Electromechanical materials, Mechanism of polarization, Its measurements

8

Magnetic Properties for Applications; Diamagnetism, Paramagnetism, ferromagnetism, Antiferromagnetism, Ferrimagnetism, Soft and hard magnetic materials magnetic storage.

2

Optical properties: Optical properties of Metals and Nonmetals, Luminescence, photoconductivity, Optical Fibers in communications

3

Books & References:

1. Callister J , Material science for Engineers
2. Van Vlack, Material Science
3. Raghavan V, Material Science
4. Guy, Physical Metallurgy

Computer Based Numerical & Statistical Techniques

CS311	**L**	**T**	**P**	**Credits**
	1	**1**	**2**	**4**

Introduction: Errors in numerical computation, Mathematical preliminaries, Errors and their analysis, Machine Computations, Computer Software.

Algebraic and Transcendental Equations: Bisection method, Iteration method, Method of False Position, rate of convergence, Method for complex root, Muller s Method, Quotient Difference method, Newton-Raphson Method.

Interpolation: Introduction, Errors in Polynomial interpolation, Finite differences, Decision of errors, Newton s formula for interpolation, Gauss, Sterling, Bessel s, Everett s Formula, Interpolation by unevenly spaced points, Lagrange interpolation formula, Divided Difference, Newton s General interpolation Formula.

Curve Fitting, Cubic Spline & Approximation: Introduction, Method of Least Square curve fitting procedures, Fitting a straight line, Curve fitting by sum of exponential, Data fitting with cubic splines, Approximation of functions.

Numerical Integration and Differentiation: Introduction, Numerical differentiation, Numerical integration, Trapezoidal rule, Simpson 1/3 rule, Simpson 3/8 rule, Booles & Weddles rule, Euler-Maclariaun formula, Gaussian Formula, Numerical evaluation of singular integrals.

Statistical Computations: Frequency Chart, Regression Analysis, Least Square fit, Polynomial fit, Linear and Nonlinear Regression, Multiple Regression, Statistical Quality Control Methods.

Books and References:

1. Balaguruswamy, Numerical methods , TMH
2. Shastri, Introductory methods of numerical analysis , PHI
3. V. Rajaraman, Introduction to Numerical Methods , TMH

MA-301 Mathematics-III Credit: 4 3-1-0

First order PDE, Complete general and particular solutions, Second order linear PDE,

Interior and exterior BVP, Functions of a complex variable, The complex plane, Analytic functions, Elementary functions, Multivalued functions, Singularities, Complex integration, Conformal mapping, Probability theory, Axiomatic definition of probability, Conditional probability, Random variables Distribution function,

Expectation, Moments, Moment generation function, Special types of Probability distributions, Normal approximation to Binomial distribution.

References:

1. E. Kreyszig, Advanced Engineering Mathematics, 8th Edition, Wiley Eastern
2. Jain and Iyengar, Advanced Engineering Mathematics, Narosa Pub. House
3. Jaggi and Mathur, Higher Engineering Mathematics, Khanna Publishers.
4. B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers.
5. J.N. Kapur, Mathematical Statistics, S.Chand & Co.
6. Zill and Cullen, Advanced Engineering Mathematics, C.B.S.Publishers.

EC 301 Electronic Devices and Circuits 3-1-2-5

1. Transport phenomenon in semiconductors. [4]

2. Junctions Diode: its working, analysis and applications. [6]

3. BJT : Action, configuration, biasing, stability, HF & LF small signal model and analysis. [12]

4. JFET & MOSFET : Action characteristics biasing LF & HF small signal model and applications. [8]

5. Feed back amplifier: concept, classification characteristics and effects. [6]

7. Power amplifier : Class A, B & C amplifiers. [4]

Reference Books

1. Semiconductor Devices & Circuits - B.P. Singh

2. Electronics Devices and Circuits - Allen Mottershead

3. Intigrated Electronics - Millman & Halkias

4. Solid state Electronics Devices : B.G. Streetman

EE-301 NETWORK AND SYSTEMS 3-1-2-5

Network classification & Introduction to continuous time signals and systems:

Unit Step, ramp and impulse signals, Example of each signal, Differential Equation Formulation of linear time invariant continuous system, Responses for unit ramp, square pulse and impulse function

Review of Laplace Transform:

Initial value and Final Value Theorem, Properties and solution of differential equation using LT, Time domain analysis of LTI network using Laplace transform, Waveform Synthesis, LT of Complex waveforms, Concept of Transform Impedance, voltage ratio, transfer function, Relation between impulse response and system function.

Networks Theorems:

Maximum power transfer Theorem, Superposition, Telligen s, Milliman s, Thevenin s and Norton s Theorem, Concept of poles and zeros, Relation between location of poles, time response and stability,

Two port networks :

Two port network parameters (z, y, T, T , h, g), Symmetrical & Reciprocal networks, Inter-conversion of two port network parameters, Interconnection of two port networks, ,Ladder networks, T-□ transformation, Image & characteristic impedance. Network functions: Driving point and Transfer functions

Positive real function:

Definition and properties, Synthesis of LC, RL & RC circuits using Cauer and Foster s first and second form

Books Recommended:

1 M.E. Van Valkenberg, Network Analysis Prentice Hall

2 M.E. Van Valkenberg, Network Synthesis Prentice Hall

3 D. Roy Choudhary, Networks & Systems

4 W. H. Hayt & J. E. Kemmerly, Engineering circuit Analysis, TMH

5 A Chakrabarti & S. Bhadra, Networks & Systems Dhanpat Rai & Co.

CE 301 Environmental and Ecology UG (All branches) L3 T1

Introduction and scope (2)

Conservation of natural resources i.e. forest resource, water resource, mineral resource, energy resource, land resource etc. Role of individual for resource conservation and sustainable development. (7)

Ecosystem and its basic concept, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids. Examples of ecosystems. (7)

Biodiversity and its conservation**:** Introduction - Definition: genetic, species and ecosystem diversity, National and global scenario. (3)

Environmental Pollution, Definition, Causes, effects and control measures of:Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards (7)

Sustainable development**,** Urban problems related to energy**,** Water conservation, rain water harvesting, watershed management**,** Environmental ethics: Issues and possible solutions**,** Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust Case studies**,** Wasteland reclamation**,** Consumerism and waste products, Environmental Management through Acts (7)

Human Population and the Environment: Environment and human health, Role of Information Technology in Environment and human health, Case studies (5)

Total 38

Field Work

Visit to a local area to document environmental assets- river/forest/grassland/hill/mountain

Visit to a local polluted site- Urban/Rural/Industrial/Agricultural

Report submission on field visit

PHY 101 Physics-I 3-1-3-5

1. Special Theory of Relativity

Frame of Reference, Galilean Transformation, Inertial and Non-inertial frames, Postulates of Special Theory of Relativity, Michelson-Morley Experiment Lorentz transformation of space and time, Length contraction, Time dilation, Simultaneity in relativity theory, Addition of velocities, Relativistic dynamics, Variation of mass with velocity, Equivalence of mass and energy.

6

2. Thermal Physics

Maxwell-Boltzmann Law of distribution of molecular velocities, Evaluation of r.m.s.velocity and of average and most probable speeds, Mean free path, Transport phenomena.

3

3. Geometrical Optics

Combination thin lenses, Cardinal points of coaxial optical systems, thick lenses, location and properties of cardinal points, Newtons formula, graphical

construction of images. Eye pieces, Aplantic points. Optical Instruments- Spectrometer (Prism and grating), Sextant.

5

4. Physical Optics

Interference- Condition of observing interference. Degree of coherence and visibility of fringes. Production of interference fringes and determination of wavelength using Fresnels Biprism. Michelson interferometer and its uses. Interference due to thin films. Wedge shaped films. Newtons rings.

8

Diffraction- Frasnels Diffraction, Fresnels Half Period Zone, Zone Plate, Fraunhofers diffraction by single slit, double slit. Theory of plane grating. Width of principal maxima. Rayleighs criterion of resolution. Resolving power of prism and grating.

7

Polarisation- Unpolarised, polarized and partially polarized lights. Polarisation by reflection. Double refraction by uniaxial crystals, Polaroids, Huygens theory of double refraction. Half wave and quarter wave plates. Production and analysis of plane elliptical and circularly polarized light. Optical activity. Fresnels theory of optical rotation, Specific rotation, Biquartz and Laurent half-shade polarimeters.

6

5. Holography

Basic principles of Holography and its applications.

6. Laser

Stimulated and spontaneous emission, Einsteins coefficients, relative contribution of stimulated and spontaneous emissions, population inversion, Laser emission, Ruby and He-Ne lasers, characteristic of Laser light.

9. Accoustics

Production and detection of Ultrasonics, Measurement of Velocity in Liquids, Applications of Ultrasonics. Accoustics of building.

