06-ELE-15/25 BASIC ELECTRICAL ENGINEERING

DEPTH OF COVERAGE (BLOW UP SYLLABUS)

PART-A.

UNIT-I

1a) D.C.CIRCUITS:

Definition of unidirectional quantity.

Ohm's law – Definition, illustration, limitation.

Kirchhoff's laws – Definition, illustration, applications. Analysis and illustrative examples on simple series, parallel and series-parallel (simple two loop circuit analysis by branch current method only) circuits excited by independent voltage sources.

Calculation of Power and energy.

1b) ELECTROMAGNETISM:

Basics of magnetic circuits- Definitions of - magnetic circuit, flux, mmf, reluctance, flux density, Magnetic field intensity, leakage flux, fringing flux, leakage factor (prerequisite and no questions to be asked) .

Faraday's laws, Lenz's law, Fleming's rules. Statically and Dynamically induced emf's. with the derivation of relevant equations for single conductor .Illustrative numerical examples

Definition and concept of self and mutual inductance, coefficient of coupling with derivation of relevant equations. Energy stored in magnetic field. Illustrative numerical examples.

UNIT – II

2. SINGLE PHASE A.C.CIRCUITS:

Definition of alternating quantity, frequency, time period of an alternating quantity. Generation of sinusoidal AC voltage. Definition of average value and rms value and evaluation of their values for a sinusoidal quantity. Form factor , peak factor.

COMPLEX ALGEBRA – complex numbers, scalar, vector and phasor. Representation of vectors, concept of the complex operator j, conversion of vectors from R to P and P to R forms, complex operations and use of calculator for the simplification of complex operations.(prerequisite and no questions to be asked)

Phase and phase difference, lag, lead and in-phase in vectors.

Analysis of pure R, pure L and pure C excited by sinusoidal emf. With proofs. Phasor diagrams, voltage, current and power oscillograms power consumption in each and power factor. Analysis of R – L, R –C and R – L –C circuits on a.c. Expression for power in an ac circuit. (To prove that P = VI CosΦ). Definition and units and equations of Active, reactive and apparent power in single phase circuits. Illustrative typical numerical examples ,on series, parallel and series-parallel circuits.

UNIT – III

3.THREE PHASE CIRCUITS:

Basics of three phase emf generation. Three phase balanced emf's. phasor diagram, phase sequence, Oscillograms of three phase balanced emf's. Comparison of three phase system with single phase systems, advantages. Three phase balanced loads (Star and Delta). Relationship between the line and phase quantities in balanced Star and Delta connected loads. Power in three phase balanced loads. Equation and measurement of power and power factor in balanced star and delta loads using two wattmeter method. Illustrative numerical examples.

UNIT – IV

4a) MEASURING INSTRUMENTS:

Principle of electrical measurements- deflecting torque, controlling torque and damping torques(prerequisite).

Construction and principle of operation of Dynamometer type wattmeter and Induction type single phase Energy meter.

4b) DOMESTIC WIRING:

Two way and three way control of a lamp. Necessity and types of Earthing(Pipe and Plate earthing). Elementary discussion on fuse (definition of fuse, need , ratings and the materials used). Electrical shock-Causes , prevention, precautionary measures and remedy.

PART – B.

UNIT -V

5. D.C. MACHINES:

Basic principle of D.C. machine as a generator and motor , constructional features. D.C. Generator, emf equation and illustrative examples on E.M.F equation only.

D.C. Motors – types and their representation, Back emf and its significance, voltage and current relations. Production of torque and the torque equation. Characteristic of D.C. Motors(T vs Ia, N vs Ia, N vs T) . Applications of D.C. Motors, Need of a starter for D.C. motors . Numerical examples on D.C. Motors.

UNIT -VI

6. TRANSFORMERS:

Basic principle, construction and types (core and shell types) of single phase transformers.

EMF equation. Losses, efficiency (includes condition for maximum efficiency)

Definition and importance of voltage regulation. Numerical examples on EMF equation and efficiency only.

UNIT – VII

7. SYNCHRONOUS GENERATORS:

Basic principle and operation. Advantages of stationary armature, types and their construction.

EMF equation ,elementary idea of the winding factors without any derivation. Numerical examples on EMF equation .

Mention of Losses in Generators, calculation of efficiency (Losses to be given).

UNIT – VIII

8. THREE PHASE INDUCTION MOTORS:

Rotating magnetic field, principle of operation. Types and construction. Slip and its importance.

Applications of Induction motors. Need of a starter. Numerical examples on speed and slip calculations.