AMIE03 FUNDAMENTALS OF ELECTRICAL ENGINEERING

UNIT-1 ELEMENTARY CONCEPTS
1.1 Prerequisite: Concept of Potential difference. Current and resistance.
1.2 Ohm's law, effect of temperature on resistance, resistance temperature coefficient, insulation resistance.
1.3 SI units of work Power and Energy.
1.4 Conversion of energy from one form to another in electrical and thermal systems.

UNIT-2 D. C. CIRCUITS (ONLY INDEPENDENT SOURCES)
2.1 Kirchhoff's law, ideal and practical voltage and current sources. Mesh and Nodal analysis (Super node and super Mesh excluded).
2.2 Source transformation. Star delta transformation.
2.3 Superposition theorem, Thevevnins's theorem Norton's theorem, maximum power transfer theorem (Source transformation not allowed for superposition theorem, Mesh and Nodal analysis.

UNIT-3 A.C. FUNDAMENTALS
3.1 Sinusoidal voltage and currents, their mathematical and graphical representation, concept of cycle period, frequency, instantaneous, peak, average, r.m.s. values, peak factor , and form factor, phase difference, lagging, leading and in phase quantities and phasor representation.
3.2 Rectangular and polar representation of phasors.
3.3 Study of A.C circuits of pure resistance, inductance and capacitance and corresponding voltage- current phasor diagrams, voltage – current and power waveforms.

UNIT-4 SINGLE PHASE AND POLY PHASE A. C. CIRCUITS
4.1 A)Single phase AC Circuits: Study of series and parallel R-L, R-C, R-L-C circuits, concept of impedance and admittance for different combinations, wave form and relevant voltage current phasor diagrams.
4.2 Concept of active, reactive, apparent, complex power and power factor, resonance in series and parallel RLC circuit. Q- factor and band with
4.3 B) Polyphase AC circuits: Concept of three phase supply and phase sequence.
4.4 Balanced and unbalanced loads voltage current and power relations in three phase balance star and delta loads and their phasor diagrams.

UNIT-5 ELECTROMAGNETISM
5.1 A) Magnetic effect of electrical current cross and dot convention, right hand thumb rule and cork screw rule, nature of magnetic field of long straight conductor, concepts of solenoid and torrid.
5.2 Concepts of m.m.f, flux, flux density, reluctance, permeability and field strength, their units and relationship.
5.3 Simple series and parallel magnetic circuits.

5.4 Comparison between electrical and magnetic circuits, force on current carrying conductor placed in magnetic field, Fleming's left hand rule.

5.5 B) Faraday's law of electromagnetic induction, Fleming's right hand rule, statically and dynamically induced EMF's self and mutual inductance coefficient of coupling, energy stored in magnetic field.

5.6 C) Introduction to electrical AC DC Machines: Principles of operation and applications.

UNIT-6 SINGLE PHASE TRANSFORMER AND ELECTROSTATICS

6.1 A) Single phase transformers: Construction, principle of working, e.m.f equations, voltage and current ratios, losses, definition of regulation and efficiency, determination of these by direct loading method.

6.2 Descriptive treatment of autotransformer.

6.3 B) Electrostatics: electrostatic field, electric flux density, electric field strength, absolute permittivity, relative permittivity and capacitance, composite dielectric capacitors, capacitors in series and parallel, energy stored in capacitors, charging and discharging of capacitors and concept of time constant.

Reference Books:

1. V. N. Mittal and Arvind Mittal;, " Basic Electrical Engineering" McGraw Hill
2. Vincent DelToro, " Electrical engineering Fundamentals", PHI second edition 2011
3. Bolestaad, :"Electronics Devices and Circuits Theory", Pearson Education India
4. Edward Hughes, " Electrical Technology,", Pearson Education
5. D.P. Kothari and Nagrath " Theory and Problems in electrical Engineering", PHI edition 2011.