Reference Books

1. Mechanics-D.S.Mathur

2. Optics-A.K.Ghatak

3. Heat and Thermodynamics-Brijlal & Subramanium

4. Thermal Physics-B.K.Agarwal

4. Physics of Oscillations and Waves-R.B.Singh

5. Engineering Physics-A.S.Vasudeva

List of Experiments

Minimum ten experiment to be completed out of the following-

1. To determine the co-efficient of viscosity of water by capillary flow.
2. To determine the co-efficient of viscosity of liquid by Rotating cylinder method.
3. To determine the surface tension of water by capillary rise.
4. To determine the surface tension of water by Jagers Method.
5. To determine the co-efficient of thermal conductivity of good conductor by Searles method.
6. To determine the co-efficient of thermal conductivity of bad conductor by Lees method.
7. To determine the co-efficient of thermal conductivity of rubber.
8. To determine the value of mechanical equivalent of heat by Callenders & Barnes method.
9. To determine the height of building by Sextant.
10. To determine the focal length of combination of two thin lenses by Nodal slide assembly and its verification.
11. To determine the wavelength of light by Fresnels biprism.
12. To determine the wavelength of light by Newtons ring method.
13. To determine the wavelength of light by Diffraction Grating.
14. To determine the dispersive power of the given material of the prism.
15. To determine the specific rotation of canesugar using Polarimeter.

CH 101 Chemistry 3-1-2-5

Chemical Bonding

Valence bond theory, molecular orbital theories of bonding in metals and semi-conductors (Band theory), imperfection in solids

(6)

Polymers

Classification of polymers, types of polymerisation and their principles, structure property relationship, polymer materials of industrial importance, biopolymers.

(6)

Phase rule

Derivation of the phase rule, application of phase rule to one component system

(2)

Chemical kinetics

Reaction rates, order and molecularity of reactions, factors influencing reaction rates, complicating factors in reaction kinetics- opposing reactions, consecutive reactions, side reactions and surface reactions.

(4)

Water Chemistry

Sources and nature of impurities, characteristics of natural water, water treatment processes, boiler feed water.

(6)

Fuels

Classification, calorific value, analysis of solid fuels, carbonisation of coal, gaseous fuels including LPG and natural gases, liquid fuels and its properties, power alcohol, knocking and octane, rating, anti-knocking agents, diesel as a fuel, cetane number.

(6)

Corrosion

Theories of corrosion, types of corrosion and its protective measures, detailed account of paints, varnishes and resins.

(6)

Lubricants

Definition, functions, mechanisms and classification of lubricants, properties and testing of lubricating oils.

(4)

Reference Books

A Text Book of Engineering Chemistry, S.Chawla, Dhanpat Rai & Co., New Delhi, 2004.

Engineering Chemistry: Theory & Practices, J.N.Gurtu and N.Singhal, Pragati Prakashan, Meerut, 2004.

Engineering Chemistrty, Jain & Jain, Dhanpat Rai & Co., New Delhi, 2000.

(MA-101) Mathematics-I 3-1-0-4

Quadratic surfaces in three dimensions, Sequences and series, Power series, Limit , Continuity, Differentiability, Mean value theorem, Taylors theorem for functions of one and two variables, Transformation of one system of coordinates into another system, Extrema of functions of multi-variables, Definite integrals, Trapezoidal and Simpson rule, Improper integrals, Applications, Vector calculus- Gradient , Directional derivatives , Curl and divergence, Double, triple, line and surface integrals, Green, Gauss, Stokes theorems and applications.

References:

1. Thomas and Finney, Calculus and Analytic Geometry, Narosa Pub. House
2. N. Piskunov, Differential and Integral Calculus, Vol I $ II, Mir Pub, Moscow

3. Jain and Iyenger, Advanced Engineering Mathematics, Narosa Pub. House
4. T. Mazumdar, Engineering Mathematics, New Central Book Agency.
5. Jaggi and Mathur, Higher Engineering Mathematics, Khanna Publishers.

6. Bali and Iyengar, Engineering Mathematics, Khanna Publishers

ME 101 Introduction to Manufacturing Processes 2-0-2-3

1. **Introduction to Materials and Manufacturing**: Introduction to engineering materials such as metals and alloys and their applications. Art of manufacturing; Classification of manufacturing processes, Guide to processing of metals and alloys.

4

2. **Machining Processes and Machine Tools:** Classification of machining processes and machine tools; Construction and working of lathe, Drilling machine, Shaper, Slotter and Planer, Boring Machine, Milling Machine, Grinding Machine, Brief introduction of Newer Machining Processes such as EDM, ECM, USM, LBM, WJM etc.

8

3. **Casting Processes**: Elements of Sand Mould, Method of preparation of Sand Mould, Introduction of casting defects**.**

3

4. **Press Working Operations:** Classification of press working operations, Construction of Power Presses, Press working terminology, Types of dies and their operations.

3

5. **Fabrication Processes:** Classification of welding operations, Types of joints and welding positionss. Brief description of arc, Resistance and gas welding techniques. Brazing and Soldering.

4

Modern Trends in Manufacturing: Automation, Concept of CAD, CAM and CIM; Concept of Micro manufacturing and nano-technology

2

PH 201 PHYSICS II 3-1-3-5

1. Electrostatics

Background of vector calculus, Quantization and conservation of charge, Coulomb law (vector form) and superposition principle, concept of electric field lines, flux of E-field, Gauss flux law (Integral and differential form). Simple cases of charge distributions. Energy of charge Distribution, Energy as an integral over the field of uniformly charged spherical surface and volume.

6

2. Electric Current

Current Density Vector, Equation of Continuity, Ohm and Joules Laws(Integral and differential forms).

2

4. Magnetostatics

Amperes Law, Biot Savarts Law, Law of Force in magnetic Field on currents and Charged Particles. Magnetic Field due to a Straight Infinite Wire. Magnetic Field due to Circular Loop and Solenoid at Axial points, Variation of Magnetic field with distance along the axis of Helmholtz galvanometer. Vector potential and its Evaluation for

Uniform magnetic field and for Straight Infinite Wire. Divergence and curl of **B**. Distant Field due to Loop of Current. Magnetic Moment. Magnetic materials and magnetization. Magnetic Current Field **H,** Curl of **H** and calculation of **H**.

10

5. Time Varying Fields

Displacement Current, Curl H, Faradays Law(Integral and Differential forms). Self and Mutual Inductances. Energy of Coupled Circuits and Current Distribution. Energy as an Integral over the Magnetic field. Energy of a Solenoid.

4

6. Electromagnetic Waves in Free-Space

Maxwell equations. Plane Polarized Plane Wave Solution. Characteristics of these Electromagnetic waves. Poyntings Theorem.

3

7. Atomic & Nuclear Physics

X-rays-Characteristic and continuous X-ray spectra, Mosleys law, X-ray absorption X-ray diffraction, Braggs law, Laue Spots Braggs Spectrometer. Compton effect.

4

Magnetic Properties of Materials- Ferro, Para, Dia, Antiferro and Ferri Magnetic Materials. Hysteresis curve and their uses. Larmors Theory and Diamagnetic Susceptibility. Langevins Theory and Curie-Weiss Law. Magnetic Circuits.

4

Quantum Concepts-Particle nature of radiation, Wave nature of Particles. De-Broglie Waves, Davission-Germer experiment, Wave Packets, Phase velocity and group velocity, Heisenbergs Uncertainty Principle and its applications, one-dimensional Schrodingers wave equation and concept of probabilities, amplitude, application to one-dimensional potential well.

6

Particle Physics-Classification of elementary Particles

Reference Books

1. Electricity & Magnetism-Brijlal & Subramanium

2. Electricity & Magnetism-K.K.Tiwari

3. Introduction to Electrodynamics-David J.Griffths

4. Modern Physics-Beiser

5. Engineering Physics-A.S.Vasudeva

6.Physics for Engineers-M.R.Srinivasan

7. Quantum Mechanics- Gasirowicz

List of Experiments

Minimum ten experiment to be completed out of the following-

1. To determine the specific resistance of wire by Carry-Fosters Bridge.
2. To determine the reduction factor of Helmholtz Galvanometer.
3. To determine the E.C.E. of copper using voltameter..
4. To convert a galvanometer into a voltmeter of 3 volts.
5. To convert a galvanometer into an ammeter of 200 milliamperes.
6. To determine the variation of magnetic field along the axis of current carrying coil.
7. To determine e/m by magnetic focussing.
8. To Verify Stefans law.
9. To study the non-Ohmic behavior of the filament of an electric bulb.
10. To compare the illuminating power of two electric bulb by photometer.
11. To find the resistance of a galvanometer using P.O.Box.
12. To find the internal resistance of a cell using P.O.Box.
13. To find the current sensitivity of a galvanometer using P.O.Box.
14. To calibrate a moving coil galvanometer using P.O.Box.
15. To calibrate an ammeter and voltmeter using Potentiometer.

