., 'Engineering Circuit Analysis', McGraw Hill, New York, 5th edition, 1993.
2. Joseph. A. Edminister, ' Electic Circuits – Schaum's outline series', McGraw Hill International, 3rd edition, 1997.

REFERENCES

1. Arumugam, M and Premkumar, N., 'Electric Circuit Theory', M/s Khanna Publishers Co., 9th Reprint, 1997.
2. Paranjothi, S.Electric Circuit Analysis'- New Age International Limited, Publishers, 1996.

MM 100 *Sessional 30*
Time 3 Hrs *Theory 70*
L T P *Pass Marks 40*
3 1 0

EEC-303
ELECTRONIC DEVICES AND CIRCUITS

Objective: The objective of this course is to expose the students to the working principles of various semiconductor devices and their circuit application.

NOTE- Ten questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting *one question from each unit*. The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT-I

Basic material properties of semi-conductors; Governing factors for Fermi-Level; Carrier concentration and carrier mobility; Recombination and carrier life time; Carrier drift; Diffusion and continuity equation.

UNIT-II

Quantitative analysis of p-n diode characteristics and equivalent circuit; Schottky barrier diode; Ohmic contact; BJT moderls-low-frequency and high frequency hybrid models, Ebers-Mill model.

UNIT-III

Transients in diodes and transistors; low and high frequency models of JFET; MOS devices NMOS, PMOS and CMOS.

UNIT- IV

Transistor biasing schemes and operating point stabilization; coupling schemes for multistage amplifiers; Wide band amplifiers; Power amplifier.

UNIT- V

Feedback concepts; Analysis of negative feedback amplifiers; Condition for oscillation; Analysis of various oscillators.

References :

1. Millman. J, and Halkies, c.c.---Integrated Electronics-McGraw Hill.
2. Ryder, J.D.---Electronic Fundamentals & Applications-Prentice Hall.
3. Millman J., and Taub H.---Pulse, Digital and Switching Waveforms-McGraw Hill.
4. Robert Boylestad & Louis Nashelsky (6/e), Electronic Devices and Circuit Theory, Prentince Hall of India, New Delhi,2001

MM 100 *Sessional 30*
Time 3 Hrs *Theory 70*
L T P *Pass Marks 40*
3 1 0

EEE304
ELECTRO MAGNETIC FIELD THEROY

OBJECTIVE : On completing the course, the student will be able to apply the laws of electrostatic and electromagnetic in electrical machine theory and power line parameter calculations.

Note : **Ten** questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit.*** The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **ELECTROSTATICS – FUNDAMENTALS**

Electric charges – Coulomb's Law – Electric Field Intensity – Linear, Surface and Volume charge density – Gauss Law and its application – electric Scalar Potentials and potential difference – Potential due to uniformly charged disc and uniformly charged line, potentials between two coaxial cylinders and between two conducting spherical shell – Electric field lines and equipotential contours – Potential gradient and electric field due to electric dipoles – Conservative nature of electric field.

Unit II **DIELECTRICS & CAPACITANCE**

Dielectric boundaries – Capacitance – Capacitance of system of conductors – Overhead lines and underground cables – Methods of images and its application – Electrostatic energy and energy density – Force between charged conductors – dielectric strength and breakdown. Divergence and curl of vector fields – Divergence theorem – Stokes theorem – solutions of electrostatic problems – Examples on Laplace's equation.

Unit III **MAGNETIC FIELDS - FUNDAMENTALS**

Magnetic field intensity and magnetic flux density – Biot Savarat law – Force between current carrying wires. Torque on closed circuits – Ampere's law – Magnetic scalar and vector potentials – Boundary conditions at magnetic surfaces.

Unit IV **MAGNETIC CIRCUITS AND INDUCTANCE**

Faraday's law of electromagnetic induction – Inductor and inductance – Inductance of solenoids, toroids, transmission lines and cables – Mutual inductance – Inductors in series and parallel – energy stored in magnetic field – Pull of an electromagnet – magnetic circuits.

Unit V **ELECTRO MAGNETIC WAVES**

Maxwell's equations – Equation of continuity – displacement current – Maxwell's equation in point and integral forms – The wave equations – Uniform plane wave – relation between electric and magnetic field intensities in a uniform plane wave, Poynting vector – Poynting theorem.

TEXT BOOKS

1. Gangodhar, K.A., ' Field Theory', Khanna Pub. Delhi 11th edition, 1994.

2. William H. Hayt, ‘ Engineering electromagnetics’, Tata- McGraw Hill, 5th edition, 1992.

REFERENCES

1. Sarwate, V.V., ‘ Electromagnetic Fields and Waves’, Wiley Eastern Limited, New Delhi, 1993.

2. Mahajan, A.S. and Rangawala, A.A. ‘Electricity and Magnetism, Tata-McGraw Hill Publishing Company, Ld, New Delhi, 1989.

3. Seely, S., Introduction to electromagnetic Fields’, McGraw Hill.

4. Joseph, a. Edminister, ‘ Electromagnetic – Schaum’s outline Series’, International Edition, McGraw Hill Inc., New York, 1993.

5. Narayana Rao, N., ‘Elements of Engineering Electromagnetics’, Prentics Hall of India, 1991.

6. David J. Griffths, ‘ Introcuation to electrodynamics’, Prentice Hall of India, New Delhi, 1991.

7. John D. Kraus, ‘ Electomagnetics’, McGraw Hill Book Co, Newyork, 3rd Edn, 1984.

MM 100 *Sessional 30*
Time 3 Hrs *Theory 70*
L T P *Pass Marks 40*
3 1 0

EME301
ENGG. MECHANICS OF SOLIDS AND FLUIDS

OBJECCTIVE: To enable the students to get the basics of column, fluid properties of dynamics and fluid machines.

Note : **Ten** questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit.*** The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **COLUMNS**

Columns – Long column – Short column – Euler's Theory. Torsion of Circular shafts – Hollow Shafts- Power transmission- Simple Problems.

Unit II **FLUID PROPERTIES**

Properties of fluids – density – specific weight – specific gravity- Viscosity – Surface Tension Capillarity- Compressibility- Vapour Pressure – pressure at point – its variation – Measurement with Piezometer, manometers and gauges.

Unit III **DYANAMICS OF FLOW**

Continuity equation in one dimension – Bernoulli's equation – Venturimeters and Orifice meters- Flow through pipes – Laminar – Turbulent flow- Major losses – Simple problems.

Unit IV **FLUID MACHINES**

Pumps- Type of pumps- General Principles of displacement and Centrifugal Pumps (working methods only) – Efficiency and Performance Curves of Pumps – Caviation in Pumps

Unit V **HYDRAULIC TURBINES**

Turbines-Types of turbines – Pelton wheel, Francis turbine, Kaplan Turbine – Efficiency – governing of turbines.

TEXT BOOKS

1. Ramamirtham, S. 'Strength of Materials', Dhanpat Rai and Sons, New Delhi, 1988.
2. Rajput, R.K. 'Strength of Materials' , S.Chand & Co Ltd, New Delhi, 1996.
3. Nagarathnam, S.'Fluid Mechanics', Khanna Publishers, New Delhi, 1989.

REFERENCES

1. Vazhirani, V.N. and M.M. Ratwani, ' Analysis of Structures Vol E., Khanna Publishers, New Delhi, 1988.
2. Bansal,. R.K. A Text Book of Fluid Mechanics and Hydraulic Machnies', Laxmi Publication, New Delhi, 1989.

MM 50 *Sessional 15*
Time 2 Hrs *Practical 35*
L T P *Pass Marks 25*

0 0 2

EEC351
Advanced Electronics Lab

List of Practical

1	To study the characteristics of FET/ MOSFET/ UJT.
2	To study 8 bit and 4 bit analog to digital and digital to analog converter.
3	To study the characteristics and parameter of op-amp.
4	To study the op-amp as a comparator, Schmitt trigger and as a active Filters.
5	To study op-amp as a V to F and F to V converter and as a differentiaton.
6	To study the op-amp as a Voltage to current and current to voltage converter.
7	To study the op-amp as a buffer amplifier and a difference amplifier.
8	To study op-amp as multi vibratos.
9	To study op-amp as a pulse generator.
10	To study the UJT relaxation oscillator.

MM 50 *Sessional 15*
Time 2 Hrs *Theory 35*
L T P *Pass Marks 25*
- - 2

EEE352
ELECTICAL MACHINES I LAB

Minimum 8 experiments shall be performed

1. Open circuit and load test of DC shunt generator
2. Load characteristics of DC compound generator.
3. Load test on DC shunt and compound motor.
4. Load test on DC compound generator
5. Speed control of DC shunt motors.
6. Swinburne's test.
7. Retardation test.
8. Hopkinson's test.
9. Open circuit test, short circuit test on single phase transformer.
10. Separation of no load losses in a single phase transformer.
11. Sumpner's test.
12. SCOTT connection.

MM 50 *Sessional 15*
Time 2 Hrs *Theory 35*
L T P *Pass Marks 25*
- - 2

EEE353
Circuit Lab

The in charge of lab will decide the various circuit analysis to be done based on the theory of EEE303 Circuit Theory.

MM 50
Time 2 Hrs *Pass Marks 25*
L T P
0 0 2

EEE 360
Seminar

Objective: To increase the communication ability of students and to prepare them for presenting seminars on advanced topics of their branch.

The students will be required to deliver a seminar on a topic of general interest in or any advanced topics related to the theory papers studied. The topic will be decided by mutual concern of faculty in charge and student.

MM 100 *Sessional 30*
Time 3 Hrs *Theory 70*
L T P *Pass Marks 40*
3 1 0

EEE401
ELECTRICAL MACHINES II

OBJECTIVE : On completing the course, students will be able to operate and predict the performance of synchronous and asynchronous motors and generators.

Note : **Ten** questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit.*** The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **ALTERNATORS**

Alternators – types and constructional features – emf equation – rotating magnetic field – armature rection – load characteristics – predetermination of regulation by sysnchronous Impedance method, Ampere turn method, Zero Power factor method, Basic ideas of two reaction theory – direct and quadratur axis reactions and their determination – phasor diagram and regulation of salient pole alternators – Expression for power developed as a function of torque angle – Parallel operation of alternators.

Unit II **SYNCHRONOUS MOTORS**

Synchronous motors : Synchronous machines on infinite bus bars – phasor diagram – V and inverted V curves – current and powercircle diagrams – Hunting and its suppression – starting methods – synchronous condenser – reluctance motor.

Unit III **POLYPHASE INDUCTION MOTORS**

Polyphase Induction motors – types and constructional features principle of operation – phasor diagram – equivalent circuit – slip torque characteristics – effect of rotor resistance – circle diagram – starting and speed control.

Unit IV **INDUCTION MAHINES FOR SPECIAL PURPOSE**

High torque induction motors – Induction generators – Grid connected – Capacitor excited – Synchronous Induction Motor – Permanent Magnet Generators.

Unit V **SINGLE PHASE AND LINEAR INDUCTION MOTORS**

Single phase induction motors – types and constructional features – Principle of operation – equivalent circuit based on double revolving field theory – Universal motors – design features, Linear induction motors.

TEXT BOOKS

1. Theraja, B.L. and Theraja, A.K. 'A text book of Electical Technology', Vollume II, AC and DC machine, S.Chand & Co. Ltd., New Delhi, 1998.
2. Nagrath I.J. & Kothari, D.P. Electrical machine', Tata McGraw Hill , New Delhi, 1990.
3. Bimbhra, S.P. Electrical machinery', Khanna publishers, New Delhi, 1993.

