

Unit I. Synchronous Machine I

Constructional features, Armature winding, EMF Equation, Winding coefficients, equivalent circuit and phasor diagram, Armature reaction, Working principle of synchronous generator, O. C. & S. C. tests, Voltage Regulation using Synchronous Impedance Method, MMF Method, Potier's Triangle Method, Parallel Operation of synchronous generators, operation on infinite bus, synchronizing power and torque co-efficient

Unit II Synchronous Machine II:

Two Reaction Theory, Power flow equations of cylindrical and salient pole machines, Operating characteristics

Synchronous Motor: Working principle of synchronous motor, Starting methods, Effect of varying field current at different loads, V-Curves, Hunting & damping, synchronous condenser.

Unit III Three phase Induction Machine – I:

Constructional features, Rotating magnetic field, Principle of operation , Phasor diagram, equivalent circuit, torque and power equations, Torque- slip characteristics, no load & blocked rotor tests, efficiency, Induction generator

Unit IV Three phase Induction Machine- II

Starting, Deep bar and double cage rotors, Cogging & Crawling, Speed Control (with and without emf injection in rotor circuit.)

Unit V Single phase Induction Motor

Double revolving field theory, Equivalent circuit, No load and blocked rotor tests, Starting methods, repulsion motor. AC Commutator Motors: Universal motor, Single phase a.c. series compensated motor, stepper motors

Text Books:

1. Dr.P.S.Bhimbra, "Electrical Machinery ",Khanna Publishers India
2. D.P.Kothari & I.J.Nagrath, "Electric Machines", Tata Mc Graw Hill

Reference Books:

1. Sen, "Principles of Electrical Machines & Power Electronics", Wiley India
2. O.C. Taylor, "The performance & design of A.C. Commutator Motors", A.H. Wheeler & Co (P) Ltd.

Unit 1 Network Functions : Concept of Complex frequency, Transform Impedances Network functions of one port and two port networks, concept of poles and zeros, properties of driving point and transfer functions, time response and stability from pole zero plot.

Unit 2: Two Port Networks: Characterization of LTI two port networks Z, Y, ABCD, h and g-parameters, reciprocity and symmetry, Inter- relationships between the parameters, inter-connections of two port networks, Ladder and Lattice networks. T & Π Representation.

Unit 3: Network Synthesis : Positive real function; definition and properties; properties of LC, RC and RL driving point functions, synthesis of LC, RC and RL driving point immittance functions using Foster and Cauer first and second forms.

Unit 4: Filters: Introduction, Classification of filters, Image parameters and characteristics impedance, passive and active filter, low pass, high pass, constant K type, M derived filters and their design.

Unit 5: Sampled Data System: Introduction, Spectrum analysis of sampling process, Signal reconstruction, Difference equation, Z- transform, Z-transform function, Inverse Z-transform, Relation of z- and s-transform, Stability analysis, Application of z-transform

Text Books:

1. Kuo, "Network Analysis and Synthesis", 2nd edition, Wiley India.
2. M.E. Van Valkenburg, "Network Analysis", Prentice Hall of India.

Reference Books:

1. N.C. Jagan and C. Lakshminarayana, "Network Analysis & Synthesis", B.S. Publications, 2008.
2. Nagrath and Gopal, "Control System Engineering", Wiley Eastern Ltd.
3. M.E. Van Valkenburg, "An Introduction to Modern Network Synthesis", Wiley Eastern Ltd.

Unit 1 – Introduction To Microprocessor : 8085 Evolution Of Microprocessor, Register Structure, ALU, Bus Organization, Timing And Control, instruction set.

Architecture of 16-bit Microprocessors: Architecture of 8086; (Bus Interface Unit, Execution unit) Register Organization, Bus operation, Memory segmentation.

Unit 2 – Assembly Language Programming: Addressing Modes and instruction set of 8086, Arithmetic and Logic instructions, Program Control Instructions (jumps, conditional jumps, subroutine call) Loop and string instructions , Assembler Directives.

Unit 3 – CPU MODULE: Signal Description of pins of 8086 and 8088, Clock generator, Address and Data bus Demultiplexing, Buffering Memory Organization, Read and Write cycle Timings, Interrupt Structures, Minimum Mode, Maximum Mode Operation.

Unit 4 – Peripheral Interfacing: Programmed I/O, Interrupt Driven, I/O, DMA, Parallel I/O, (8255-PPI, Parallel port), 8253/8254 programmable Timer/Counter Interfacing with ADC.