MA 201 Mathematics-II 3-1-0-4

Linear vector spaces, Linear transformation and matrices, Determinants, Linear simultaneous algebraic equations, Special matrices, Quadratic forms, Diagonalisation and canonical forms, First order ODE, IVP/BVP, Existence and uniqueness questions, System of linear equations, Higher order ODE, Solutions of homogeneous and non-homogeneous ODE, Variation of parameters, Undetermined coefficients, Laplace transforms and application to solutions of ODE, Series solutions, Strum-Liouville problem, Orthogonal polynomials, Fourier series, Fourier integrals, Generalized Fourier series.

References:

1. E. Kreyszig, Advanced Engineering Mathematics, 8th Edition, Wiley Eastern
2. Jain and Iyengar, Advanced Engineering Mathematics, Narosa Pub. House
3. Jaggi and Mathur, Higher Engineering Mathematics, Khanna Publishers.
4. B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers.
5. Hoffman and Kunj, Linear Algebra, Prentice Hall

6. Bali and Iyengar, Engineering Mathematics, Khanna Publishers

EX 201 Electrical and Electronics Engineering 4-0-2-5

A. Electrical Engineering

Introduction to Electrical Energy

Generation: Types of power Plant, Functional Block diagram of Generating stations (Hydel & Thermal Stations)

Transmission: Standards (AC & DC), Substations, Grids

Distribution: Industrial, Commercial and Domestic Standards.

Utilization: Types of loads, UPS and domestic inverters.

Domestic Wiring: Materials, accessories & ratings of the wiring materials, types of wiring: stare case, fluorescent tube and simple domestic wiring layout, earthing and electricity rules.

6

Steady-state analysis of AC circuits: Sinusoidal and phasor representation ofVoltage & current, single phase ac circuit behavior of R, L and C. Combination of R, L and C in series and parallel. Resonance.

Three Phase AC circuits: Line and phase voltage/current relationship for star & delta connections.

5

Measuring Instruments: Types of instruments, working principles of Ammeter, Voltmeter, Wattmeter & Energy meter.

3

Transformer & Rotating Machines: Principle of operation and construction of single-phase transformer, phasor diagram and equivalent circuits, efficiency and voltage regulation. Principle of electromagnetic energy conversion, Starting and speed control of DC and AC motors

6

B. Electronics Engineering

Junction Diode : p-n junction, v-i characteristics, diode resistance, capacitance, switching time, diode applications. Breakdown mechanism, Zener and avalanche, break down characteristics, Zener diode and its applications voltage regulator.

4

Bipolar -junction Transistor : Bipolar junction transistor, CE, CB and CC configurations and characteristic curves, Requirement of biasing, types of biasing.

4

JFET and MOSFET: The JFET and MOSFET action; characteristics.

2

Linear IC and its applications 3

Digital Electronics: Number systems, conversion of bases, Boolean Algebra, logic gates, Concept of universal gate, Flip-Flops and counter**.**

4

Electronics Instruments : Oscillators, Digital Multimeter and its applications, CRO and its applications.

4

References:

1 V. Del Toro: Principle of Electrical Engineering, PHI

2 W. H. Hayt & Kemmerley, Engineering Circuit Analysis, Mc Graw Hill.

3 I. J. Nagrath, Basic Electrical Engineering, Tata Mc Graw Hill.

4 A.K.Sawhney, Electrical & Electronics Measurement & Instrumentation, Hanpat Rai & Sons, India.

5 Millman & Halkias, Integrated Electronics, TMH

6 Boylstad & Nashishky, Electronic Devices & circuits, PHI

7 Mavino & Leach, Digital Principles and applications.

8 W.D. Cooper Electronic Instrumentation & Measurement Techniques, PHI

List of Experiments:

1. Verification of Network Theorems.
2. Study of the phenomenon of resonance in RLC series circuit.
3. Measurement of Power in three phase circuits by two-wattmeter method.
4. Determination of parameters and losses in a single phase transformer by OC and SC tests.
5. DC generator characteristics.
6. Speed control of DC shunt motor.
7. Study of running & reversing of three phase induction motor.
8. Study of single-phase energy meter.
9. Study of Diode Characteristics.

10. Determination of common base 7 common emitter characteristics of a transistor.
11. Study of various logic gates.
12. To study a half wave and full wave rectifier circuits with and without capacitor filter and determination of ripple factor.

CS201 Computer Programming 2-1-2-4

Writing a Simple Program: Learning the form of a C program, Declaring variables, designing program flow and control, defining and using functions, using standard terminal I/O functions.

Fundamental Data Types and Storage Classes: Character types, Integer, short, long, unsigned, single and double-precision floating point, storage classes, automatic, register, static and external.

Operators and Expressions: Using numeric and relational operators, mixed operands and type conversion, Logical operators, Bit operations, Operator precedence and associativity.

Conditional Program Execution: Applying if and switch statements, nesting if and else, restrictions on switch values, use of break and default with switch.

Program Loops and Iteration: Uses of while, do and for loops, multiple loop variables, assignment operators, using break and continue.

Modular Programming: Passing arguments by value, scope rules and global variables, separate compilation, and linkage, building your own modules.

Arrays: Array notation and representation, manipulating array elements, using multidimensional arrays, arrays of unknown or varying size.

Structures: Purpose and usage of structures, declaring structures, assigning of structures.

Pointers to Objects: Pointer and address arithmetic, pointer operations and declarations, using pointers as function arguments, Dynamic memory allocation, defining and using stacks and linked lists.

Unions: Components in overlapping memory, declaring and using unions .h vs. private .c files, Hiding private variables and functions.

Controlling Devices: Bit access and masking, pointing to hardware structures.

Operating System Interaction: Reading command line arguments, creating and accessing files, file opening modes, formatted disk I/O.

The Standard C Preprocessor: Defining and calling macros, utilizing conditional compilation, passing values to the compiler.

The Standard C Library: Input/Output : fopen, fread, etc,string handling functions, Math functions : log, sin, alike Other Standard C functions.

Books and references:

1. Herbert Schield, Complete reference in C, TMH
2. Yashwant Kanetkar, Let US C, BPB
3. Balaguruswamy, Programming in ANSI C, TMH
4. Yashwant Kanetkar Pointers in C

AM 201 Engineering Mechanics 3-1-2-5

1. INTRODUCTION:
Idealisation of Mechanics, concept of Rigid Body, External Forces (Body forces & surface forces), Laws of Mechanics.

-1

2. FORCE SYSTEMS AND EQUILIBRIUM
Introduction to vector, Statically Equivalent Force systems (Planar and Spatial), Free Body Diagram, Equations of equilibrium and their applications to various system of forces.

-4

3. STRUCTURES AND MACHINES
Plane Trusses, Space Trusses, Method of Joints, Method of Section, Graphical Method, Method of tension coefficients, Frames and Machines.

-6

4. DISTRIBUTED FORCES AND MOMENT OF INERTIA
Centroid of Composite figures, Area Moment of Inertia, Mass Moment of Inertia, Principle axes and Principle Moment of Inertia.

-5

5. FRICTION
Introduction of friction, Laws of friction, wedge, screw, belt, rolling friction.

-4

6. BEAMS
Different support & load conditions, SFD, BMD

-4

7. KINEMATICS AND KINETICS OF RIGID BODIES
Velocity and acceleration, Rotation of Rigid bodies, Rolling motion, Plane motion of rigid bodies, Effective Forces on a rigid body, D'Alembert's Principle, Force, Mass and Acceleration, Work and Energy, Impulse and Momentum.

-12

8 THREE DIMENSIONAL DYNAMICS OF RIGID BODIES
Introduction, Kinematics and Kinetics, General Motion

-4

Total Lectures 40

Texts / References

1. Engineering Mechanics (Statics and Dynamics) J.L. Merriam and L. G. Kraige.
2. Mechanics for Engineers- (Statics and Dynamics) F.B. Beer & E.R. Johnston.
3. Engineering Mechanics I.M. Shames
4. Engineering Mechanics- S. Timisheno & T. Yong
5. Engineering Mechanics- Singer

6. Engineering Mechanics-Statics Vol-I & Dynamics,Vol-Il by V.S.Mokashi.(Tata McGraw-Hill)
7. Engg. Mechanics-Statics & Dynamics by Dr. A.K. Tayal. Umesh Publication, Delhi.

EE-301 Network And Systems 3-1-2-5

Network classification & Introduction to continuous time signals and systems:

Unit Step, ramp and impulse signals, Example of each signal, Differential Equation Formulation of linear time invariant continuous system, Responses for unit ramp, square pulse and impulse function

Review of Laplace Transform:

Initial value and Final Value Theorem, Properties and solution of differential equation using LT, Time domain analysis of LTI network using Laplace transform, Waveform Synthesis, LT of Complex waveforms, Concept of Transform Impedance, voltage ratio, transfer function, Relation between impulse response and system function.