REFERENCE

1. Puchtein, Lloyd and Conred, 'Alternating Current Machines', M/s Asia Publishing Company, 1964.
2. Say, M.G., Alternating Current Machines', Asia Publishing Company, 1980.
3. Sen, S.K. 'Rotating Electrical Machinery', Khanna Publishers, New Delhi, 1984.
4. Fitzerald, Kingsley and Umans, 'Electric Machinery', McGraw Hill Co., 1992.
5. Langsdorf A.S., 'Theory of Alternating Current Machinery', M/s Tata-McGraw Hill Book Co., 1990.

MM 100 ***Sessional 30***
Time 3 Hrs ***Theory 70***
L T P ***Pass Marks 40***
3 1 0

EEE402
NETWORKS AND LINEAR SYSTEMS

OBJECTIVE : On completion of this course , the students will be able to analyse circuits and systems with non-periodic inputs using Laplace and Fourier transforms.

Note : **Ten** questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit.*** The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **ANALYSIS USING LAPLACE TRANFFORMS**

Classification of signals – representation in terms of elementary signals – impulse functions – Time response of circuits to non-sinusoidal periodic inputs – Concept of complex frequency – poles and zero – frequency response from pole-zero configuration.

Unit II **ANALYSIS USING FOURIER SERIES & TRANSFORMS**

Fourier series representation of periodic inputs – trigonometric and complex forms – Fourier integral and Fourier transforms – Harmonic analysis of simple circuit with non- sinusoidal periodic inputs and aperiodic inputs.

Unit III **TWO PORT NETWORKS**

Driving point impedance and admittance of one port network – open circuit impedance – short circuit admittance of two port networks – transfer impedance and admittance – voltage and current ratio transfer functions – ABCD parameters – image impedance – impedance matching – equivalent networks.

Unit IV **LINEAR SYSTEMS**

Differential equations of translational and rotational systems – transfer function – block diagram representation – Block diagram algebra – signal flow graph – Mason's gain formula – concepts of state and state variables – state models using physical and phase variable – solution of state equations.

Unit V **Z TRANSFORMS AND APPLICATIONS TO LINEAR SYSTEMS**

Differential equation of linear discrete systems – pulse transfer function – response of linear discrete systems by Z transform method – z and s domain relationship.

TEXT BOOKS

1. Hayt, W.H and Kemmerly, J.E. ' Engineering Circuit Analysis', McGraw Hill, New York, 5th edition, 1993.
2. Nagrath I.J. and Gopal M. ' Control Systems Engineering', Wiley Eastern India Ltd., 1992.

REFERENCES

1. Joseph A. Edminister,' Electric Circuits – Schaum's outline', McGraw Hill International, 3d edition, 1997.
2. Arumugam, N.M. and Premkumar, N., 'Electric Circuit Theory', M/s Khanna Publishers Co., 9th Reprint, 1997.
3. Oppen Heim. A.V. and Willskey A.S. 'Signals and Systems, Prentics Hall of India, New Delhi, 1992.
4. Cheng, D.K. ' Analysis of Linear System', Addision Wesley, 1988.
5. Cooper G.R. and McGillen C.D. 'Methods of Signal and System Analysis', Richart and Winston Inc. U.S.A. 1967.

MM 100 ***Sessional 30***
Time 3 Hrs ***Theory 70***
L T P ***Pass Marks 40***
3 1 0

EEE403
ELECTRICAL AND ELECTRONIC MEASUREMENTS

OBJECTIVE : The study of the course will help the students to apply all types of common electrical and electronic instruments with the knowledge of their construction and working.

Note : **Ten** questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit.*** The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **MEASUREMENT OF VOLTAGE AND CURRENT**

Classification – measurement of voltage and current – permanent magnet moving coil and moving iron meters – dynamometer type meters – measurement of inductance and capacitance using bridges.

Unit II **MEASUREMENT OF POWER AND ENERGY**

Dynamometer type wattmeters, Induction type energy meters – single phase and poly-phase, testing and calibration of energy meter factor meters – synchroscopes.

Unit III **MAGNETIC MEASUREMENTS**

Ballistic galvanometers and flux meters, B.H. curve and permeability measurements – iron loss measurements by magnetic squares and C.R.O.

Unit IV **INSTRUMENT TRANSFORMER**

Theory – ratio and phase errors of current and potential transformers – capacitor voltage transformers – use of instrument transformers with wattmeters.

Unit V **SPECIAL INSTRUMENTS**

KVAh and KVARh meter – Maximum demand indicator, Meggar – Laboratory measuring instruments – Standard signal generators and function generators. TVM

and frequency meter, distortion factor meters and phase meters.

TEXT BOOKS

1. Golding, E.W. and Widdis, F.C. Flectrical Measurements and Measuring Instruments' A.H. Wheeler and Co, 5th edition, 1993.
2. Baldwin, C.T. 'Fundamentals of electrical measurements – Lyall Book depot,' New Delhi, 1973.

REFERENCES

1. Cooper, W.D. and Helfrick, A.D., 'Electronic Instrumention and Measurement tehniques', Prentice Hall of India, 1991.
2. Sawhney, A.K. 'A Course in Electrical and Electronic Measurements and Instrumentation', Dhanpat Rai and Sons, New Delhi, 11th edition 1995.

MM 100 ***Sessional 30***
Time 3 Hrs ***Theory 70***
L T P ***Pass Marks 40***
3 1 0

EEE404
Power System I

MM 100 *Sessional 30*
Time 3 Hrs *Theory 70*
L T P *Pass Marks 40*
3 1 0

ECS302/ ECS404
Data Structure

Objective: To prepare the students towards the use of object oriented design using complex data structures in programming.

NOTE : **Ten** questions are to be set taking two questions from each unit. The student has to attempt **FIVE** questions selecting ***one question from each unit***. The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **Introduction to Algorithm Design and Data Structure:** Design & analysis of algorithm, Top-down and Bottom-up approaches to algorithm design, Analysis of Algorithm, Frequency count, Complexity measures in terms of time and space

Arrays, Stacks and Queues : Representation of Array (Single & Multi Dimensional Arrays), Address Calculation using column & row major Ordering, Representation of Stacks & Queues Using Arrays and their operations, Circular Queues, Applications of Arrays, Stacks & Queues; Conversion from Infix to Postfix & Prefix and Evaluation of Prefix expressions using Stack.

Unit II **Linked List :** Singly linked list (operations on list), Linked stacks and queue, Polynomial representation and manipulation using linked list; **Applications :** Reading and Writing polynomials, Polynomial addition. Circular Linked list and doubly linked list, Generalized list.

Unit – III **Trees :** Logical level of binary search tree, BST traversal methods (Preorder, Postorder and Inorder), Recursive and non- recursive algorithms for traverse methods, Insertion into and deletion from a BST and their implementation.

Height balanced (AVL) trees: Definition, Insertion of a node, Deletion of a node, The height of an AVL tree; B- tree (Insertion and Deletion algorithms).

Unit IV **Searching and Sorting :** Sequential & binary searches;

Hashing schemes: hashing, Hash functions, Collision functions, Open addressing (Linear probing and modification), Chaining; Sorting methods (Insertion, selection, Bubble, Quick, Merge and Heap sorts).

Unit V **Removal of Recursion :**General Method of removal of recursion; Recursion removal by folding Nonrecursive quick sort; Stackless recursion removal: merge sort **Threaded binary tree :** Introduction, Threads, Inorder, preoredr and postorder traversal, Insertion in Threaded tree; **File System :** Files, File Organizations, File Operations, File system, File Directories; Various approaches of File Organization : Sequential file, Relative file and Indexed sequential file organizations.

Prerequisite: Knowledge of Programming in C

References:

1 Kruse, Leung and Tondo, Data Structures and Program Design in 'C',PHI, New Delhi, 1994
2 Ellis Horowitz and Sartaj Sahani, Fundamentals of Data Structures, Galgotia, New Delhi, 1998

Time 3 Hrs *Theory 70*
L T P *Pass Marks 40*
3 1 0

EEC406
ANALOG ELECTRONIC CIRCUITS

OBJECTIVE : At the end of this course, the students will be able to analyze and design amplifier, oscillator and multi vibrator circuits, employing BJT and FET devices.

Note : **Ten** questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit.*** The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **AUDIO FREQUENCY AMPLIFIERS**

Biasing circuits for transistors – CE, CC and CB amplifiers – FET amplifiers – frequency response – Analysis of class A and B power amplifiers – Complementary symmetry amplifiers – Switched mode power stages.

Unit II **DIFFERENTIAL & TUNED AMPLIFIERS**

Cascade and Darlington connections – Cascade amplifier differential amplifier – common mode and differential mode analysis – Drift compensation – FET input stage – chopper stabilized amplifier – introduction to tuned amplifiers.

Unit III **FEEDBACK AMPLIFIERS**

The concept of feedback – Gain with feedback – Effect of feedback on gain stability, distortion – bandwidth – Input and output impedances – Topologies of feedback amplifiers.

Unit IV **OSCILLATIORS**

Barkhausen Criterion for oscillation – Hartley & colpits oscillators – phase shift, Wien bridge and crystal oscillators – clapp oscillator – Oscillator amplitude stabilization.

Unit V **PULSE CIRCUITS**

RC Integrator and differentiator circuits – Diode clampers and clippers – multi vibrator, Schmitt Trigger – UJT Oscillator; simulation of BJT and FET Circuits using PSPICE.

TEXT BOOKS

1. Millman and Halkias, 'Integrated Electronics', McGraw Hill. Int. Student Edition, 5th Reprint, 1993.
2. Millman and Taub, ' Pulse, Digital and Switching Waveforms', McGraw Hill, Int. Student Edition, 1991.

REFERENCES

1. Malvino, 'Electronic Principles', Tata McGraw Hill 5th edition, 1995.
2. Malcom Goodge, 'Analog Electronics – Analysis and Design', MacMillan Publishers, 1990.
3. Millman, ' Micro electronics', McGraw Hill, 2nd edition, 1988.

MM 50 ***Sessional 15***
Time 2 Hrs ***Practical 35***
L T P ***Pass Marks 25***
0 0 2

EEE451
ELECTRICAL MACHINES II LAB

Minimum 8 Experiment shall be performed.

1. Regulation of 3 phase alternator by E.M.F. and M.M.F. methods.
2. Regulation of 3 phase alternator by Z.P.F. method.
3. Regulation of salient-pole alternator by slip test.
4. V and inverted V-curves of synchronous motor.
5. Power angle curve of synchronous motor.
6. Load test on 3 phase induction motor.
7. No load and blocked rotor tests on 3 phase induction motor.
8. Load test on grid connected induction generator.
9. No load and blocked rotor tests on 1- phase induction motor.
10. Synchronous induction motor.
11. Study of 3 phase AC windings.
12. Study of induction motor starters.
13. Parallel operation of alternators – (Demonstration).

MM 50 ***Sessional 15***
Time 2 Hrs ***Practical 35***
L T P ***Pass Marks 25***
0 0 2

EEE452
Measurement Lab

Minimum 8 experiments from the following:

1. Calibration of AC Voltmeter and AC ammeter.
2. Measurement of form factor of a rectified sine wave and ascertaining the source of error, if RMS value is measured by a multimeter.
3. Measurement of phase difference and frequency using CRO. (Lissajous figure)
4. Measurement of power and power factor of single phase at varying load.
5. Measurement of low resistance Kelvin's double bridge.
6. Voltage measurement using potentiometer.
7. Schering bridge measurement
8. Maxwell bridge measurement.
9. Hay's bridge measurement.
10. Owen's bridge measurement.
11. Study of frequency and differential time counter.

MM 50
Time 2 Hrs
L T P
0 0 2

Sessional 15
Practical 35
Pass Marks 25

ECS 351/ ECS454
Data Structure Lab

The in charge of lab will decide the programs to be made based on the theory of the subject.

