EE 303: Electro Technology-I (ME & CHE)

L – T - P
(3 – 1 – 2)
Theory Marks =100
Sessional Marks = 50
Laboratory Marks = 50

1. **D C Machines**:

Basic Constructional features, E M F equation of D C generator, Elementary Idea of DC machine winding-winding pitch, Lap and Wave windings. Types of generators. Characteristics of DC generator-the OCC and the load characteristics. The shunt generator-condition for voltage builds up. Load characteristics. Losses in a DC generator, Efficiency, Applications, Compound generators

Working principle of DC motor. Back EMF, Calculation of torque and power. Types of DC motors. Characteristics curves. Losses and Efficiency. Speed equation. Method of speed control. Method of starting. The 3 point, 4 point starter (calculations of the star resistors not required)

2. **Transformer:**

Physical description of transformer. Elementary theory of the ideal transformer, EMF equation, Voltage and current transformation ratio. No load and load phasor diagrams. Transformer reactance and impedances. Equivalent resistance & reactance. Simplified equivalent circuit, open and short ckt tests. Losses and efficiency. Condition for maximum efficiency. All day efficiency. Voltage regulation. Star and delta connection in 3-ph transformer. The auto transformer, basic working principle.

3. **Induction motor**:

Constructional features of 3-ph induction motor-principle of rotating magnetic field(mathematical treatment not required)Principle of operation of the 3-ph induction motor speed. Rotor emf, current and rotor cu loss, Torque, Starting torque .Maximum torque. Condition for maximum torque. Torque slip curves. Necessity of a starter. Methods of starting of squirrel cage and the slip-ring induction motors.

Introduction to single phase induction motor. Nature of a field and torque produced in single phase induction motors (details of double revolving field not required).Types of motors-split phase, capacitors motors.

4. **A.C. Synchronous machines:**

Principle of operation of alternators. Constructional features of cylindrical generators and salient pole alternator, EMF equation.

Principle of operation of the synchronous motor, Synchronous motor on no load, Synchronous motor on load, Behaviour of the Synchronous motor with change of excitation,V curves. Starting methods of Synchronous Motor. Application of Synchronous motor.

6. **Measuring Instruments**:
Dynamometer type wattmeter. Induction type wattmeter. Single phase induction type energy meter. Errors and compensations.

Books:

1. Theraja :A Text book of Electrical Technology.
2. Say : Preformance and Design of Alternating Current Machine.
3. Guru, B.S., and Huseyin R. Hiziroglu, Electric Machinery and Transformers, Oxford University Press
4. Kothari D.P., and Nagrath, I.J., 'Electrical Machines', Tata McGraw Hill
5. Electrical Measurements and Measuring Instruments – A.K. Shawney (Dhanpat Rai)

Reference book:

1. Langsdrof : 'Theory of Alternating Current Machines' Tata McGraw Hill
2. Kingsley, Fitzereld : Electric Machinery (McGraw Hill)