Networks Theorems:

Maximum power transfer Theorem, Superposition, Telligens, Millimans, Thevenins and Nortons Theorem, Concept of poles and zeros, Relation between location of poles, time response and stability,

Two port networks :

Two port network parameters (z, y, T, T, h, g), Symmetrical & Reciprocal networks, Inter-conversion of two port network parameters, Interconnection of two port networks, ,Ladder networks, T-□ transformation, Image & characteristic impedance. Network functions: Driving point and Transfer functions

Positive real function:

Definition and properties, Synthesis of LC, RL & RC circuits using Cauer and Foster s first and second form

Books Recommended:

1 M.E. Van Valkenberg, Network Analysis Prentice Hall

2 M.E. Van Valkenberg, Network Synthesis Prentice Hall

3 D. Roy Choudhary, Networks & Systems

4 W. H. Hayt & J. E. Kemmerly, Engineering circuit Analysis, TMH

5 A Chakrabarti & S. Bhadra, Networks & Systems Dhanpat Rai & Co.

EE-302 EMMI 3-1-2-5

Principle of measurement and error analysis. Electrical instruments: DC & AC voltage and current meters, power and energy meters, extension of instrument ranges, potentiometers and bridges: Measurement of inductance and capacitance, Measurement of low, medium and high resistances, Electronic instruments for V,.I,.Z, Q, P, frequency and phase. Instrument Transformers and their application, Measurement of speed frequency and power factor, Introduction to transducers, Harmonic Analyzer and Power Analyzer

AM 301 Material Science and Engineering 3-1-2/2-4

Introduction

Structure and properties relationship of Engineering Materials

Structure of Crystalline Solids: Crystal structures and Systems, Unit Cells,Metallic Crystal Structures, Crystallographic directions and Planes, Density Computations,

Characterization of Materials: Crystallography, Reciprocal Lattice, Stereographic projections, Diffraction methods, Electron microscopy, Metallography, Thermal analysis.

6

Imperfections in Crystals: Point defects, Dislocations, Interfacial Defects, Bulk defects

3

Diffusion: Mechanisms, steady state and non steady state Diffusion, factors influencing diffusion

3

Multiphase Structures, Phase Transformations: Unary, Binary, Equilibrium Phase Diagrams, Eutectic, Eutectoid Peritectic and Peritectoid Reactions**,** Iron Carbon Diagram,

4

Mechanical Behaviour of Materials: Elastic and Plastic properties, Creep, Fracture, Heat treatment of steels

6

Ceramic Materials: Ceramic Structures, Properties

3

Electric and Electronic materials: Electrical Conduction, Classification of semiconductor materials, Materials and Technology for integrated circuits, Photonic materials, super conductivity and special super-conducting materials, Ferrites. Quartz crystal, Dielectric materials. Piezoelectric and Ferro-electric materials, Electromechanical materials, Mechanism of polarization, Its measurements

8

Magnetic Properties for Applications; Diamagnetism, Paramagnetism, ferromagnetism, Antiferromagnetism, Ferrimagnetism, Soft and hard magnetic materials magnetic storage.

2

Optical properties: Optical properties of Metals and Nonmetals, Luminescence, photoconductivity, Optical Fibers in communications

3

References:

1 Callister J , Material science for Engineers

2 Van Villack, Material Science

3 Raghavan V, Material Science

4 Guy , Physical Metallurgy

MA-201 Mathematics-III 3-1-0-4

First order PDE, Complete general and particular solutions, Second order linear PDE,

Interior and exterior BVP, Functions of a complex variable, The complex plane, Analytic functions, Elementary functions, Multivalued functions, Singularities, Complex integration, Conformal mapping, Probability theory, Axiomatic definition of probability, Conditional probability, Random variables Distribution function, Expectation, Moments, Moment generation function, Special types of

Probability distributions, Normal approximation to Binomial distribution.

References:

1. E. Kreyszig, Advanced Engineering Mathematics, 8th Edition, Wiley Eastern
2. Jain and Iyengar, Advanced Engineering Mathematics, Narosa Pub. House
3. Jaggi and Mathur, Higher Engineering Mathematics, Khanna Publishers.
4. B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers
5. J.N. Kapur, Mathematical Statistics, S.Chand & Co.
6. Zill and Cullen, Advanced Engineering Mathematics, C.B.S.Publishers.

EC 301 Electronic Devices and Circuits 3-1-2-5

1. Transport phenomenon in semiconductors.

[4]

2. Junctions Diode: its working, analysis and applications.

[6]

3. BJT : Action, configuration, biasing, stability, HF & LF small signal model and analysis.

[12]

4. JFET & MOSFET : Action characteristics biasing LF & HF small signal model and applications.

[8]

5. Feed back amplifier: concept, classification characteristics and effects.

[6]

7. Power amplifier : Class A, B & C amplifiers.

[4]

Reference Books

1. Semiconductor Devices & Circuits - B.P. Singh

2. Electronics Devices and Circuits - Allen Mottershead

3. Intigrated Electronics - Millman & Halkias

4. Solid state Electronics Devices : B.G. Streetman

EE-401 Electrical Machines-1 3-1-3-5

Principles of electromechanical energy conversion-energy, co-energy, forces of electromagnetic origin, singly- and multiply-excited systems, Transformer principles, Equivalent circuits, regulation and efficiency, three-phase transformers. Elements of rotating electric machinery, Speed and transformer e.m.f., commutator action, Armature windings, Torque production in D.C. machines, armature reaction, series, shunt and compound machines: Characteristics, Speed control and starting, Efficiency and Testing of DC machines.

References:

1: P.S.Bimhra, Electrical Machinery, 2000, Khanna publishers New Delhi.

2: J.Nagrath & D.P.Kothari, Electrical Machines 2000, TMH Publication New Delhi.

3: P.S.Bimhra, Generalized theory of Electrical Machine, 1996, Khanna publishers,

New Delhi.

4. Gopal K.Dubey, Fundamental of Electrical Drives, 2001 Narosa Publishing House,

New Delhi.

EE-402 Control System-I 3-1-2-5

Basic concepts of open loop and closed loop control. System modelling. block diagrams signal flow graphs, transfer function, and state space representation. Concepts of controllability, observability, minimality, stability, and sensitivity. Time domain and frequency domain analysis of control systems. Stability analysis using Routh-Hurwitz, Nyquist and root locus methods, phase margin, Gain margin. Compensator design using frequency domain and time domain methods like root locus, Bode plots, pole placement in time and frequency domain. Asymptotic observers

CS 402 Computer Based Numerical & Statistical Techniques 2-1-0-3

Introduction: Errors in numerical computation, Mathematical preliminaries, Errors and their analysis, Machine Computations, Computer Software.

Algebraic and Transcendental Equations: Bisection method, Iteration method, Method of False Position, rate of convergence, Method for complex root, Mullers Method, Quotient Difference method, Newton-Raphson Method.

Interpolation: Introduction, Errors in Polynomial interpolation, Finite differences, Decision of errors, Newtons formula for interpolation, Gauss, Sterling, Bessels, Everetts Formula, Interpolation by unevenly spaced points, Lagrange interpolation formula, Divided Difference, Newtons General interpolation Formula.

Curve Fitting, Cubic Spline & Approximation: Introduction, Method of Least Square curve fitting procedures, Fitting a straight line, Curve fitting by sum of exponential, Data fitting with cubic splines, Approximation of functions.

Numerical Integration and Differentiation: Introduction, Numerical differentiation, Numerical integration, Trapezoidal rule, Simpson 1/3 rule, Simpson 3/8 rule, Booles & Weddles rule, Euler-Maclariaun formula, Gaussian Formula, Numerical evaluation of singular integrals.

Statistical Computations: Frequency Chart, Regression Analysis, Least Square fit, Polynomial fit, Linear and Nonlinear Regression, Multiple Regression, Statistical Quality Control Methods.

Books and References:

1. Balaguruswamy, Numerical methods, TMH
2. Shastri, Introductory methods of numerical analysis, PHI
3. V. Rajaraman, Introduction to Numerical Methods, TMH

EC 401 Digital Electronics 3-1-2-5

Ebers-moll model, analysis of transistor as switch.

2

Number systems and codes; Boolean algebra and logic gates; Minimization using Karnaugh map. NAND and NOR gate implementation.

4

Combinational Systems : Combinational Logic Circuit Design, code converters BCD to Seven Segment decoder, 4-bit magnitude Comparator, Decoders.

5

Design of the circuits using Decoders, MUX and DEMUX, Design of the circuits using multiplexers, ROM and PLA Designs.

7

Master-Slave and edge- triggered flip-flops, conversion design of flip-flops, shift registers, serial and parallel loading

3

Design of synchronous counters, Mod-k or Divide-by-k counters, Decade counter, BCD Counter, Ring counters, The Johnson or Twisted-ring counter, Counter Applications.

5

Multivibrators (Monostable, Astable, bistable).

2

Logic families : RTL, DTL, TTL, ECL & MOS, Calculation of noise margins and fan-out.