MM 100 *Sessional 30*
Time 3 Hrs *Theory 70*
L T P *Pass Marks 40*
3 1 0

EMA401/ EMA501

Numerical Analysis

Objective: To expose the students to various Numerical methods for solving a variety of problems and to develop their skills in numerical computation by working on numerical examples with the awareness of different types of errors involved.

NOTE : **Ten** questions are to be set taking two questions from each unit. The student has to attempt **FIVE** questions selecting ***one question from each unit***. The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **Errors in numerical computations**: Absolute, relative, round-off and truncation errors. Significant digits.
Algebraic and Transcendental Equations, Numerical solution, Method of bisection, Newton-Raphson iteration, Direct iterative method, convergence.

Unit II **Interpolation:**Finite differences operators, and other operators, Greogory- Newton, Stirling and Bessel and Lagrange's formula. Errors in interpolation. Divided differences.

Unit III **Numerical Differentiation and Integration**: Newton- Cotes formula, Gaussian Quadrature formula. Extension of Trapezodial and Simpson, rules to multiple integration.

Unit IV **Linear Simultaneous Algebric Equations**: Gauss elemination, Jacobi's and Gauss-Seidal methods, Largest eigen value and corresponding eigen vector. Relaxation techniques

Unit V **Ordinary Differential Equations**: Taylor, Eulers, Picard, Runge-kutta, Adams-bash Forth and Milne's method. System of ordinary differential equation, Partial Differential Equations: Numerical solutions by difference Laplace Equations, Laplace and poisson equations by finite difference method.

Prerequisite: Nil

References:

1 Jain, Iyengar , Numerical Methods for scientific & Engineering Computation, Wiley ,1987
2 Grewal, B.S., Numerical Methods in Engineering & Sciences, Khanna, New Delhi,
3 Balaguruswamy, Numerical Methods, TMH
4 Sastry, Introductory Method of Numerical Analysis, PHI
5 Vendamurthy , Numerical Methods, Vikas
6 Flowers, Numerical Methods in C++, Oxford
7 C.F.Gerald (5/e), Applied Numerical Analysis, Addison Wesley, 1994

MM 100 *Sessional 30*
Time 3 Hrs *Theory 70*
L T P *Pass Marks 40*
3 1 0

ECS 403/ ECS505
Object Oriented Programming Using C++

Objective: To make the students learn object oriented style of computer programming and using it with help of C++.

NOTE: **Ten** questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit***. The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I Objects, relating to other paradigms (functional, data decomposition), basic terms and ideas (abstraction, encapsulation, inheritance, polymorphism)
Review of C, Difference between C and C++, Cin, Cout, new deleted operators.

Unit II Encapsulation, information hiding, abstract data types, object& classes, attributer methods. C++ class declaration, state identity and behaviour of an object, constructors and destructors, instantiation of objects, default parameter value, Object types, C++ garbage collection, dynamic memory allocation, metaclass/ abstract classes.

Unit III Inheritance, Class hierarchy, derivation-public, private & protected; aggregation, composition Vs classification hierarchies, polymorphism, categorization of polymorphic techniques

Unit IV Method polymorphism, polymorphism by parameter, operator overloading parametric polymorphism, generic function- template function, function name overloading, overriding inheritance methods, run time polymorphism

Unit V Standard C++ classes, using multiple inheritance, persistent objects, stream and files namespace, exception handling, generic classes.

Prerequisite: Nil

References:

1 C++ Primer S.B.Lippman & J.Lajoie (Addison Wesley)
2 Object Oriented Programming with C++ E.Balagurusamy (TMH)
3 Object Oriented Programming using C++ R.Lafore (Galgotia)
4 G.Booch (2/e), Object Oriented Design & Applications, (Bengamin, Cummings)

MM 100
Time 3 Hrs
L T P
3 1 0

Sessional 30
Theory 70
Pass Marks 40

EEE501
Power System II

MM 100
Time 3 Hrs
L T P
3 1 0

Sessional 30
Theory 70
Pass Marks 40

EEE502
Control System I

MM 100 *Sessional 30*
Time 3 Hrs *Theory 70*
L T P *Pass Marks 40*
3 1 0

EEC506
DIGITAL ELECTRONICS

OBJECTIVE : On completion of this course, the students will be able to analyse, and design combinational and sequential logic circuits.

Note : **Ten** questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit.*** The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **NUMBER AND BOOLEAN ALGEBRA**

Review of Number system- Radix conversion – Complements – Subtraction using complements – Binary code – Theorem of Boolean algebra – Canonical forms – Logic gates.

Unit II **DIGITAL LOGIC FAMILIES**

Introduction to RTL, DTL,TTL, ECL and MOSL families – Details of TTL logic family – Totem pole, open collecter outputs – TTL subfamilies – Wired and operations, characteristics of TTL family – comparison of different logic families.

Unit III **COMBINATIONAL LOGIC**

Representation of logic function – Simplification using karnaugh map – tabulation methods – Implementation of combinational logic using standard logic gates and multiplexers – Encoders and decoders – Multiplexers and demultiplexers – Code converters, adders, subtractors.

Unit IV **SEQUENTIAL LOGIC CONCEPTS AND COMPONENTS**

Flip flops – SR, JK, D and T flip flops – Level triggering and edge triggering – Excitation table – Counters – Asynchronous and synchronous type – Modulo counters – Shift register – Ring counters.

Unit V **SEQUENTIAL LOGIC DESIGN AND MEMORIES**

Concept to state, state diagram, state table , flow table – State reduction – Analysis, design and implementation of synchronous sequential circuits – Analysis of asynchronous sequential logic circuits – Introduction to design of asynchronous sequential logic Concepts of programmable logic – PROM – EPROM – Semiconductor electromagnetic core memories.

TEXT BOOKS

1. Malvino 'Digital Principle and Applications', 4th edition, Tata McGraw Hill, 1997.
2. Mano, M.M. 'Digital logic and computer design', Prentice Hall of India, 1992.

REFERENCES

1. Leach, 'Digital Principles and Applications', 5th edition, McGraw Hill, 1995.
2. Tocci R.J., 'Digital Systerms : Principles and Application', Prentice Hall of India, New Delhi, 6th Edition, 1997.
3. Palmer J.E., Perlman D.E. 'Introduction to Digital Systems ' Schamn's Outline Series McGraw Hill, New York, 1993.

MM 100 *Sessional 30*
Time 3 Hrs *Theory 70*
L T P *Pass Marks 40*
3 1 0

EEC507
LINEAR INTEGRATED CIRCUITS

OBJECTIVE : On completion of this course the students will have a comprehensive knowledge of opamp circuits, A/D and D/A converters, 555IC and voltage regulator circuits.

Note : **Ten** questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit.*** The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I INTROCUTION TO OPERATIONAL AMPLIFIERS

Block diagram of a typical op-amp- characteristics of ideal op-amp practical op amp – parameters of op-amp – Interpretation of data sheet – Inverting and Non-inverting amplifier configurations – Frequency response of op-amp – circuit stability.

Unit II APPLICTIONS OF OPERATIONAL AMPLIFIRS – I

DC and AC amplifiers – summing amplifier – difference amplifier – voltage follower – Diffenentiator – Integrator – clamper – clipper – precision rectifiers peak detector zero cross detector- Schmitt trigger – Active low pass and high pass filters.

Unit III APPLICATIONS OF OPERATIONAL AMPLIFIERS-II

Square wave generator – Triangular wave generator – sine wave generator – saw tooth wave generator – voltage controlled oscillator – Basic comparator uter – comparator characteristics – precision computer – window detector.

Unit IV DACs and ADCs

Digital to analog converters – with binary weighted resistors – with R and 2R resistors = Monolithic D/A converters – D/A converter characteristics and specifications – A/D converters – parallel comparator type – single – slope and dual slope A/D converters – A/D converter using counter and D/A converter – successive approximation A/D converter Monolithic A/D converter – A/D converter specifications

Unit V IC 555 and PLLs

The 555 Timer – Block diagram, monostable and astable modes of operation; phase Locked loops – operating principles- Monolithic PLL – applications of PLL – voltage regulators – Fixed voltage regulators, Adjustable voltage regulators – switching regulators – current amplifiers in IC regulators.

TEXT BOOK

1. Gayakwad, R.A. 'Op-amp & Linear Integrated Circuits', Prentice Hall of India, New Delhi, 3rd edition, 1993.

REFERENCES

1. Roy, D. Chodhury, Shail Jain, ' Linear Integrated circuits', Wiley Eastern Limited, 1991.
2. Millman, J. and Halkias, C.C. 'Integrated electronics – Analog and Digital System',

McGraw Hill, 9th Reprint, 1995.

MM 50 ***Sessional 15***
Time 2 Hrs ***Practical 35***
L T P ***Pass Marks 25***
0 0 2

ECS 453/ ECS554
Object Oriented Programming Lab

Programming exercise on the following topics.

Functions in C++, parameter passing, call and return by reference, friend functions, inline functions, function overloading.

Classes and objects: arrays within a class, memory allocation for objects, static members, returning objects, constructor and destructors, operator overloading.

Inheritance: derived classes, single and multiple inheritance, hierarchical inheritance, constructors in derived classes, classes containing objects of other classes.

Polymorphism: pointers to objects, this pointer, pointer to derived classes, virtual functions.

Templates: class and function templates, template arguments, exception handling; use of files, learning to use Visual C++ environment.

MM 50 ***Sessional 15***
Time 2 Hrs ***Practical 35***
L T P ***Pass Marks 25***
0 0 2

EEC553
Integrated Circuit Lab

MM 50
Time 2 Hrs
L T P
0 0 2

Sessional 15
Practical 35
Pass Marks 25

EEE551
Power System Lab

MM 100 *Sessional 30*
Time 3 Hrs *Theory 70*
L T P *Pass Marks 40*
3 1 0

EEE601
COMPUTER AIDED DESIGN OF ELECTICAL MACHINES

OBJECTIVE : The student will be able to design the main dimensions and other major parts of transformer and d.c. and a.c. rotating machines.

Note : **Ten** questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit.*** The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **FUNDAMENTALS OF DESIGN**

General concepts in the design of rotating machines-Output equation-Magnetic and electric loadings – Common design features of all rotating machines-Conducting, insulating and magnetic materials used in electrical apparatus – mmf calculation for the magnetic circuit of rotating machines- Leakage reactance calculation. CAD tools for electrical machine design.

Unit II **D.C. MACHINES**

Armature winding – Output equation – Choice of specific loadings – Choice of poles-design of conductors, winding, slot, air gap, field poles and field coils, commutator and brush- Predetermination of efficiency, temperature rise and open circuit characteristics from design data (qualitative treatment only).

Unit III **TRANFORMERS**

Output equation – Design of core and coils for single phase and three phase transformer – Design of tank and cooling tubes- predetermination of circuit parameters magnetsing current, losses, efficiency , temperature rise and regulation from design data (qualitative treatment only)

Unit IV **INDUCTION MOTORS**

Output equation – Choice of specific loadings – Design of stator Design of squirrel cage and slip ring rotors – Stator and rotor winding designs – Predetermination of circuit parameters, magnetizing current, efficiency and temperature rise form design data (qualitative treatment only).

Unit V **SYNCHRONOUS MACHINES**

Constructional features – SCR – Output equation – specific loadings – Main dimensions- Stator design – Design of salient pole field coil.

TEXT BOOKS

1. Sawhney, A.K. ‘A course in Electrical Machines Design’ Dhanpat Rai and Sons, New Delhi, 1984.
2. Sen, S.K., ‘Principles of Electrical Machine Design with Computer Programmes’, Oxford and I.B.H. Publishing Co. Pvt. Ltd, New Delhi, 1987.

REFERENCES

1. Rai, H.M., ‘Principles of Electrical Machines Design’, Sathya Prakash, New Delhi, 1988.
2. Clayton, A.E., ‘Performance and Design of Direct Current Machines’, The English Language Book Society and Sir Isaac Pitman and Sons Ltd, London, 1962.