Unit 5 – Peripheral Interfacing (Contd.): 8259 Programmable Interrupt controller, 8237 DMA controller, Concept of Advanced 32 bit Microprocessors: Pentium Processor.

Text Book:

1. Ray , A.K. & Burchandi, K.M., "Advanced Microprocessors and Peripherals: Architecture, Programming and Interfacing", Tata McGraw Hill.
2. Hall D.V. , "Microprocessors Interfacing" ,2nd edition, Tata McGraw Hill

Reference Books

1. Gaonkar, Ramesh S., "Microprocessor Architecture, Programming, and Applications with the 8085", Pen Ram International Publishing , 5th edition
2. B.P. Singh & Renu Singh, "Microprocessors and Microcontrollers", New Age International.
3. Liu and Gibson G.A. , "Microcomputer Systems: The 8086/8088 Family", Prentice Hall (India), 2nd edition
4. Brey, Barry B. , "INTEL microprocessors", Prentice Hall (India), 4th edition
5. Ram B., "Advanced Microprocessor & Interfacing" , Tata McGraw Hill
6. Renu Singh & B.P. Singh, "Microprocessors and Interfacing & Applications", New Age International.

UNIT 1

Introduction: Electric energy demand and growth in India, electric energy sources.

Thermal Power Plant: Site selection, general layout and operation of plant, detailed description and use of different parts.

Hydro Electric Plants: Classifications, location and site selection, detailed description of various components, general layout and operation of Plants, brief description of impulse, reaction, Kaplan and Francis turbines, advantages & disadvantages, hydro-potential in India

UNIT 2:

Nuclear Power Plant: Location, site selection, general layout and operation of plant. Brief description of different types of reactors Moderator material, fissile materials, control of nuclear reactors, disposal of nuclear waste material, shielding.

Gas Turbine Plant: Operational principle of gas turbine plant & its efficiency, fuels, open and closed-cycle plants, regeneration, inter-cooling and reheating, role and applications.

Diesel Plants: Diesel plant layout, components & their functions, its performance, role and applications

UNIT 3:

Power Plant Economics and Tariffs:

Load curve, load duration curve, different factors related to plants and consumers, Cost of electrical energy, depreciation, generation cost, effect of Load factor on unit cost. Fixed and operating cost of different plants, role of load diversity in power system economy. Objectives and forms of Tariff including three part tariff; Causes and effects of low power factor, advantages of power factor improvement, different methods for power factor improvements

UNIT 4:

Major Electrical Equipment in Power Plants: Alternators for hydro plants, turbo alternators, requirement of excitation systems, types of excitation systems, duties and qualities of automatic voltage regulators, brief description of different types of voltage regulators, earthing of power systems

Cogeneration: Introduction, types of cycles and technologies, advantages and scope in India

Captive Generation: Introduction, advantages and constraints, types of captive power generation, future prospects, energy banking and wheeling.

MHD generation: Working principle, open and closed cycles, MHD systems, advantages, parameters governing power output.

UNIT 5:

Solar power plant: Conversion of solar heat to electricity, Solar energy collectors, Photovoltaic cell, power generation, future prospects of solar energy use.

Wind Energy: Windmills, power output with combined operation of wind turbine generation and isolated generating system, technical choices & economic size.

Introduction to Geothermal energy, Ocean Energy and Tidal energy, Introduction to fuel cells.

Energy Conservation: Principles of energy conservation, energy conservation planning; energy conservation in industries, generation, transmission, distribution, transport, agriculture etc.,

Text Books:

1. B.R. Gupta, "Generation of Electrical Energy", S. Chand Publications

Reference Books:

1. Elements of Electric Power Station Design by M.V. Deshpande

2. A. Chakrabarti, M.L. Soni, P.V. Gupta, U.S. Bhatnagar , "A Text Book on Power System Engineering", Dhanpat Rai & Co

3. J.B.Gupta, "A Course in Electrical Power", Kataria Publications

4. R.K.Rajput, "Power Plant Engineering", Laxmi Publications

UNIT – I: Crystal Structure of Materials:

Bonds in solids, crystal structure, co-ordination number, atomic radius representation of plane distance b/w two planed packing factor, Miller Indices, Bragg's law and x-ray diffraction, structural Imperfections, crystal growth

UNIT – II: Electrical Engineering Material:

Electron theory of metals, factors affecting electrical resistance of materials, thermal conductivity of metals, heat developed in current carrying conductors, Half effect, Drift and Diffusion currents, continuity equation, thermoelectric effect, superconductivity and super conducting materials, optical properties of solids

UNIT – III: Magnetic Material:

Origin of permanent magnetic dipoles in matters, Classification Diamagnetism, Paramagnetism, Ferromagnetism, Antiferromagnetism and Ferrimagnetism, magnetostriction, Properties of magnetic materials, soft and hard magnetic materials, permanent magnetic materials.

