

### **Unit I**

**Single phase Transformer:** Construction, phasor diagram, Voltage Regulation, OC & SC Test, Polarity test, Sumpner's test, all day efficiency

**Three phase Transformer:** Construction: core type, shell type, three phase bank of single phase transformer, scott connection.

**Autotransformer:** Volt-Ampere Relationship, efficiency, advantages and disadvantages, applications.

### **Unit II**

**DC Machine:** Construction, EMF and torque equation, Armature Reaction, Commutation, Methods to improve Commutation, performance characteristics of motors and generators, starting of motors, speed control methods, losses, efficiency, applications.

### **Unit III**

**Three phase Induction Motor:** Constructional features, Rotating magnetic field, Principle of operation Phasor diagram, equivalent circuit, torque and power equations, Torque- slip characteristics, Speed Control, starting of squirrel cage and slip ring induction motor.

### **Unit IV**

**Synchronous Machine:** 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, Working principle of synchronous motor, Starting torque and mechanical power developed, Effect of varying field current at different loads, V-Curves, application.

### **Unit V**

#### **Special Purpose Machines:**

Two phase servomotor: Construction, working principle and application.

Stepper motor: construction, working principle and application.

#### **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.

**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 obtain magnetization characteristics of a d.c. shunt generator.
- 2) To obtain load characteristics of a d.c. shunt generator and compound generator.
- 3) To obtain speed-torque characteristics of a dc shunt motor.
- 4) To obtain speed control of dc shunt motor using (a) armature resistance control (b) field control.
- 5) To study polarity and ratio test of single phase and 3-phase transformers.
- 6) To obtain equivalent circuit, efficiency and voltage regulation of a single phase transformer using
- 7) O.C. and S.C. tests.
- 8) To obtain efficiency and voltage regulation of a single phase transformer by Sumpner's test.
- 9) To perform no load and blocked rotor tests on a three phase squirrel cage induction motor and determine equivalent circuit.
- 10) To perform load test on a three phase induction motor and draw:
  - (i) Torque -speed characteristics (ii) Power factor-line current characteristics
- 11) To perform no load & blocked rotor tests on 1- $\emptyset$  induction motor and determine equivalent circuit.
- 12) To perform O.C.& S.C. tests on a 3- $\emptyset$  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.
- 13) To determine V-curves and inverted V-curves of a three phase synchronous motor.
- 14) To study synchronization of an alternator with the infinite bus by using: (i) dark lamp method (ii) two bright and one dark lamp method