3. Say, M.G., 'The Performance and design of alternating current machines', Sir Issac Pitman and Sons Ltd, London, 1958.

MM 100 ***Sessional 30***
Time 3 Hrs ***Theory 70***
L T P ***Pass Marks 40***
3 1 0

EEC607
POWER ELECTRONICS

OBJECTIVE : To understand the working of various power electronic devices and a knowledge of different types of power converters, and to arrive at suitable specifications and acquire design skills.

Note : **Ten** questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit.*** The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **POWER SEMICONDUCTOR DEVICES**

Power diodes- power transistors- Thyristor family – SCRs – Triac- GTOs power MOSFETS – IGBTs- MCTs-Static and dynamic characteristics –Protection circuits – EMI- series and parallel connection-Turn-on characteristics – Turn off characteristics- Driver circuits- Driver ICs.

Unit II **AC TO DC CONVERTERS**

Natural commutation – Single phase and three phase bridge rectifiers, Semecontrolled and fully controlled rectifiers- Dual converters- Effect of load and source inductances-Inverter operation.

Unit III **DC TO DC CONVERTERS**

Voltage – Current –Load commutation – Thyristor Chopper- Design of commutation elements MOSFET/IGBT choppers – Step up choppers. Basic principles of switch mode power suppliers. Buck, boost and buck – boost converters.

Unit IV **DC TO AC CONVERTERS**

Thyristor inverter – Mc Murray – Mc Murray Bedford inverter – three-phase voltage source inverters-120º and 180º mode-Current source Inverter-voltage control-waveform control-inverters using devices other than thyristors. Digital firing circuits.

Unit V **AC TO AC CONVERTERS**

Single phase and three phase AC voltage controllers using thyristors and Triac Integral cycle control – AC choppers-single phase cyclo converters – Applications – Effect of harmonics and Electromagnetic Interference.

TEXT BOOKS

1. Reshid, M.H., 'Power Electronics – circuits, devices and applications', Prentice Hall India, New Delhi, 1995.
2. Dubey, G.K., Doradia. S.R., Joshi & Sinha R.M., 'Thyristorised Power Controllers', New Age International publishers, New Delhi, 1996.
3. Joseph Vithyathil, 'Power Electronics', McGraw Hill series in Electrical & Computer Engineering, USA, 1995.
4. M.D. Singh and K.B. Khanchandani., 'Power Electronics' Tata Mc Graw Hills Publishing Company Limited, New Delhi 1998.

MM 100 *Sessional 30*
Time 3 Hrs *Theory 70*
L T P *Pass Marks 40*
3 1 0

EEC608
MICROPROCESSOR AND MICROCONTROLERS

OBJECTIVE : To get and indepth knowledge of the configurations of common 8-bit microprocessors and microcontrollers and to design systems applying these processors for control purpose.

Note : **Ten** questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit.*** The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **ARCHITECTURE AND PROGRAMMING OF 8085**

Functional Block diagram- Registers –Bus systems – instruction set, addressing modes – Timing diagram and simple assembly level programmes.

Unit II **INTERFACING**

Requirements of interfacing – Memory control signals – Read and write cycles – Interfacing RAM and ROM sections – Memory mapped I/O scheme – I/O mapped I/O scheme –simple I/O ports – programmable peripheral interface (8255) – data transfer schemes : Programmed and DMA – Interfacing of simple keyboards and LED displays.

Unit III **INTERRUPTS AND DMA**

Interrupt features – types of interrupts – methods of servicing interrupts – Development of interrupt service routines – Multiple interrupt requests and their handling – programmable Interrupt controller – Need for Direct Memory Access – Devices for handling DMA – programmable DMA controller.

Unit IV **APPLICATIONS**

Interfacing of A/D converters (ADC 0800/ADC 0808/ADC 0809)- Interfacing D/A Converters (DAC 0800)- Waveform generators – Seven segment LED display systems measurement of frequency, phase-angle and power factor-Stepper motor control – Speed control of DC motor using thyristor converters.

Unit V **MICROCONTROLLERS**

Architecture of 8051 – Memory organization – Addressing modes – Instruction set – simple programs – Interrupt structure of 8051 – parallel port features – modes of operation – interfacing of 8051 – Typical applications – MCS 51 family features : 8031/8051/80751

TEXT BOOKS

1. Ramesh Gaonkar, 'Microprocessor Architecture, Programming and application', With the 8085/8080A ", 3rd Edition, Penram International Publishing house – 1997.
2. Singh, I.P. 'Microprocessor systems ' Module 9' Microcontrollers & their application 'IMPACT learning material series, IIT, New Delhi, 1997.

REFERENCES

1. Douglas V.Hall, 'Microprocessors and Interfacing – Programming and Hardwar, 2nd Edition, Mc Graw Hill. 1992.
2. John. B.Peatman,' Design with Microcontrollers', McGraw Hill Book Company, 1988.
3. Kenneth. C.Shot, "Microprocessor and programmed logic', Prentice Hall of India, 2nd edition, 1987.

4. Microcontroller Hand Book, Intel 1984

MM 100 ***Sessional 30***
Time 3 Hrs ***Theory 70***
L T P ***Pass Marks 40***
3 1 0

EEE603
Control System II

MM 100 *Sessional 30*
Time 3 Hrs *Theory 70*
L T P *Pass Marks 40*
3 0 0

EEE604
Electrical Engineering Materials

MM 100 *Sessional 30*
Time 3 Hrs *Theory 70*
L T P *Pass Marks 40*
3 1 0

ECS502/ ECS607
Operating System

Objective: To introduce basic concepts of operating system and its design.

NOTE : **Ten** questions are to be set taking two questions from each unit. The student has to attempt **FIVE** questions selecting ***one question from each unit***. The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **Introduction:** Operating System and function, evolution of operating systems, Batch, interactive, time sharing and real time system, System protection, distributed systems, methodologies for implementation of O/S service system calls, system programs, Interrupt mechanism.

Unit II **Concurrent Processes**: Process concept, Principle of concurrency, Product/ Consumer problem, Critical section problem, Semaphores, Classical problems in concurrency, Inter processes communication, Process generation, Process scheduling

CPU Scheduling: Scheduling concept, Levels of scheduling, Performance criteria, scheduling algorithm, Evolution, multiprocessor scheduling.

Unit III **Memory Management**: Base machine, resident monitor, multiprogramming with fixed partition, Multiprogramming with variable partition, Multiple base register, Paging, Segmentation, paged segmentation, Virtual memory concept, Demand paging, Performance, paged replaced algorithm, allocation of frames, thrashing. Cache memory organization, Impact on Performance

Unit IV **Device Management**: Hardware organization, devices scheduling policies

Deadlock: System model, Deadlock characterization, prevention, avoidance and detection, Recovery from deadlock combined approach.

Unit V **I/O Management and Disk Scheduling**: I/O devices and the organization of I/O function, I/O buffering, disk I/O, operating system design issues

Protection: Mechanisms and policies, implementation

File system: File concept, file organization and access mechanism, file directories, file sharing, implementation issues: hierarchy and device management.

Prerequisite: Computer Organization

References:

1 Silberschatz & Galvin(5/e), Operating System Concepts, Addison Wesley, 1998
2 Madnick & Donovan, Operating Systems, Mcgraw Hill,1996
3 Tanenbaum, A.S ., Modern Operating System, PHI , 1997
4 A.S. Godbole , Operating Systems,TMH, 1997
5 Deitel H.M.(2/e), An introduction to operating system concepts, Addison Wesley,1989

MM 50
Time 3 Hrs
L T P
0 0 2

Sessional 15
Theory 35
Pass Marks 25

EEE651
CAD of Electrical Machines Lab

MM 50 ***Sessional 15***
Time 3 Hrs ***Theory 35***
L T P ***Pass Marks 25***
0 0 2

EEC653
POWER ELECTRONICS LABORATORY

Minimum 8 experiments shall be performed

1. SCR triggering circuits.
2. SCR and Triac phase control circuits.
3. Fully controlled single-phase thyristor bridge.
4. Voltage commutated DC chopper.
5. Current commutated DC chopper.
6. Microprocessor based three-phase thysistor bridge
7. Series connected single-phase converters.
8. Series invertes.
9. IGBT and MOSFET single phase inverters
10. IGBT and MOSFET choppers.
11. Extinction angle control of converter.

MM 50 *Sessional 15*
Time 3 Hrs *Theory 35*
L T P *Pass Marks 25*
0 0 2

EEC654
MICROPROCESSOR AND MICRO CONTROLLERS LAB

Minimum 8 experiments shall be performed

1. 8 bit multiplication and division.

2.16 bit multiplication and division

3. Waveform generation using 8255 m\d DAC

4. Interfacing of ADC 0809

5. Interfacing of relay circuit

6. Generation of firing pulses for 1 phase full converter

7. Generation of firing pulses for 3 phase full converter

8. Study of micro controller kits

9. Programming exercises on 8051/8031 microcontroller

10.Generation of gate pulses for l phase Inverter

11.Stepper motor Interface

12.Interfacing of 7 segment LED displays

MM 100 *Sessional 30*
Time 3 Hrs *Theory 70*
L T P *Pass Marks 40*
3 1 0

EEE701
POWER SYSTEM PROTECTION AND SWITCH GEAR

OBJECTIVE: On completion of the course, the students will have a knowledge of the various types of relays, protection of lines and apparatus and theory and working of circuit breakers and necessary design skills in these areas.

Note : **Ten** questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit.*** The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **RELAYS AND RELAY CHARACTERISTICS AND RELAYING SCHEMES**

Basic ideas of short circuit currents and concepts of relay protection – basic terminology- essential qualities of a protective relay – classification of protective relays and protective schemes-operation relays-directional overcurrent relays-distance relays-differential relays-negative sequence relays-earth fault protection –reverse power protection – electromagnetic and solid state relays.

Unit II **APPARATUS AND LINE PROTECTION**

Application of over current relays and distance relays to feeder protection – ring main protection- busbar protection-carrier current protection of transmission lines-protection of generators and transformers.

Unit III **PROTECTION AGAINST OVER VOLTAGES**

Over voltages due to Lightning and switching – arcing grounds – Peterson Coil – methods of protection against over voltages – ground wires-surge absorber and diverters – Power System earthling – Earth resistance – Neutral Earthing-basic ideas of insulation coordination.

Unit IV **THEORY OF ARC QUENCHING**

Arcing phenomena and arc quenching – circuit breaker rating – RRRV – current chopping and capacitance current breaking – characteristics of HRC fuses – d.c. circuit breaking.

Unit V CIRUIT BREAKERS

Bulk oil and oil minimum circuit breakers – air blast circuit breakers – vacuum and SF6 circuit breaker – Rating, speed of operation, selection and testing of circuit breakers.

TEXT BOOKS

1. Badri Ram Vishwakarma, & D.N., ‘power system protection and switchgear’, Tata-McGraw Hill publishing company Ltd., 1995.
2. Sunil S.Rao, ‘Protective Switch Gear’, khanna Publishers, New Delhi, 1999.

REFERENCES

1. Wadhwa, C.L., ‘Electrical Power System’, Wiley Eastern Ltd, 1983.
2. Uppal. S.L. ‘Electrical power’ Khanna publication, Delhi, 1976.
3. Ravindranath, B. and Chander, N., ‘Power Systems Protection and Switch Gear’, Wiley Eastern Ltd., 1977.

MM 100 *Sessional 30*
Time 3 Hrs *Theory 70*
L T P *Pass Marks 40*
3 1 0

EEE702
Power Generation Systems

OBJECTIVE: To understand the layout and working details of different types of conventional and non-conventional power generation systems.

Note : **Ten** questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit.*** The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **ECONOMICS OF GENERATION**

Load and load duration curve -load, demand and diversity factors -plant capacity and plant use factor –choice of type of generation -choice of size and number of units -cost of energy generated – tariffs.