10

Reference Books

1. Digital Integrated Electronics - Taub and schilling
2. Microelectronics - Millman
3. Digital concept Using standard ICs Sandige
4. M. Morris Mano: *Digital Design*. Third Edition, Prentice Hall 2002.
5. R. J. Tocci. *Digital Systems: Principles and Applications,* Fourth Edition. PH, 1988.

EC 402 Signals and Systems 3-1-0-4

Signals: Introduction, Types of signals, Continuous-time and discrete time signals.

Energy and Power, Transformations of the independent variable, Exponential and sinusoidal signals, Unit impulse and Unit sample signals,

4

Continuous-time and Discrete time systems and Basic system properties.

2

Linear time-invariant systems: Discrete and Continuous time systems, convolution sum, convolution Integral, Properties, causal LTI systems described by difference equations, singularity function.

3

Representation of periodic signal by Fourier: Continuous-time and discrete-time signals, Properties

8

Representation of aperiodic signals by Fourier Transform: Continuous-time and discrete-time signals, Properties, System characterized by linear constant coefficient differential equation.

8

Z-transform: The region of Convergence, Inverse z-transform, pole zero plot, Properties of z-transform, Analysis and characterization of LTI system using z-Transform.

6

Sampling: representation of Continuous-time signals by its samples, sampling theorem, Impulse train sampling, Sampling with zero order hold, Reconstruction of signal from its samples using interpolation, Aliasing.

6

Discrete time processing of continuous time signals, Digital differentiator, half sample delay, Sampling of Discrete-time signals, Decimation and interpolation.

3

Random signals: review of probability theory, Random variable: Continuous and Discrete, Description of Continuous Random variable, Statistical averages. Description of Discrete Random variable, Statistical averages.

6

Random processes: definition, properties and types.

3

Reference Books

(1) Signals and Systems, A. V. Oppenheim, A. S Willsky, and S. H. Nawab, Prentice-Hall, Englewood Clieffs

(2) Probability, random variables, and stochastic Processes, A. Papoulis, McGraw-Hill

(3) Signals and Systems, B. P. Lathi

(4) Signals and Systems, M. J. Roberts McGraw-Hill

EC 403 Electromagnetic Theory 3-1-0-4

Overview of electrostatics and magnetostatics.

[4]

Laplace and Poissions equation, Solution of Laplace equation by separation of variables in Cartesian, cylindrical and spherical co-ordinates, cylindrical and spherical harmonics, Examples.

[6]

Maxwells equations for static fields, their modifications for time-varying fields conducting and dielectric media.

[4]

EM Wave equations and uniform plane waves, in free space and in lossy medium, ☐, ☐, ☐, ☐, v_p, v_g, and ☐, wave propagation in good dielectrics, in good conductors:

Depth of penetration, Poynting vector and power flow, Reflection and refraction of EM Waves.

[6]

Transmission lines : Transmission line equations, Parameters- primary and secondary constants, Reflection coefficient and SWR, Metched Transmission line, Impedance matching, Smith chart problems, Analogy of transmission lines with e.m. waves.

[10]

Guided waves and Waveguides : Electric and magnetic fieldsin rectangular waveguide- TE, TM and TEM modes, Dominant modes, $\square_{c,}$ $\square_{g}$, v_p, v_g, Numerical examples.

[10]

Reference Books

1. Electromagnetic waves and Radiating systems - E.C. Jordan and K.G. Balmain.

2. Introductory course in electromagnetic fields - P.V. Gupta.
3. Electromagnetics - Hayt
4. Fandamentals of Electromageatics - M.A. Wazed Miyah
5. Electromagnetic fields and waves - V.V. Sarvate
6. Electromagnetics - B.B. Laud

EE 501 Electrical Machine II 3-1-3-5

SYNCHRONOUS MACHINE-I:

- Construction Features
- EMF Equation
- Winding Co-efficients
- Harmonics in the induced EMF
- Production of Rotating magnetic field in 3 phase

SYNCHRONOUS MACHINE II:

- Two reaction Theory
- Power expression for cylindrical and salient pole machines, performance characteristics

Synchronous Motor

- Principle of Operation starting methods

POLY PHASE INDUCTION MACHINE-I:

- Construction features
- Production of rotating magnetic field
- Phasor diagram
- Equivalent circuit Torque and power characteristics
- Torque slip characteristics
- No-load and blocked Rotor Test
- Efficiency

POLY PHASE INDUCTION MOTOR:

- Starting and speed control

(With and without EMF injection in the rotor circuit)

- Deep bar and double cage induction motors
- Cogging and crawling
- Operation under Unbalanced Supply

SINGLE PHASE INDUCTION MOTOR:

- Double revolving field theory
- Equivalent
- No load and blocked rotor tests
- Starting methods
- Repulsion Motor

AC COMMUTATOR MOTORS:

- EMF Induced in commentator winding
- Single Phase AC series motors
- Universal Motor

REFERENCES:

1: P.S.Bimhra, Electrical Machinery, 2000, Khanna publishers New Delhi.

2: J.Nagrath & D.P.Kothari, Electrical Machines 2000, TMH Publication New Delhi.

3: P.S.Bimhra, Generalized theory of Electrical Machine, 1996, Khanna publishers,

New Delhi.

4. Gopal K.Dubey, Fundamental of Electrical Drives, 2001 Narosa Publishing House,

New Delhi.

EE 502 Control system II 3-1-2-5

State space analysis of control system:

Introduction, state space representation of continuous linear time invariant system, transfer function and state variables, solution of state equations.

Analysis of discrete systems:

Introduction to discrete time systems; sample and hold circuits; representation by difference eq. And its solution using Z-transform, pulse transfer function, representation of discrete system in state variable form and its solution.

Controllability and observability:

State & output controllability and observability; design of state observer and controllers.

Stability:

Liapunovs method, methods for generating Liapnovs function; Lures transformation; Popovs criterion.

Optimal control:

Introduction, formation of optimal control problem, calculus of variations, minimization of functions, constrained optimization.

Dynamic programming, performance index, optimality principle, Hamilton-Jacobi eq., linear quadric problems, ricatti eq. And its solution, solution of two point boundary value problems.

Adaptive Control:

Introduction, modal reference adaptive controls system, controller structure, self tuning regulators, various adaptive control systems, Fuzzy logic and its applications.

Introduction to digital control.

References:

1. B.Ogata,state-space analysis,
2. M.Gopal,Modern control system theory, Wiley eastern ltd.
3. Brian D.O. Anderson and john B.Moore,optimal control: linear quadric method,
4. Shastri and bodson,adaptive control, Prentice hall of India.
5. S.das gupta,control system theory, khanna puliishers.

EE 503 POWER SYSTEM I 3-1-2-5

Power system components:

Single line diagram of power system, Brief Description of Power system elements such as, Synchronous Machine, Transformer, Bushbar, Circuit Breaker etc.

Supply System:

Different kinds of supply system and their comparison, Choice of transmission voltage, Kelvins law, Distribution system DC & AC

Transmission Line:

Configuration, Type of conductors, Resistance of line, Skin & Proximity Effects.

Overhead Transmission Line:

Calculation of Inductance and capacitance of single phase, three phase, Single circuit and ouble circuit transmission lines.Representation and performance of short, medium and long transmission lines. Ferranti effect.

Corona and Interference:

Phenomenon of Corona, Corona Loss,Factors affecting Corona, Electrostatic and electromagnetic interference with communication lines Methods of reducing corona and interference, Overhead lines insulators type of insulators and their applications Potential distribution over a string of insulators, Methods of Equalizing the potential.

Mechanical Design of Transmission Lines:

Catenary curve, Calculation of sag and Tension, Effects of wind and ice Loadings, Sag Templates, Vibration dampers

Insulated cables:

Types of Cable, Dielectric stress, Grading of Cables, Insulation Resistance, Capacitance of single phase and three phase cables, Dielectric Loss, Heating of cables

Neutral Grounding:

Necessity of neutral grounding, Various methods of neutral grounding, Earthling Transformer

Grounding Practice, High Voltage Transmission, Introduction to extra and ultra H.V.A.C. Transmission, High Voltage D.C. Transmission Kind of D.C. Link, Merits and Demerits of HVDC transmission, Introduction of flexible AC transmissions system

References:

1. Element of Power System analysis, W. D. Stevenson Mc Graw Hill, 1982
2. Electric Power S.L.Uppal Khanna Publisher, 1998
3. A Text Book on Power System Engineering, A.Chakrabarti, M.L.Soni, P.V.Gupta, & U.S.Bhatnagar , Dhanpat Rai & Co., 2001
4. Electric Power System, C.L.Wadhwa, New Age International Ltd., 2000
5. Electric Power System, Ashfaq Hussain, CBS Publisher & Distributors, 2000

CS 506 Database Management System 3-1-0-4

Introduction: Data base system concepts and architecture, Data models schema and instances, Data independence and data base language and interface, Data definition languages, DML. Overall data base structure

Data modeling using Entity Relationship Model: E.R. model concept, notation for ER diagrams mapping constraints, Keys ,Concept of super key, candidate key ,primary key generalizations, Aggregation, reducing ER diagrams to tables, extended ER model, Relationships of higher degree.