UNIT – IV: Dielectric Materials:

Polarization and Dielectric constant, Dielectric constant of mono-atomic, Poly atomic gases and solids, frequency dependence of electronic and ionic polarisabilities, dipolar relaxation, dielectric loss, piezoelectricity, ferroelectric materials

UNIT – V : Polarization and Dielectric constant, Dielectric constant of mono-atomic, Poly atomic gases and solids, frequency dependence of electronic and ionic polarisabilities, dipolar relaxation, dielectric loss, piezoelectricity, ferroelectric materials

Text Books:

1. A.J. Dekker, "Electrical Engineering Materials", Prentice Hall of India
2. R. K. Rajput, "Electrical Engineering Materials", Laxmi Publications

Reference Books:

1. Solymar, "Electrical Properties of Materials" Oxford University Press.
2. Ian P. Hones, "Material Science for Electrical & Electronic Engineering," Oxford University Press.
3. J.B. Gupta, "Electrical and Electronics Engineering Materials" Katson publishers.

EA4210: ELECTRO-MECHANICAL ENERGY CONVERSION – II LAB

Note: Minimum eight experiments are to be performed from the following list. The department may add 3 to 4 more experiments in the following list.

1. To perform no load and blocked rotor tests on a three phase squirrel cage induction motor and determine equivalent circuit.
2. To perform load test on a three phase induction motor and draw:
(i) Torque -speed characteristics (ii) Power factor-line current characteristics
3. To perform no load & blocked rotor tests on 1- ϕ induction motor and determine equivalent circuit.
4. To study speed control of three phase induction motor by keeping V/f ratio constant
5. To perform O.C. & S.C. tests on a 3- ϕ alternator and determine voltage regulation at full load and at unity, 0.8 lagging and leading power factors by (i) EMF method (ii) MMF method.
6. To determine V-curves and inverted V-curves of a three phase synchronous motor.
8. To determine X_d and X_q of a three phase salient pole synchronous machine using the slip test and draw the power-angle curve.
9. To study synchronization of an alternator with the infinite bus by using: (i) dark lamp method (ii) two bright and one dark lamp method

EA4220: SIMULATION LAB

Note: Minimum eight experiments are to be performed from the following list. The department may add 3 to 4 more experiments in the following list.

1. To determine node voltages and branch currents in a resistive network. To obtain Thevenin's equivalent circuit of a resistive network.
2. To obtain transient response of a series R-L-C circuit for step voltage input.
3. To obtain transient response of a parallel R-L-C circuit for step current input.
4. To obtain transient response of a series R-L-C circuit for alternating square voltage waveform.
5. To obtain frequency response of a series R-L-C circuit for sinusoidal voltage input
6. To determine line and load currents in a three phase delta circuit connected to a 3-phase balanced ac supply.
7. To plot magnitude, phase and step response of a network function.
8. To determine Z, Y, G, H and transmission parameters of a two part network.
9. To obtain transient response of output voltage in a single phase half wave rectifier circuit using capacitance filter.

EA4230: MICROPROCESSOR LAB

Note: Minimum eight experiments are to be performed from the following list. The department may add 3 to 4 more experiments in the following list.

A. Study Experiments

1. To study 8085 based microprocessor system
2. To study 8086 and 8086A based microprocessor system
3. To study Pentium Processor
- B. Programming based Experiments (any four)
4. To develop and run a program for finding out the largest/smallest number from a given set of numbers.
5. To develop and run a program for arranging in ascending/descending order of a set of numbers
6. To perform multiplication/division of given numbers
7. To perform conversion of temperature from $^{\circ}\text{F}$ to $^{\circ}\text{C}$ and vice-versa
8. To perform computation of square root of a given number
9. To perform floating point mathematical operations (addition, subtraction, multiplication and division)

B. Interfacing based Experiments (any four)

10. To obtain interfacing of RAM chip to 8085/8086 based system
11. To obtain interfacing of keyboard controller
12. To obtain interfacing of DMA controller
13. To obtain interfacing of PPI
14. To obtain interfacing of UART/USART
15. To perform microprocessor based stepper motor operation through 8085 kit
16. To perform microprocessor based traffic light control
17. To perform microprocessor based temperature control of hot water