Unit II **THERMAL AND HYDRO POWER SYSTEMS**

Comparison of power systems -layout and working of steam, diesel, low and high head hydropower plants - pumped storage plants.

Unit III **ECONOMIC OPERATION OF STEAM-HYDRO PLANTS**

Interconnected operation -division of load in interconnected systems -loss formula coefficients – economic loading of steam power plants and steam hydro power plants.

Unit IV **NUCLEAR POWER PLANTS**

Principle of nuclear power generation -location -advantages and disadvantages of nuclear power plants - types of nuclear reactors and their comparison -layout of reactors-reactor control - reactor safety -waste disposal.

Unit V **NON-CONVENTIONAL POWER PLANTS**

Basic concepts, principle of working and layout of MHD, solar, wind, tidal, biomass and geothermal power generation.

TEXT BOOKS

1. Soni, Gupta, Bhatnagar and Chakrabarti, , ‘A text book on Power Systems Engg.', Dhanpat Rai and Sons, New Delhi, 1997.

2. Wadhwa, C.L.,' Generation, Distribution and Utilisation of Electrical Energy', Wiley Eastern Ltd N.D. 1992.

REFRENCES

1. Deshpande M.V.,'Elements of Electrical Power systems Design Pitman, New Delhi', TMH,1990.
2. Starr, A. T., ‘Generation, Transmission and Utilisation of Electrical Power', ELBS edition, New Delhi, 1978.
3. Uppal, S.L.,' Electrical Power', Khanna Publishers, New Delhi, 1992.

MM 100 *Sessional 30*
Time 3 Hrs *Theory 70*
L T P *Pass Marks 40*
3 1 0

EEE703
COMPUTER METHODS IN POWER SYSTEM ANALYSIS

OBJECTIVE : On completing the course, the students will be able to make analysis of power systems for load flow, stability and short circuits.

Note : **Ten** questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit.*** The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I. **MODELLING OF POWER SYSTEM COMPONENTS FOR COMPUTER ANALYSIS**

Circuit model of synchronous machines- transformers-induction motors – Representation – single line diagram – per unit quantities - per unit impedance diagram – primitive impedance and admittance matrix – Busimpedence matrix- bus admittance matrix and its formation – bus impedance matrix and its formation.

Unit II **POWER FLOW ANALYSIS**

Formation of power flow equation using admittance matrix – solution by Gauss-Seidel and Newton-Raphson methods for systems with voltage controlled buses – flow chart for the above methods.

Unit III **SYMMETRICAL SHORT CIRCUIT ANALYSIS**

Types of faults in power systems – symmetrical fault analysis symmetrical fault analysis through bus impedance matrix – current limiting reactor, transient and sub-transient reactances.

Unit IV **UNSYMMETRICAL SHORT CIRCUIT ANALYSIS**

Symmetrical components – sequence impedance of lines, transformers, synchronous machines and induction motors – unsymmetrical faults – analysis of single line to ground, line to line – double line to ground faults – using zbus and using symmetrical component transformations.

Unit V **STABILITY STUDIES**

Steady state and transient stability – stability limits – swing equation for signle machine infinite bus system – equation area criterion – solution of swing equation by modified Euler method- Qualitative treatment of multimachine stability analysis.

TEXT BOOKS

1. John J Grainger & Stevenson. W.D., ‘ Power System Analysis’, McGraw Hill. 1994.
2. Wadhwa, C.L., ‘Electrical Power Systems’, New age international Pvt. Ltd. Publishers, 1995.
3. Stagg, C.W. and Elabiad, A.H. Computer Methods in Power System Analysis’, McGraw Hill International Book Company, 1990.

REFERENCES

1. Nagrath, J. and Kothari, D.P. ‘Modern Power System Analysis’, Tata McGraw Hill, New Delhi, 1989.
2. Elgerd, O.I ‘Electric Energy System Theory’, An Introduction, Tata McGraw Hill Publishing Company, 1991.
4. Pai, M.A. ‘Computer Techniques in Power System Analysis Tata McGraw Hill, New Delhi,

1979.

MM 100 ***Sessional 30***
Time 3 Hrs ***Theory 70***
L T P ***Pass Marks 40***
3 1 0

EEE704
ELECTRICAL POWER UTILIZATION

OBJECTIVE: On completing the course, the students will be able to design illumination systems, traction' systems, make suitable choice of electronic drives, refrigeration and air- conditioning systems for given applications.

Note : **Ten** questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit.*** The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **ILLUMINATION**

Production of light -lighting calculations -determination of MHCP and MSCP -Polar curves of different types of sources -Roasseau's construction -photometers -interior and exterior illumination systems -lighting schemes -Design of lighting schemes -factory lighting -flood lighting - electric lamps -gaseous discharge lamp-high pressure and low pressure neon signs- light frequency , low pressure discharge tubes.

Unit II **ELECTRIC FURNACES AND WELDING**

Resistance, inductance and Arc Furnaces -Construction and fields of application -control equipment, efficiency and losses -high frequency dielectric heating, resistance -welding equipment -mechanical, thyratron, current and energy actuated control devices -characteristics of carbon and metallic arc welding -butt welding -spot welding.

Unit III **ELECTIRIC DRIVES AND CONTROL**

Electric drives -Group drive -Individual drive -selection of motors -starting characteristics - Running characteristics -mechanical features of electric motors -Electric drives for general factory, textile mills -printing press, mines, hoists, lifts, conveyers, pumps, blowers, and ship propulsion -choice of drives -calculation of power requirement power factor improvement.

Unit IV **ELECTRIC TRACTION**

Traction system -series, parallel control of D.C. motors, open circuited, shunt and bridge transition -tractive effort calculations -electric braking -control. wire -A.C. traction -recent trend in electric traction.

Unit V **REFRIGERATION AND AIR-CONDITIONING**

Control of temperature -protection of motors -basic wiring diagram -simple heat load and motor calculations. Air-conditioning -function of complete air conditioning system -type of compressor motor and fan motor-wiring diagram for a typical air conditioning unit- estimation of tonnage capacity and motor power.

TEXT BOOKS

1. Uppal, S.L., 'Electrical Power', Khanna publishers, New Delhi, 1992.
2. Gupta, J.B., 'Utilisation of Electrical Energy and Electric. Traction', S.K.Kataria and sons, 1990.

REFERENCES

1 Partab, .H., 'Art and Science of Utilisation of Eleclrical Energy', Dhanpat Rai and Sons, New Delhi, 1986. ,

2. Wadhwa. C.L., 'Generation, Utilisation and Distribution' Wiley Eastern Ltd,1992.
3. Tripathy S.C., 'Electric Energy Utilization And Conservation', Tata McGraw Hill, 1991.

MM 100 ***Sessional 30***
Time 3 Hrs ***Theory 70***
L T P ***Pass Marks 40***
3 1 0

EMA701
Operation Research

MM 100 *Sessional 30*
Time 3 Hrs *Theory 70*
L T P *Pass Marks 40*
3 0 0

EEC705
PRINCIPLES OF COMMUNICATION SYSTEMS

OBJECTIVE : On completing the course the students will have a knowledge of different modulation techniques and systems and fundamental of television and radio.

Note : **Ten** questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit.*** The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I AM AND FM SYSTEMS

Principles of Amplitude Modulation, single and double side band – suppressed carrier system and frequency modulation – varactor diode and reactance modulator – AM detectors – FM discriminators – AM and FM transmitters and receivers.

Unit II PULSE AND DIGITAL COMMUNICATION

Sampling theorem – pulse modulation techniques – PAM, PWM and PPM concepts – PCM encoder and decoder – multiplexing – time division multiplexing and frequency division multiplexing.

Unit III DATA COMMUNICATION TECHNIQUES

Data transmission using analog carries – MODEMS employing BSK, QPSK, QAM and MSK – asynchronous and synchronous transmission – error control techniques – data communication protocols – link oriented protocols – asynchronous protocols.

Unit IV MODERN COMMUNICATION SYSTEMS

Microwave links, Optical communication principles – Satellite communication systems – Pagers – Cellular phones – EPABX.

Unit V TELEVISION SYSTEM

Requirements and standards – need for scanning – interlaced scanning – VSB modulation – types of camera tubes and picture tubes – B/W and colour systems – PAL – CCTV – Cable TV – Microwave relay systems.

TEXT BOOKS :

1. Willain Stallings, 'Data and Communications', 4th condition Prentice Hall of India Pvt Ltd., 1994.
2. Kennedy, G.,'Electronic Communication System', McGraw Hill, 1987.

REFERENCES :

1. Simon Haykins, 'Communication Systems', 3rd Edition, John Wiley, 1995.
2. Tabu & Schilling, 'Principles of Communication Systems', 2nd Edition, McGraw Hill, 1995.

MM 50 *Sessional 15*
Time 3 Hrs *Practical 35*
L T P *Pass Marks 25*
0 0 2

EEE751
Power system protection and Switchgear Lab

MM 100 *Sessional 30*
Time 3 Hrs *Practical 70*
L T P *Pass Marks 50*
0 0 3

EEE760
Minor Project and Seminar

The student has to take one project and required to present a seminar on it for final evaluation.

MM 100 *Sessional 30*
Time 3 Hrs *Theory 70*
L T P *Pass Marks 40*
3 0 0

EHU801/ EHU501/ EHU401
INDUSTRIAL ECOMOMICS AND BUSINESS MANAGEMENT

OBJECTIVE: The course aims at knowing l)How the micro and macro economic principles are useful for firms' decision making purposes, 2)The latest trends in banking, 3)The maintenance of accounts by business firms and also countries engaged in international trade, 4)and also how the basic & general management concepts (with emphasis on marketing and personnel) are helpful for managerial purposes.

Note : **Ten** questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit.*** The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **INDUSTRIAL ECONOMICS**

Elasticity of demand and supply -Demand forecasting methods -consumption laws -Types of competitions -Time elements -Break even analysis -National income accounting -Keyenesion employment theory -Multiplier and accelerator -Trends in industrialisation in India -Economics of sale -Production, planning and control.

Unit II **MONEY ,BANKING AND FINANCIAL MANAGEMENT**

Nature and functions of money -Functions of commercial and central banking -Credit creation in the banks " Balance of payment and trade -The problem of foreign exchange -Exchange control - Devaluation and Revaluation -Source of industrial finance -Principles of accounting -Preparation of balance sheet - Cash flow statement - Management accounting.

Unit III **PRINCIPLES OF MANAGEMENT**

Managerial functions -Scientific management -Merits and demerits of different types of business organization - Advanced techniques in management: MBE,MBO,MBC,MBP ,MIS -Quantitative techniques in management.

Unit IV **MARKETING MANAGEMENT**

Marketing definition -Market research -Need for marketing -Sales forecasting -Product life cycle Market segmentation.

Unit V **PERSONNEL MANAGEMENT AND INDUSTRIAL PSYCHOLOGY**

Selection and recruitment -Training and development ..Job evaluation and merit rating -Fatigue - Accidents -causes and prevention -The concepts of industrial relations and causes of industrial disputes -Worker participation -QWL -Quality work life.

References:

1. Dewtt. K.K.,'Modern Economic Theory" S.Chand & Co (r)Ltd(r) 1999.
2. Nair N.G., Latha Nair, 'Personnel Management and Industrial Relations', S. Chand & Co. Ltd.,1999,
3. Craig Peterson H & Cris Lewis W, 'Managerial Economics' PHI-1996
4. Kooutsnnis, ‘Modern Economic Theory', PHI, 1996.
5. Maheswari S.N.: An Introduction to Accountancy' Vikas Publishing House 1999 Edn.
6. Robbins(r) P .Stephen, Coutter Mary, 'Management' PHI 1998

7. Koontz Harold, O Donnel Cyril, Weihirch Heinz, 'Management', TMH-1983.
8. Cascaio F.Wayne, 'Managing Human Resources', Mc Graw Hill, Inc(r) 1995
9. Millkoovich, Boudreau, 'Personnel/Human Resource Management '. Richard-D Iruin Inc.- 1996.
10. Monoppan Arun, Sayadain S(r)Mirza, 'Personnel Management', TMH(r) 1997 Edn.
11. Kootler Philip, 'Marketing Management', PhI 1998 Edn.