Relational Data Model and Language: Relational data model concepts, integrity constraints ,Keys domain constraints, referential integrity, assertions triggers, foreign key relational algebra, relational calculus, domain and tuple calculus, SQL data definition queries and updates in SQL.

Example DBMS System (Oracle 8): Basic architecture data definition and data manipulation, ISQL,PL SQL, cursors, triggers, stored procedures etc.

Data Base Design: Functional dependencies, normal forms, first, second and third functional personal normal forms. BCNF, multi-valued dependencies fourth normal forms, join dependencies and fifth normal forms. Inclusion dependencies, loss less join decompositions, normalization using FD, MVD and JDs, alternatives approaches to database design.

Transaction processing concepts: Transaction processing system ,schedule and recoverability, Testing of serializability, Serializability of schedules, conflict&view serializable schedule ,Transaction processing in distributed database fragmentation,locking,Protocols for distributed database,recovery from transaction failures,deadlock handling,Long durations transactions,SAGA.

Concurrency Control Techniques: Locking Techniques for concurrency control ,time stamping protocols for concurrency control,concurrency control in distributed systems.Estimtaion of cost and optimization of tuple transfer for join in distributed styles,validation technique,multiple granularity,multiversion schemes.

References:

1. Korth ,Silbertz,Sudarshan,Data base concepts,McGraw-Hill
2. Elmassari,Navathe,fundamentals of Database systems,Addision schemes

3. Date C.J.,An Introduction to Database systems

4. Ramakrishna,Gehkre,Database Management System,McGraw-Hill

5. Alexion leon, Fundamental of database Management Systems,Vikas

CS 507 Computer Organization 3-1-0-4

Representation of information: Number system, Integer and floating-point representation, character codes (ASCII, EEBCDIC), and Error detection and correction codes.

Central Processing Unit: ALU, Arithmetic and logic operations, faster algorithm and their implementation

Control Units: Hardwired and Micro Programmed design concept, Microprogramming

Memory: Memory types and organization, address decoding and selecting

Peripheral Devices: I/O devices (disk and tapes), Programmed interrupt control mechanism, I/O Controllers, DMA

Bus architectures: Uni-bus and multi-bus architectures.

Books and References:

1. Hamacher, Computer Organization, McGraw hill.
2. Tennenbaum, Structured Computer Organization, PHI
3. B. Ram, Computer Fundamentals architecture and organization, New age international
4. Gear C. w., Computer Organization and Programming, McGraw hill
5. Mano Moris, Computer system Architecture, PHI

EC 504 Communication Systems 3-1-2-5

(1) Review of Signal Representation using Fourier series & Fourier Transforms. Power spectral density, Random signal theory, Random Variables, Random processes, Stationary, Time Averages and Ergodicity.

(4)

(2) Analog Signal Transmission: Modulation

(1)

(3) Amplitude Modulation: Equation for am wave, Modulation Index and Power relationships.

(3)

(4) AM transmitter: Generation of AM.

(3)

(5) AM demodulator: Theory and Mathematical analysis of Square Low detector, Envelope detector and synchronous detector.

(3)

(6) DSB Modulation: Principle of nonlinear resistance, Balance modulator and Switching Modulator.

(3)

(7) Generation of SSB Modulation: Filter method, Phase shift method and third method.

(3)

(8) Time domain representation of SSB signal: Mathematical Derivation (2)

(9) SSB demodulator. (1)

(10) Frequency and phase modulation, Multiplexed Stereo FM system

(2)

(11) Generation of Frequency Modulation: Reactance modulator and Indirect method

(3)

(12) Radio receivers: Tunned radio frequency receiver, Superheterodyne receiver Sensitivity and selectivity, selection of IF.

(2)

(13) Block diagram and features of Communication Receiver.

(1)

(14) FM receiver: block diagram, FM discriminates: slope detector, balance slope detector and phase discriminator.

(2)

(15) Frequency division and Time division multiplexing.

(1)

(16) Noise in Communication Systems: Thermal noise, Shot noise, S/N ratio, noise Equivalent bandwidth, noise temperature and noise figure.

(4)

(17) Pulse modulation and Pulse Code Modulation, Differential pulse code modulation Delta modulation,

(5)

Referece Books

1. Electronics Communication Systems - G. Kennedy

2. Digital and Analog communication systems - K.S. Shanmugham

3. Electronics Communication Systems - Roddy and Coolen

4. Principles of Communication Engineering - Umesh Sinha

5. Principles of Communication Systems - Toab & Schilling

EE-601 Power Electronics 3-1-2-5

Power Devices: SCR, Triac, BJT, MOSFET, IGBT & GTOs - operating characteristics and gate drive requirements and circuits. Review of line commutated converters, Principle of phase control, Half wave converters with R and RL loads, Full wave converters, Single phase half controlled and fully controlled bridge converters, Overlap angle, Three phase half controlled and fully controlled bridge converters, Dual converters, Cycloconverter, Inverters: Voltage source inverters:-single phase & six step inverters, voltage control & PWM strategies and implementation aspects, Linear mode and Switched Mode Power Conversion**,** Control Strategies, Hard switched and Soft Switched Converter, Types of chopper, Applications- Static circuit breakers, UPS, Static frequency converter, Power factor control

References:

1. Power Electronics M. H. Rashid
2. Thyristorised Power Controllers - G. K. Dubey, S. R. Doradla, A. Joshi & V. P. Sinha
3. Power Electronics - P. C. Sen
4. Power Electronics P. S. Bimbhra
5. Power Electronics- Cyril W. Lander
6. Power Electronics (Converter, Applications & Design) Ned Mohan, T. M. Undeland & W. P. Robbin
7. Power Electronics - R .S. Ramstrand.
8. Thyristor and their Application - M. Ramamoorthy

EE 602 Microprocessor and Application 3-1-2-5

Microprocessor architecture, fetching, decoding, and execution of an instruction, functions of the registers in the 8085, Flag, Opcode, Operand, and Mnemonic, 8085 Instruction Set, Addressing Mode, 8085 Data Transfer, Arithmetic, Logic, and Branch instructions, assembler language programming, memory, input-output devices, addressing schemes, programs involving Timers and Counters, Stack, Stack Pointer, and Program Counter and describe their uses, Defining Subroutine, various Interrupt instructions, digital-to-analog and analog-to-digital conversions, interface adapters and communications.

8086 : CPU architecture, internal operations, addressing modes, instructions formats, execution timing.

Instruction set of 8086, assembly language programming (ELEMENTARY PROGRAMMING) assembly directives. Operators

Textbook:

1. Microprocessor Architecture, Programming, and Applications with the 8085; 4th ED; Ramesh S. Gaonkar; Prentice Hall

2. Hall D.V. : Microprocessor and Interfacing Programming and Hardware, McGraw Hill Co., New York. 1986.

3. Gibson G.A., Liu Y.C. : Microcomputer System the 8086/8088 Family, Prentice Hall India Pvt. Ltd., New Delhi (second edition), 1986.

EE-603 Power System II 3-1-2-5

Integrated operation of power systems.Capability chart, system modelling-Y bus and Z bus formulation .Load flow analysis-Newton Raphson,fast decoupled methods,fault analysis, dynamic stability, transient stability, equal-area criterion, Step by Step methods for improvement of system stability. Economic operation and security assessment. Power system control:p-f and q-v control. Excitation system, Static VAR systems. SCADA and Computer control voltage Expert system applications to power systems.

EC 606 VLSI Technology 3-1-2-5

Carrier concentration, Fermi level Drift of carrier in electrical and magnetic fields. [3]

Carrier life time diffusion of carrier. [3]

PN Junctions: Equilibrium condition, forward and reverse bias junction, reverse bias breakdown, Metal semiconductor junction. [3]

Field effect transistor: Junctions FET, Metal semiconductor FET and MOS FET Transistor. [3]

Fundamental of BJT operation minority carrier distribution and terminal currents, Secondary effects in transistor, Kirk effect. [4]

Introduction to monolithic integrated circuit. [1]

Diffusion. [6]

Lon implantation. [2]

Epitaxy. [2]

Oxidation. [5]

Photolithography and etching. [3]

Metallization. [3]

Future tends in VLSI. [2]

Reference Books :

1. Basic VLSI Design - Pucknell and Eshraghian
2. Digital systems testing and testable design - M. Abramovici, M. Breuer & A.D. Fnedman

CS612 Computer Networking 3-1-2-5

Introduction: History & development of computer network, network topologies, ISO reference model.

Physical layer: Transmission media, analog transmission, digital transmission, switching multiplexing, FDM, TDM.

MAC layer: Aloha Protocols, LANEthernet, token ring, FDDI, and data link layer.Network layer: Routing algorithms, Congestion Control algorithms, multicast and mobile routing.