MM 350 ***Sessional 100****
L T P ***Final 250*****
0 0 15 ***Pass Marks 175***

EEE860
Major Project

The student is required to undergo a project work for which the topic will be decided with mutual concern of faculty in charge (guide) and student. The report of the work is required to submit in the form of Dissertation. The student will be required to submit his Dissertation work till 10th April of the concerned year.

Faculty in charge for each student will be notified within one week of start of Seventh Semester. After that topic should be finalized and a copy of that decision must be submitted to the office of Head of the department within 15 days of notification of Faculty in charge.

Evaluation : Routine progress monitoring of the project will take place by departmental committee. The project Sessional marks to be awarded on the basis of presentation and demonstration by departmental committee.

Final examination will take place at the end of eighth semester, when complete presentation of project need to be done.

*Sessional 100 from Routine presentation

** Final 250 includes 100 marks of dissertation, 75 marks of demonstration and 75 marks of viva-voce.

MM 100 *Sessional 30*
Time 3 Hrs *Theory 70*
L T P *Pass Marks 40*
3 0 0

EEE801
STATIC RELAYS

OBJECTIVE: On completion of this course, the students will know the basics of protection and functioning of different types of static relays.

Note : **Ten** questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit.*** The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **INTRODUCTION**

Philosophy of power systems protection and its requirements -Conventional Vs static relays -generalised characteristics and operational equations of relays -steady state and transient performance of signal deriving elements, signal mixing techniques and measuring techniques - CTs and PTs in relaying schemes -saturation effects – stabilising resistors.

Unit II **OVER CURRENT PROTECTION**

Static relay using analog and digital ICs for over current protection. time, current characteristics, inverse definite time relay- instantaneous over current relay -directional over current relay-applications -differentials relays.

Unit III **GENERATOR AND TRANSMISSION LINE PROTECTION**

Static relay circuits for generator loss of field, under frequency, distance (impedance, reactance, mho and special characteristics -reverse power relays.

Unit IV **CARRIER PROTECTION AND TESTING OF RELAYS**

Static relay circuits for carrier current protection -steady state and transient behaviour of static relays -testing and maintenance of relays -tripping circuits using thyristors.

Unit V **MICROPROCESS BASED RELAYS**

Hardware and software for the measurement of voltage, current, frequency and phase angle -microprocessor based implementation of overcurrent, directional, impedance and mho relays.

TEXT BOOKS

1. Ram.B., 'Fundamentals of Microprocessors and Microcomputer', M/s. Dhanpat Rai &sons, New Delhi, 1992.

2. Madhava Rao T.S., 'Power System Protection -Static Relays', McGraw Hill, New Delhi,1984

REFERNCE

1. Van. C. Warrington, 'Protective Relays -Their Theory and Practice', Vols. I & 11,

Chapman & Hall Ltd. London, 1969.

MM 100 ***Sessional 30***
Time 3 Hrs ***Theory 70***
L T P ***Pass Marks 40***
3 0 0

EEE802
RENEWABLE ENERGY SYSTEMS

OBJECTIVE: To get an in depth knowledge of various systems of renewable energy sources and the ability to give suitable specifications.

Note : **Ten** questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit.*** The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **GENERAL**

Primary and commercial energy resources -study of availability, energy consumption pattern and growth rate in India, Non conventional energy sources. availability , Economics and efficiency.

Unit II **SOLAR PHOTOVOLTAICS**

Silicon PN junction, PV circuit properties and laods, PV fed drives.

Unit III **WIND ENERGY**

Energy from the wind -General theory of wind mills -types of wind mills -performance of wind machines -wind power -efficiency- wind generator characteristics.

Unit IV **TIDAL ENERGY AND GEOTHERMAL**

Energy from tides and waves -working principles of tidal plants -tidal power generations . Geothermal energy -principle of working of geothermal power plants.

Unit V **BIO-ENERGY**

Energy from Bio-mass -Biogas plants -various types -Industrial wastes -Municipal waste - Burning -plants -Energy from the Agricultural wastes -Applications.

TEXTBOOKS

1. John W.Turdell, Anthony W.Wein "Renewable energy resources" CLBS, 1987
2. Rai, G.D.,'Non conventional Energy Sources', Khanna publishers, 1993.

REFERENCES

1. Rai , G.D.,'Solar Energy Utilisation', M/S.Khanna publishers, 4th edition, 1991.1
2. Ronald Shaw, 'Wave energy: (A design challenge)' Ellis Horwood Limited Publishers, Ist edition, 1982.
3. Daniel Hunt. V., 'Wind power -A hand book of WECS systems', Van Nostrand Co., New York, 1981.

MM 100 *Sessional 30*
Time 3 Hrs *Theory 70*
L T P *Pass Marks 40*
3 0 0

EEE803
HIGH VOLTAGE ENGINEERING

OBJECTIVE: To learn the methods of high voltage and current generation and their measurement and high voltage testing procedures.

Note : **Ten** questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit.*** The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **OVERVOLTAG.ES AND INSULATION COORDINATION**

Causes & types of over voltages -Lightning, switching, temporary over voltages -Effects of over voltages on power system components -EMI and EMC protection against over voltages - Surge diverters -Insulation co-ordination.

Unit II **GENERATION OF HIGH VOLTAGES AND CURRENTS**

Generation of high AC and DC, impulse and switching voltages – Generation of high impulse currents.

Unit III **MEASUREMENT OF HIGH VOLTAGES AND HIGH CURRENTS**

Measurement of high AC, DC, impulse and switching voltages using sphere gaps, peak voltmeters, potential dividers, high speed CRO and digital techniques; -Measurement of high currents.

Unit IV **DIELECTRIC BREAKDOWN**

Self and non self restoring insulation -Breakdown in gases, liquids and solids -Breakdown in uniform and non-uniform fields -partial discharges -Corona.

Unit V **HIGH VOLTAGE TESTING**

Standards and specifications -Types of tests -Testing and fault diagnostics -Testing of circuit breakers, isolators and air switches -Testing of insulators, bushing and surge diverters.

TEXT BOOKS

1. Wadhwa,C.L., High voltage engineering, Wiley Eastern Limited, New Delhi, 1994.
2. Naidu,M.S. and Kamaraju,V., High Voltage Engineering, Tata McGraw Hill Publishing Company, New Delhi, 1994, 2nd edition.

REFERENCES

1. Gallaghar,P.J. and Pearmin,A.J., High Voltage Me-asurement, Testing and Design, John Wiley and Sons, New York, 1982.
2. Kuffel,E., and Abdullah,M., High Voltage Engineering, Pergawon Press, Oxford, 1970.
3. Kuffel,E and Zaengl W.S.,'High Voltage Engineering Fundamental." Pergamon press, Oxford, London, 1986.

MM 100 *Sessional 30*
Time 3 Hrs *Theory 70*
L T P *Pass Marks 40*
3 0 0

EEE804
POWER SYSTEM OPERATION AND CONTROL

OBJECTIVE: To gain the concepts of economic load dispatching and power frequency control and reactive power control of power systems.

Note : **Ten** questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit.*** The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **INTRODUCTION**

Approach adopted in utilities for providing reliable, quality and economic electric power supply- necessity for regulation of system frequency and voltage -p-f and Q- V control structure- Recent trends in real time control of power systems- Load dispatching- System load characteristics- load curves- chronological load curves- load duration curves- energytime curves- load factor- utilization factor- diversity factor- coincidence factor- demand factor- reserve requirements- installed reserve -spinning reserve- cold reserve- hot reserve- operational restrictions- load dispatching.

Unit II **PRE-REQUISITIES TO LOAD DISPATCHING**

Load forecasting -components of system load- classification of base load- forecasting of the base load by method of least square fit- introduction to unit commitments- constraints on unit commitment- unit commitment using priority ordering.

Unit III **POWER FREQUENCY CONTROL**

Local control- Power control mechanism of individual machine- mathematical model of speed governing mechanism -speed load characteristics of governing mechanism- regulation of two generators in parallel- System control- Division of power system into control areas- LFC control of a single area- static and dynamic analysis of controlled system- proportional plus integral control of a single area- LFC control of two area system – uncontrolled case- static and dynamic response- Tie line with frequency bias control of two area.

Unit IV **ECONOMIC DISPATCH CONTROL**

Incremental cost curve- co-ordination equations with loss neglected -solution by iteration- co-ordination equation with loss included (No derivation of Bmm co-efficients)- solution of co-ordination equations using Bmm co-efficients by iteration method- Base point and participation factors - Economic dispatch controller added to LFC.

Unit V **REACTIVE POWER VOLTAGE CONTROL**

Local control - Fundamental characteristics of excitation system- block diagram model of exciter System control- Generation and absorption of reactive power- method of voltage control-Injection of reactive power – static shunt capacitor/Inductor V AR compensator- Tap changing transformer.

TEXT BOOK

1. Olle I. Elgerd, 'Electric Energy System Theory -An Introduction' Tata McGraw Hill Publishing Company, New Delhi, 1991 2nd edition.

REFERENCES

1. Allem. J. Wood. Bruce. F.Wollenbarg, 'Power Generation, Operation and Control,' John Wiley and Sons, 1984.
2. Weedy, B.M.,. Electric Power System' John Wiley and Sons, Elsevier Publishing

Company, Amsterdam , 1972.

MM 100 ***Sessional 30***
Time 3 Hrs ***Theory 70***
L T P ***Pass Marks 40***
3 0 0

EEE805
POWER SYSTEM DYNAMICS

OBJECTIVE: At the end of the course,the studen.ts will be able to model the power systems for static and dynamic stability studies.

Note : **Ten** questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit.*** The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **STABILITY CONSIDERATIONS**

Dynamic modelling requirements -voltage and angle stability -equal area criterion -effect of damper winding -effect of AVRs and Governors -Critical fault clearing time and angle - numerical integration techniques.

Unit II **SYNCHRONOUS MACHINES**

Park's transformation -flux linkage equations -formulation of normalised equations -state space current model -subtransient inductances and time constants -simplified models of the synchronous machine -turbine, Generator -steady state equations and phasor diagrams calculation of machine parameters from manufacturing data.

Unit III **DYNAMICS OF SYNCRONOUS MACHINES**

Mechanical relationships -electrical transient relationships -saturation in synchronous machines - adjustment of machine models -Park's equation in the operational form.

Unit IV **INDUCTION MACHINE MODELLING**

Induction motor equivalent circuits and parameters -free acceleration characteristics -dynamic performance -changes in load torque -effect of three phase short circuit -effect of unbalanced faults.

Unit V **DYNAMIC STABILITY**

Transient and dynamic stability distinction -system response to small disturbances -linear model of unregulated synchronous machine and its oscillation modes -regulated synchronous machine -distribution of power impacts –effects of excitation on stability - supplementary stabilisation signals.

TEXT BOOK

1. Elgerd, O.I., 'Electric Energy Systems Theory', TMH, New Delhi,1991, 2nd edition.
2. Anderson, P.M. and Fouad, A.A., 'Power System Control, and Stability', Galgotia Publ., New. Delhi, 1981.