Internetworking: Bridges, Switches, Repeaters and Routers.

Transport Layer: Connection Management, Flow control and buffering.

Application Layer: DNS, SNMP, MAIL, WWW, and FTP.Use of TCP/IP Protocol Suite as running example.

Books and references:

1. A. S. Tennanbaum, Computer Network, 2nd Edition, PHI

2. D. E. Comer, Internetworking with TCP/IP: Principles, Protocols and Architecture, Vol. I, 2nd edition, PHI

3. D. E Comer and D. L. Stevens, Internetworking with TCP/IP: Design, Implementation and internals, Vol. II PHI

4. L. L. Peterson and B. S. Davie, Computer Network a System approach, 2nd Edition Morgan Kaufmann, 2002

5. W.R Steves, Unix Networking Programming, PHI

HS-501 Principles of Management 2-1-0-3

Concept:

Definition of management,evolution of management thought,systems approach,process of decision making.

Functions of Management.

Planning,types of plans,major steps in managerial planning,Organizing,nature and purpose,process of organization,basic departmentation.

Coordination,nature purpose and process of coordination.

Supervision,Leadership:purpose,functions,types.

Communication,process of communication,effective communication,barriers to communication.

Motivation:what is motivation,factors involved,theories,motives in organization.

Controlling-Nature and purpose.

Management of change:forces of change,strategies of change,resistance to change.

Human Elements in management

Factors in individual behaviour,Perception,Learning,Personalty development,Interpersonal relationship&group behaviour,Conflict managementStress management, ,sources of stress,vonsequences ,strategies of stress management.

Reference Books.

Koontz,H&Weihrich,H.Management:A Global Perspective 10th ed.

Robbins,S.P.Organizational Behaviour.

Prasad,L,M,Principles of management

EE-701 ` Electric Drives 3-1-2-5

Electric Drive, its advantage, parts, Choice of drive, Various Load Torques, Steady state stability, Load Equalization, Selection of Motors, DC motor drives, Starting, Speed control and Braking of DC drives using solid state devices, Induction motor drives, Starting, Speed control and braking of Induction motors drives using solid state devices, Synchronous motor drives, DC and AC motor drives in transportation system & Traction

References:

1. J.M.D.Murphy- Power electronics control of AC motors, Perganmon press, Newyork.

2. P.C.Sen- Thyristor DC drives. Wiley inter science publication.

3. G.K.Dubey- Fundamental of electric drives. Narosa Publishing House

4. B.K.Bose- Thyristor AC drives. Wiley inter science publication

5. V.Subramanayam- Thyristor control of electric drives. Tata McGraw Hill Publication.

6. S.B.Dewan- Thyristorized Power Controller Drives, Wiley Inter Science

EE 702 Instrumentation 3-1-2-5

Instrumentation systems: role and importance, elements of DAS and types; standards of instrumentation systems. (3)

Sensors and Transducers: primary sensing elements; characteristics; classification, desirable properties; Passive transducers-Resistive,inductive,capacitive;Types-features,configrations,analysis,applications. (8)

Active Tranducers: thermoelectric, electromagnetic, piezo-electric, photoelectric; types-principle, construction, analysis and applications. (8)

Signal conditioning:

Analog conditioning-bridges; instrumentation amplifiers.

Digital conditioning-s/h operation; mutiplexers; A/D, D/A converters-common types, operation. (06)

Data telemetry: types-analog/digital, block diagram, operation, comparative performance (04)

Data display and recording devices: principle, operation and use of -LEDs, LCDs,Recorders-paper chart, magnetic tape, semi-conductor; (07)

DSO-principles, configration, operation. (04)

Text-book

Rangan, sharma, mani-instrumentation system and devices (PHI)

Patranabis, D-industrial instrumentation

References:

Murthy, D.V.S. - Transducers instrumentation

Doeblin, E.O.-mearurement systems (MGH)

Jones,B.E.-instrumentation,ma\earurement and feedback (TMH)

Professional Elective I (PE 01)

EE 703 Neural Network and Fuzzy System 3-1-0-4

Motivation [1].

The role of neural networks in engineering, artificial intelligence, and cognitive modelling.

Supervised learning in neural networks [4].

Feed-forward neural networks of increasing complexity, gradient descent learning and extensions, learning and generalization theory

Computation and dynamical systems [4]

Hopfield model of content-addressable memory, Hopfield-Tank approach to optimisation, resistive networks for vision models, complex dynamical learning models.

Reinforcement Learning [4]

The problem of reinforcement learning, Arp learning, Q-learning, TD-learning. Generalization and function approximation.

Unsupervised Learning [4]

Competitive learning, Self-organizing feature maps, ART networks, GWR networks.

Selected Applications [8]

Fuzzy Systems

An introduction to fuzzy logic , Operations on fuzzy sets, Fuzzy relations , The extension principle ,Metrics or fuzzy numbers , Fuzzy implications , Linguistic variables , The theory of approximate reasoning , An introduction to fuzzy logic controllers , Defuzzification methods , Inference mechanisms , Construction of data base and rule base of FLC , Ball and beam problem , Aggregation in fuzzy system modeling, Averaging operators, Fuzzy screening systems , Applications of fuzzy systems

Textbook:

1. Haykin S., *Neural Networks* , 2nd Edition, Prentice Hall, 1999, ISBN 0 13 273350 1
2. Intoduction to Neuro-Fuzzy Systems, Advances in Soft Computing Series, Springer-Verlag, Berlin/Heildelberg, 2000, 289 pages. [ISBN 3-7908-1256-0]

EE 704 Advanced Control 3-1-0-4

Modelling of physical systems, Concepts of state, state-space, Controllability and observability. Sensitivity and error analysis. Nonlinear systems, singular points, phase plane analysis, Lyapunov stability, describing functions, on-off and dual mode systems. Sampled Data Systems. Computer control

Principles of measurements and error analysis. Electrical instruments: DC & AC voltage and current meters, power and energy meters, estimation of instrument ranges, potentiometers and bridges. Amplifiers in instrumentation. Analog electronic instruments for V.I.Z, Q, P frequency and phase. Transconductance amplifiers and analog multiplier. Oscilloscopes and Recorders. Analog switches and Data Converters: V/F, F/V, A/D, D/A converters. Digital displays and instruments. Noise in Electronic Systems: Noise in passive devices, Design of low noise circuits, Grounding and shielding. Signal Measurement in the Presence of Noise.

EE 706 Utilization Of Electrical Energy & Electric Traction 3-1-0-4

Electric Heating and Welding:

Salient features of electric heating, resistance heating, induction heating, electric arc heating, dielectric heating, methode of generating high frequency power.

Illumination:

Laws of illumination, polar curves, design of indoor and outdoor systems, street lighting.

Electrolytic Process:

Principle of electrodeposition, laws of electrolysis, applications of electrolysis.

Electric Traction:

Electric traction-Salient features, comparision with other types of traction systems, types of electric trection; systems of track electrification, traction system in India, speed time curves, tractive effort and specific energy consumption, coefficient of adhesion, suitability of electric motors for traction service, conventional and solid state control of traction motors, electric braking, current collection systems, dc and ac substations, signalling system, diesel electric traction.

Books Recommended:

1. H.Pratab,Utilization of Electrical Energy, Dhanpat Rai &Sons.
2. G.K.Dubey,Fundamentals of Electrical Drives, Narosa Publishing House.
3. Dover, Electric Trection, Pitiman & Sons.
4. H.Cotton,Illumination Engineering, Pitman &Sons.
5. E.O.Taylor, Utilization of Electrical Energy, Pitman &Sons.

EE 707 Advanced Semi-Conductor Devices 3-1-0-4

Diodes (P-N junction, schottky, contact), Gunn diodes, IMPATT diodes; TEAPATTs; BARPATTs; mixer diodes; Step recovery diodes;

Junction Transistors BJT, Hetrojunction BJTs; HBT)

Field Effect Transistors (JEFT, MESFET, MOSFET, HEMT). MESFETs; Transport in low dimensional structures: HEMTs: Design of high frequency amplifiers and oscillators, Resonant tunnelling structures, RTD oscillators;

Textbook:

1. Ned Mohan, Power Electronics, PHI
2. M. H. Rashid, Power Electronics PHI

EE801 PE02

EHV AC & DC TRANSMISSION

Introduction:

Need of EHV transmission,comparision of EHV ac &dc transmission,mechanical **considerations of transmission line.**

EHV AC Transmission:

Paramerers of EHV line,over-voltages due to switching,ferroresonance,line insulator and clearance,corona,long distance transmission with series & shunt compensations,principle of half wave transmission,flexible ac transmission.

EHV DC Transmission

Types of dc links,terminal equipments & their operations,HVDC system control,reactive power control,harmonics,multiterminal dc (MTDC) system,ac/dc system analysis,protection of terminal equipments.