REFERENCES

1 Krause, P.C. ‘Analysis of Electric Machinery' McGraw-Hill International Editions, ,1986.

2 Concordia, C., 'Synchronous Machines', Wiley, 1951.

3 Kimbark, 'Power System Stability', Vol. I to III, John Wiley,1950.

MM 100 *Sessional 30*
Time 3 Hrs *Theory 70*
L T P *Pass Marks 40*
3 o 0

EEE806

MODERN CONTROL SYSTEMS

OBJECTIVE To learn the concepts of state variable techniques handling non-linear systems and basics of optimal and adaptive control.

Note : **Ten** questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit.*** The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **STATE VARIABLE SYSTEMS**

Controllability and observability- state variable feedback and its effect on controllability and observability - elements of observer theory.

Unit II **NON LINEAR SYSTEM**

Common types of non-linear phenomena- linearization- singular points- phase plane method- construction of phase trajectories- .applications to ON-OFF control systems.

Unit III **STABILITY OF NON-LINEAR SYSTEMS**

Basic concepts- derivation of describing functions -stability of non- linear systems by describing ': function method- jump resonance- Liapunov's method of stability studies- Popov's criterion.

Unit IV **POLE PLACEMENT AND HIGH GAIN CONTROL TECHNIQUES**

Pole placement technique by state feed back for linear SlS0 time invariant system- Theory of high gain feedback - back advantages-Pole placement technique along with high gain feed back control.

Unit V **MODERN CONTROL APPROACHES**

Optimal control, adaptive control, Robust control and intelligent control methods.

TEXT BOOKS

1. Nagarth and Gopal, 'Control System Engineering', Wiley Eastern, reprint, 1995.
2. Stanley M. Shiners, ‘Modern Control System theory and Design' John Wiley and Sons, Singapore, 1992.

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REFERENCES

1. Ogata K.'Modern Control Engineering' P.H.I. New Delhi,1982.
3. Chalam V.V, 'Adaptive Control Systems', Marcel Dekker, INC, New York and Easel, 1987

MM 100 *Sessional 30*
Time 3 Hrs *Theory 70*
L T P *Pass Marks 40*
3 1 0

OBJECTIVE: To understand the working of HVDC links and their control and basics of EHV AC transmission.

Note : **Ten** questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit.*** The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **GENERAL ASPECTS AND CONVERTER CIRCUITS**

Historical developments -HV AC and HVDC links. comparison -economic, technical performance -reliability -limitation -properties of thyristor converter circuits -assumptions - choice of best circuit for HVDC converters -transformer connections.

Unit II **BRIDGE CONVERTERS- ANALYSIS AND CONTROL**

Analysis with gate control but no overlap -with overlap less than 60 degrees -operation of inverters -basic means of control -power reversal- desired features of control -actual control characteristics.

Unit III **MISOPERATION OF CONVERTERS AND PROTECTION**

Converter disturbance -bypass action in bridges -commutation failure -basics of protection. DC reactors -voltage and current oscillations -circuit breakers -.over voltage protection.

Unit IV **HARMONICS, FILTERS AND CONVERTER CHARTS**

Characteristics and uncharacteristic harmonics -troubles due to harmonics -ham1onic filters. converter charts of direct current and voltage -active and reactive power.

Unit V **EHV AC TRANSMISSION**

Design of EHV lines based on steady state limits and transient over voltages -design of extra of HV cable transmission -XLPE cables -gas insulated cables -corona.

TEXT BOOK

1. Padiyar, K.R.'HVDC transmission systems', Wiley Eastern Ltd.,New Delhi,1992.

REFERENCES

1. Arrilaga, .J.,'High voltage direct current transmission', Peter Peregninver Ltd., London, U.K., 1983.
2. Rakosh Das Begamudre, ' Extra HVAC Transmission Engineering', Wiley Eastern Ltd.,Madras, 1990.
3. Kimbark. E. W., Direct current transmission -Vol I', Wiley Interscience, New York, 1971.

MM 100 ***Sessional 30***
Time 3 Hrs ***Theory 70***
L T P ***Pass Marks 40***
3 o 0

MODERN CONTROL SYSTEMS

OBJECTIVE To learn the concepts of state variable techniques handling non-linear systems and basics of optimal and adaptive control.

Note : **Ten** questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit.*** The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **STATE VARIABLE SYSTEMS**

Controllability and observability- state variable feedback and its effect on controllability and observability - elements of observer theory.

Unit II **NON LINEAR SYSTEM**

Common types of non-linear phenomena- linearization- singular points- phase plane method- construction of phase trajectories- .applications to ON-OFF control systems.

Unit III **STABILITY OF NON-LINEAR SYSTEMS**

Basic concepts- derivation of describing functions -stability of non- linear systems by describing ': function method- jump resonance- Liapunov's method of stability studies- Popov's criterion.

Unit IV **POLE PLACEMENT AND HIGH GAIN CONTROL TECHNIQUES**

Pole placement technique by state feed back for linear SlS0 time invariant system- Theory of high gain feedback - back advantages-Pole placement technique along with high gain feed back control.

Unit V **MODERN CONTROL APPROACHES**

Optimal control, adaptive control, Robust control and intelligent control methods.

TEXT BOOKS

1. Nagarth and Gopal, 'Control System Engineering', Wiley Eastern, reprint, 1995.
2. Stanley M. Shiners, 'Modern Control System theory and Design' John Wiley and Sons, Singapore, 1992.

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REFERENCES

1. Ogata K.'Modern Control Engineering' P.H.I. New Delhi,1982.
2. Chalam V.V, 'Adaptive Control Systems', Marcel Dekker, INC, New York and Easel, 1987

MM 100 ***Sessional 30***
Time 3 Hrs ***Theory 70***
L T P ***Pass Marks 40***
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PRINCIPLES OF ROBOTICS

OBJECTIVE: On completion of this course, the students will have a knowledge of different types of robots, their operations, control, programming and applications.

Note : **Ten** questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit.*** The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **TYPES OF ROBOTICS**

Automation and Robotics- Robot Anatomy- Classification of Robots by DOF motion-

platform- power source- intelligence and application area.

Unit II BASIC COMPONENTS OF ROBOTS

Manipulators : Wrists- End effectors- control units- power units- Robot sensors- proximity sensors- range sensors- tactile sensors- visual sensors- sensors for mobile robots.

Unit III ROBOT MOTION ANAL YSIS AND CONTROL

Introduction to manipulator kinematics- Homogeneous transformations and Robot Kinematics-manipulator path control- robot dynamics - configuration of a Robot controller- Obstacle avoidance.

Unit IV ARTIFICIAL INTELLIGENCE

AI techniques- LISP programming- AI and Robotics- LISP in the factory- sensoring and digitizing function in machine vision- image processing and analysis- training and vision system- natural language processing- speech recognition- legged locomotion- collision avoidance- natural networks computing.

Unit V ROBOT PROGRAMMING AND APPLICA TIONS

Method of Robot Programming- lead through programming methods- A robot program as a path in space- motion interpolation- weight- signal and delay commands- branching- capabilities and limitations of lead through methods -Material handling- processing operations- Assembly and inspection- future applications.

TEXTBOOKS

1. Milell.P.Groover, Michell Wein, Roger.N.Nagel and Nicholas.G.Ordey, 'Industrial Robotics, Technology, Programming and applications', McGraw Hill, 1987.

2. Harry ,H.Poole, 'Fundamental of Robotics Engineering', VanNostrand Reinhold, New York, 1989.

REFERENCES

1. Demel Hunt, V.,'Smart Robots', Chapman and Hall, 1985.

2. Ranky, G.& Ho, C. Y., 'Robot Modelling', IFS (Publication) Ltd, UK, 1985. ,

3. Wenwar. L. Hall, Betlle. C. Hall, 'Robotics A user friendly introduction', Holt-Saunders, International Edition, Japan, 1985.

MM 100 ***Sessional 30***
Time 3 Hrs ***Theory 70***
L T P ***Pass Marks 40***
3 0 0

COMPUTER NETWORKS

OBJECTIVE: This course will render the knowledge of various layers involved in computer network. The course deals extensively with the advanced communication techniques like electronic mail, Internet and video conferencing.

Note : **Ten** questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit.*** The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I INTRODUCTION

Goals and applications of Networks, Network structure and architecture. The OSI

reference model, services. Physical Layer -Transmission Media, Switching methods, ISDN services, Terminal Handling.

Unit II **MEDIUM ACCESS SUBLAYER AND DATA LINK LAYER**

Medium Access sublayer -channel allocations, LAN -topology -protocols -ALOHA protocols - token bus and token ring protocols -overview of IEEE standards -FDDI. Data link layer-Design issues -error detection and correction -Elementary data link protocols, sliding window protocols.

Unit III **NETWORK AND TRANSPORT LAYER**

Network layer: Design issues -Point-lo-Point Network,, routing, congestion control –Internet working -principles -bridges. routing protcols. Transport Layer –Design issues, connection management.

Unit IV **SESSION AND PRESENTATION LAYER**

Session layer -Design issues, remote procedure call. Presentation Layer -Design issues, data compression techniques, cryptography.

Unit V **APPLICATION LAYER**

Application layer -Design issues -File Transfer, Access and management, Electronic mail, Virtual Terminals, Other applications. Example Networks -Internet and Public Networks -Arcnet, Eithernet. Introduction to TCP/IP.

TEXTBOOK

1. Tanenbaum, A.S., 'Computer Networks', Third Edition, Prentice Hall of India, 1996,

REFERENCES

1. Stallings, W., 'Data and Computer Communication',PHI,5th edition 1989.
2. Bertsekas, D., and R.Gall, 'Data Networks', Prentice Hal! International, 2nd edition, 1989.
3. Ahuja, V., 'Design and Analysis of Computer communication Networks, McGraw Hill,1985.

MM 100 ***Sessional 30***
Time 3 Hrs ***Theory 70***
L T P ***Pass Marks 40***
3 0 0

ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS

OBJCTIVE : This course aims at giving a knowledge of Expert systems, a system which has been developed to solve a lot problems.

Note : **Ten** questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit.*** The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **INTRODUCTION TO A.I.**

Problem solving concepts definition -Production systems -Search strategies: Hill climbing, back tracking, graph search (algorithm A and A) -properties of A * algorithm, monotone restriction Specialized production systems -AO* algorithm,

Unit II **SEARCHING METHODS**

Searching game trees: Minimax procedure, alpha -beta pruning -Introduction to predicate Calculus – Resoation refutation systems -Answers extraction.

Unit III REPRESENTATION OF KNOWLEDGE

STRIPS robot problem solving system -structured representations of knowledge: Semantic Nets, Frame, Scripts – Dealing with uncertainty: non monotonic reasoning, certainty factors, Fuzzy reasoning.

Unit IV AN INTRODUCTION TO EXPERT SYSTEMS

Forward chaining, Backward chaining -Development Process -Languages and Tools –Exploitation facilities – knowledge acquisition.

Unit VI AN INTRODUCTION TO NATURAL LANGUAGE UNDERSTANDING

Protection and leaning algorithms -Introduction to fuzzy systems.

TEXT BOOKS

1. Rich, E, 'Artificial Intelligence, Tata McGraw Hill International, 2nd Edition, 1991.
2. Nilsson, N.J., ' Principles of Artificial Intelligence, Narosa Publishing House, 1980.

REFERENCES

1. Forsyth, R.,' Expert systems, Principles and case studies, Chapman and Hill, 1985.
2. Keller, R.,' Expert System Technology Development and Application, Yourdon Press, 1987.
3. Rolston, D.W., 'Principles of Artificial Intelligence and Expert systems Development , McGraw Hill International Edition, 1988.

MM 100 ***Sessional 30***
Time 3 Hrs ***Theory 70***
L T P ***Pass Marks 40***
3 0 0

ECS814
COMPUTER GRAPHICS

OBJECTIVE: The objective of the course is to give an overview of Graphics system, various, input and output methods and the relevant fundamental algorithms for development of lines, curves, which finally extends to 2-D and 3-D Graphics and ultimately to visual realism.

Note : **Ten** questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit.*** The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I OVERVIEW OF GRAPHICS SYSTEMS

Display Devices -Hard copy Devices. Interactive Input Devices -Display Processors -The Graphical Kernel system -Output Primitives – Line drawing algorithms, Circle Generation algorithms -Character Generation.

Unit II INTERACTIVE INPUT METHODS

Pointing and Positioning techniques, Event handling, -Segmentation -2D Transformations - Windows and View ports -Window -to -View port Transformation -Clipping -Line Clipping - Polygon Clipping.

Unit III RASTER SCAN GRAPHICS

Scan conversion algorithms -Solid area scan Conversion -Polygon filling -Scan converting , polygons -Seed fill algorithms -Anti -aliasing, Halftoning.

Unit IV THREE DIMENSION CONCEPTS

3D Representations -Polygon surfaces -Curved surfaces. Fractal -Geometry Methods -Sweep representations -Octrees. 3D Transformations -Viewing in Three Dimensions -Projections - Viewing Transformation.

Unit V VISUAL REALISM

Hidden line and hidden surface removal -shading and colour models -Modelling methods.

TEXT BOOK

1. Computer Graphics " Theory and Practice', by Foley and Van Dam, Addision Wesley, 1996.

REFERENCES

1. Rogers, D.F., ' Procedural Elements for Computer Graphics', McGraw Hill, 1985.
2. Harrington, S..'Computer Graphics -A Programming approach', McGraw Hill, 2nd edition, 1987.
3. Hearn, D. and Baker, M.P.,' Computer Graphics, Second Edition, Prentice Hall of India, 1986.
4. Newmann, W.M. and Sproull, R.F., 'Principles of Interactive Graphics, McGraw Hill International Student Edition, 1982.

MM 100 ***Sessional 30***
Time 3 Hrs ***Theory 70***
L T P ***Pass Marks 40***
3 0 0

BIOMEDICAL INSTRUMENTATION

OBJECTIVE: To inculcate the basics of human anatomy, measurement and recording of related parameters and processing methods of bio signals.

Note : **Ten** questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit.*** The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I INTRODUCTION TO HUMAN PHYSIOLOGICAL SYSTEMS

Cell and its Structure -Electrical and mechanical activity of heart- cardiovascular system- central nervous system -respiratory system -musculo-sketetal system -digestive system -kidney.

ELECTRODES

Origin of resting and action potential -propagation of action potential- electrode potential - electrode impedance- equivalent circuit for extra cellular electrodes -micro electrodes- micropipette and their equivalent circuits -PH, PO2 and PCO2 electrodes.

Unit II MEASUREMENT OF NON-ELECTRICAL PARAMETERS

Blood flow, blood pressure, respiration rate, temperature, mean and instantaneous heart rate measurements.

BIOSIGNAL ACQUISITION

Special requirements of physiological signal amplifiers -various types of pre amplifiers - Isolation amplifier -Differential amplifier -Instrumentation amplifier -bridge amplifier -chopper amplifier Biosignal analysis -signal recovery and Data acquisition.

Unit III **BIOPOTENTIAL RECORDERS**

Electro cardiography -echocardiography -vector cardiography -electro encephalography - echo encephalography -applications of ECG and EEG in vartous investigations -Arrythonia monitor.

OPERATION THEATER EQUIPMENT

Short wave Diathermy.: Microwave Diathermy -ultrasonic diathermy -surgical diathermy -anaesthetic monitor -Gas analyses -PH meters, Oxymeters.

Unit IV **PHYSIOLOGICAL STIMULA TORS**

Cardiac pacemakers -Defibrillators -nerve and muscle stimulators -Heart valves -heart-lung machines -artificial kidney -bio telemetry .

RADIOTHERAPEUTIC EQUIPMENTS

Applications of X-rays in various investigations -Generation of X- rays -properties of X-rays - Diagnositic X-rays -Super voltage therapy -radiation detectors -properties of isotopes -usage , of isotopes in various investigation.

Unit V **RECENT TRENDS IN BIOMEDICAL INSTIUMENTATION**

Computer analysis of ECG and EEG -computers in patient monitoring system -computers in clinical laboratories -application of lasers in various investigations -endoscopes -computer tomography -thermography -Ultrasonic imaging systems -NMR imaging -application of microprocessors in medical instrumentation, electron microscopy.

Unit V **PATIENT -SAFETY**

Micro and macro shocks -possible causes of electric shock -GFL and other measures against shock -recent trends in patient isolation.

TEXT BOOKS

1 Cromwell, L. ,. Weibell, F.J. and Fliffer, E.A., 'Biomedical Instrumentation and Measurements', Prentice Hall of India, New Delhi,2nd edition, 1997.

2. Dr. Arumugam, M., 'Biomedical Instrumentation', Anuradha agencies publishers, 1992.

REFERENCES

1. Khandpur, R.S., 'Handbook of Biomedical Instruments', Tata McGraw Hill Publishing Co. Ltd, New Delhi, 1998.
2. Jacobson and Webster, ' Clinical Engineering'; PHI, 1979.

MM 100 ***Sessional 30***
Time 3 Hrs ***Theory 70***
L T P ***Pass Marks 40***
3 0 0

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OPTIMIZATION TECHNIQUES

OBJECTIVE: On completion of this course, the students will be able to solve nonlinear programming ,games, sequencing and replacement problems.

Note : **Ten** questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit.*** The previous year papers/ model paper can be used as a guideline and the following syllabus should be

strictly followed while setting the question paper.

Unit I **CALCULUS OF VARIATIONS**

Extrema of functions of several variables with and without constraints -functionals -Euler's equation for general cases - variational problems in parametric form -Natural boundary conditions.

Unit II **NON-LINEAR PROGRAMMING -1**

Basic ideas of one dimensional and multidimensional optimization problems -Unconstrained and constrained problems -Lagrange's multipliers -Kuhn- Tucker's conditions" Quadratic programming -Wolfs method -Beale's method.

Unit III **NON-LINEAR PROGRAMMING - II**

Unconstrained optimization techniques -Direct search methods -Powell's method -Hooke and Jeeves method -Rosenbrock's method -Decent methods -steepest descent method - Conjugate gradient method.

Unit IV **GAME THEORY**

Two person Zero -Sum games - Maximin minimax principle -Saddle point -solution by dominance property -graphical solution of 2xn and mx2 games -solution of game by L.P.P. methods -Brown's iterative method.

Unit V **SEQUENCING AND REPLACEMENT PROBLEMS**

Sequencing problem -problems with n-jobs and two machines -problems with n-jobs and three machines -replacement of items that deteriorate with time without and with money value changed -Individual replacement policy -Group replacement problem.

TEXT BOOKS

1. Kanti Swarup, Gupta, P.K. and Man Mohan, 'Operations Research', Sultan Chand,I992.
2. Rao, S.S., 'Optimization: Theory and applications', Wiley Eastern, 1978.

REFERENCES

I. Taha, H., 'Operations Research: an Introduction', McGraw Hill, 1980.
2. Phillips, D. T. Ravindran . A. and 'Solberg, J., 'Operations Research' Principles and Practice', John Wiley, 1987.

MM 100 ***Sessional 30***
Time 3 Hrs ***Theory 70***
L T P ***Pass Marks 40***
3 0 0

ENTEREPRENEURSHIP DEVELOPMENT

OBJECTIVE: This course earnestly attempts to present the various aspects of entrepreneurship and what a prospective entrepreneurship and what a prospective entrepreneur must know before embarking on an industrial, business venture.

Note : **Ten** questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit.*** The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I **INTROUDCTION**

Meaning, importance, benefits of entrepreneurship -characteristics, factors of Entrepreneur -Barriers to entrepreneurship -Difference between entrepreneurship and

management -Evolution of the concept of Entrepreneur -Difference between entrepreneur and entrepreneur. Motivational aspects of entrepreneur (McClelland's theory).

Unit II PROJECT ID ENTIFICATION AND SLECTION

Meaning, classification of projects -Factors involved in project identification, selection - significance, contents, formulation of a project report-specimen of a project report-planning commission's guidelines for formulating a project -Basics of capital budgeting -Pay Back period, Net present value, Internal Rate of Return.

Unit III SOURCES OF FINANCE

Cost of capital -importance of cost of capital -Basic concepts, rational assumptions -cost of debt, reference, equity capital-source of finance-internal, external sources-institutional finance to entrepreneurs and institutional support to entrepreneurs.

Unit IV PROJECT APPRAISAL

Concept of project appraisal-Methods of project appraisal, economic analysis Financial analysis Market Analysis Technical feasibility and Managerial competence(Assessment of working and fixed capital Govt. Policies, qualitative methods of market analysis, Life cycle segmentation.

Unit V OWNERSHIP STRUCTURES & EV ALUA 1'ION OF EDPS

Ownership structures -sole trader, partnership (Partnership deed) type of partnership - Joint stock companies -Difference between private and a public company – Advantages and Disadvantages of the ownership structures -Distinction between MDP and EDP -Training methods and Role playing (Games).

TEXTBOOKS

1. Stoner James, A.F., Freeman Edward, R. Gillbert, Jr. Daneil, R, "Management" --PHI-1996 Edn.
2. Udai Pareek, Venkateswara Rao, T. "Developing Entrepreneurship -A hand Book - Learning Systems -1978 Edn.

REFERENCES

1. Chndraprasanna, Financial Management Theory and Practice, TMH, 1994 Edn.
2. Khanka, S.S., "Entrepreneurial Development" S.Chand -.1999 End.
3. Shukla, M.C. "Business Organizations and Managent", 1994 Edn.

MM 100 ***Sessional 30***
Time 3 Hrs ***Theory 70***
L T P ***Pass Marks 40***
3 0 0

FUZZY SYSTEMS

OBJECTIVE: To impart a knowledge of fundamentals of Fuzzy systems and their applications to Electrical Systems.

Note : **Ten** questions are to be set taking two questions from each unit. The student has to attempt FIVE questions selecting ***one question from each unit.*** The previous year papers/ model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I INTRODUCTION

Different faces of imprecision -inexactness, Ambiguity, Undecidability, Fuzziness and certainty, Fuzzy sets and crisp sets, Probability & Fuzzy logic, Fuzzy control and knowledge based systems.

Unit II FUZZY SETS AND OPERATIONS

Imprecise concepts, Fuzziness & imprecision, Properties of Fuzzy sets, Fuzzy representations, Conventional set operations, Intersections of Fuzzy sets, Union of Fuzzy sets, the complement of Fuzzy sets.

Unit III FUZZY REASONING

Linguistic variables, Fuzzy propositions, Fuzzy compositional rules of inference- the Min-Max rules implication and fuzzy additive rules of implication, Methods of decompositions and defuzzification-composite moments, composite maximum, average of maximum values and centre of maximums.

Unit IV METHODOLOGY OF FUZZY DESIGN

Direct & Indirect methods with single and multiple experts, Construction from sample data- Least square method, Adaptive Fuzzy controllers-Membership function tuning using gradient descent.

Unit V APPLICATIONS

Fuzzy controllers- A Fuzzy steam turbine controller, DC motor speed control. Fuzzy decision making, Neuro Fuzzy systems, Fuzzy Genetic Algorithms.

TEXTBOOK

1. Zimmermann, H.J. 'Fuzzy set theory and its applications', Allied publishers limited, Madras,1966

REFERENCES

1. Klir, G.l., and Folger, T. 'Fuzzy sets, uncertainty and information', PHI, New Delhi,1991.

2. EarlCox,'The Fuzzy Systems Harldbook', AP professional Cambridge, MA 02139, 1994.

3. D. Driankov , H. Hellendoon , M. Reintfank: An introduction to Fuzzy Control', Narosa Publishing House, New Delhi,1996