Books:

1. Rakesh Das Begmudre,Extra High Voltage AC Transmission Engineering,Wiley Estern Limited.
2. K.R.Padiyar,HVDC Power Transmission System, Wiley Estern Limited.
3. E.W.Kimbark,EHV-AC and HVDC Transmission Engineering &Practice,Khanna Publishers.

EE802 **Solid Control of Electrical Drives**

DC drives: converter and chopper control. AC Drives: Operation of induction and synchronous motors from voltage and current inverters, slip power recovery, pump drives using ac line controller and self-controlled synchronous motor drives. Closed loop control of solid state DC drives, self controlled synchronous motor drive switched reluctance motor drive, brushless DC motor drive, permanent magnet drives, industrial drives.

Textbook:

1. G. K . Dubey, Fundamental of Electrical Drives,
2. S. B. Dewan, Power Semiconductor Controlled Drives, PHI

EE803 **Digital Signal Processing**

Review of continuous-time signals and spectra; how discrete-time signals arise via sampling. Aliasing distortion and its avoidance. The Discrete-Time Fourier Transform for standard signals. Numerical computation by means of the FFT

Difference equations: solution and effects of initial conditions.

Stability conditions. More on the z transform and relations to Fourier descriptions of system transfer functions. Use of feedback and Pole-Zero patterns.

Linear-phase FIR filter design using an elementary Impulse-Invariant approach; effects of windowing. Frequency-Sampling FIR design aided by Slifer

Optimal filter design concepts; Weighted Least Integral-Squared FIR design and straightforward matrix solution. Use of the Remez algorithm for equiripple design. Importance of real-time adaptive systems; the LMS algorithm

Introduction to multi-rate systems. Up-sampling and interfering spectral replications; zero-insertion interpolation and zero-order holding. Linear interpolation and general interpolation filter requirements. Down-sampling and in-band aliasing. Sample rate conversion. Exercises in multi-rate processing.

Introduction to Image Coding. Transform Coding, Entropy coding. Standards, JPEG, MPEG I to IV, H2

Text & Reference books:

A V Oppenheim , R W Schafer & J R Back, *Discrete-time Digital Signal Processing*, Prentice Hall Int 1999.

A V Oppenheim , A S Willsky & S H Nawab, *Signals and Systems*, Prentice Hall Int 1996.

N K Sinha, *Linear systems*, John Wiley 1991 J G Proakis and D G Hanolakis, *Digital Signal Processing*, Maxwell Macmillan Int 1992

Digital Signal Processing Using MATLAB, by Vinay K. Ingle and John G. Proakis, Brooks/Cole Thomason Learning, 2000.

EE804 Biomedical Instrumentation

General measurement schemes of major biological events. Medical measurement constraints. Classification of medical instrument, sensing devices for medical instruments. Transducers and electrodes, electrode-electrolyte interface, electrode potential and impedance, origin of electrical activity of the body. Biopotential amplifiers. Measurement and recording of ECG, EEG, and EMG etc. Instruments for non-electrical medical parameters specially blood pressure meters, pulse rate meters, respiratory rate meters, and plethysmography.

Telemetry of biological signals, digital signal processing and imagery construction suitable for scanning such as CAT, NMR and ultrasonics with a special reference to instrumentation.

LASER applications in biomedical field.

References:

1. Cromwell L. biomedical instrumentation and measurement.
2. Buestein E.-Introduction to biomedical electronics.

EE805 **Operation Research**

Linear programming problems:

Linear programming problems (L.P.P.)-formulation of an LPP-graphical method-simplex method-revised simplex method-two these method-dual simplex method-primal-dual problem (emphasis should be on algorithms and problems).

Transportation and assignment problem:

Principles of duality-interpretation sensitivity analysis-dengeneracy-Integer (linear) programming, branch and bound method computational procedure application of IP, 0-1 Linear programming problem, Knapsack problem, facility location problem assignment problems, mathematical formulation, fundamental theorem, hungirian method for solving an assignment problem, variation of an assignment problem, application (emphasis should be more on problem then theory)

CPM and PERT:

CPM and PERT-network diagram-events and activities-project planning-reducing critical events and activities-critical path calculations-examples-resources and man power levelling. Sequencing problems-travelling salesman problems-machine-scheduling problem (job-shop)

Replacement problems and inventory models:

Replacement problems-capital equipment-discounting costs-replacement and anticipation of failure-group replacement-stochastic nature underlying the failure phenomenon. Inventory models-various costs-deterministic inventory models-economic lot size-price breaks-finite storage.

Inventory model application and dynamic programming:

Single period inventory model with shortest cost-stochastic models-application of inventory models. Dynamic programming formulation-Investment problem-general allocation problem-storage coach problem-production scheduling.

References:

13.H.A TAHA,Operational Research-An Introduction, Macmillan1976

14.Hiller and Libermann,Introduction to Operational Research, (1990) McGraw Hill, Company.

15.Ecker and Kuperfesch mid:Introduction to Operational Research(1988) John Wiley & Sons

16.B.E Gillet,Introduction to Operational Research-A computer orientated Algorithm Approach, (1989) McGraw Hill, Company.

17.K.Swarup, P.K Gupta & A.Manmohan,Operational Research. S.Chand 1978.

EE807 **MICRO CONTROLLERS & THEIR APPLICATIONS**

Microcontroller Organization and Architecture; Data Representation and Memory Usage; Introduction to Operating Systems (monitors); Problem Solving and Algorithm Development; Assembling/Compiling and Execution Assembly and C Programming; Analysis of timing and memory requirements.

ADC/DAC interfacing : 8 & 12 bit ADCs (0800/0809, 1210/1211, ICL 7109), their working and interfacing with 8085 & programming. DAC-0800, 0808, 0008. working, interfacing with 8085. Realisation of ADC using DAC.

Textbook:

1. The 8051 Microcontroller, 3rd Ed., Scott MacKenzie,1999, Prentice Hall.
2. The 80251 Microcontroller, Kenneth Ayala, 2000 Prentice Hall.
3. The 8051 Microcontroller: Hardware, Software, and Interfacing, 2nd Ed, James Stewart and Kai Miao,, 1999, Prentice Hall.
4. C and the 8051, 2nd Ed,Tom Shultz, 1998, Prentice Hall.
5. Intel Manual : Microprocessor and Microcontroller.

EE809 PE03 Switch Mode & Resonant Converters

Hard switched and Soft Switched Converter: Load Resonant Converters, Series, Parallel and Hybrid Loaded Converters, Resonant Switch Converter, Zero Current, Zero Voltage Switched Resonant Converter, Zero Voltage Switched Clamped Voltage Resonant Converter, DC-DC resonant link inverters, hybrid resonant link inverters, quasi resonant link converters, switched mode rectifiers, synchronous link converters.

Textbook:

1 Ned Mohan, Power Electronics, PHI

2 M. H. Rashid, Power Electronics PHI

EE813 PE04 FACTS

Power semiconductor devices Voltage-sourced and current-sourced converters Specific FACTS Controllers, including SVC, STATCOM, TCSC, SSSC, UPFC, IPFC plus voltage regulators, phase shifters, and special Controllers with a detailed comparison of their performance attributes

Textbook:

1. Understanding FACTS : Concepts and Technology of Flexible AC Transmission Systems, Narain G. Hingorani, Laszlo Gyugyi ISBN: 0-7803-3455-8

2. Power Quality Enhancement Using Custom Power Devices by Arindam Ghosh, Gerard Ledwich, Kluwer Academic Publishers (August 2002) ISBN 1402071809

EE815 Mechatronics

Introductory: Basic concept; elements; role and importance; example systems

Signal: analog signal processing with op-amp; instrumentation amplifiers; signal processing ICs;

Digital signal conditioning: quantising theory; A to D and D to A converters.

Sensor & actuators:

Position, speed, strain, stress, temperature, vibration, acceleration, pressure measurement; semiconductor sensor and microelectromechnical devices; solonoids and relays; servo motors-ac and dc; stepper motor;

Mechatronic systems:-

Control architecture; PLCs; microcontrollers; microcontroller programming and interfacing; case studies.

Text Book:

Alciton, D.G. and Histand, M.B.-Introduction to mechatronics and measurement systems (TMH

EE817 Artificial Intelligence

Introduction to AI. Brief history. Different agent architectures. Search: uninformed and heuristic search, A*, local search and optimization. Constraint satisfaction problems. Game playing and adversarial search. Logical reasoning. Propositional Logic. First-order logic. Inference in first-order logic. Planning Supervised learning methods. Decision trees. Neural networks. Reasoning under uncertainty. Bayes rule. Belief networks. Using beliefs to make decisions. Sequential decision making. Reinforcement learning Special topics: Robotics, Natural Language Processing

Textbook:

1. Russell and P. Norvig. *Artificial Intelligence: A Modern Approach*, *Second Edition*, Prentice Hall, 2003.

2. N. Nilsson. *Artificial Intelligence: A New Synthesis.* Morgan Kaufmann, 1998.