

## ELECTRICAL MACHINES- I

### Module- I

#### University Portion (80%):

Single phase transformers: Phasor Diagrams at No -Load and Load Conditions of an Ideal transformer and practical transformer, Equivalent Circuit, Determination of Parameters from Tests (Polarity Test, Open Circuit Test and Short Circuit Test, Back to Back test), Per Unit Calculation and its importance, Voltage Regulation, Losses, Efficiency and all day efficiency. Parallel operation of transformers and load sharing.

Auto Transformer: Basic constructional features; VA conducted magnetically and electrically. Comparative study with two winding transformer. Conversion of a two winding transformer into a single winding transformer.

### Module- II

#### University Portion (80%):

Three phase transformers: Constructional features, As a single unit and as a bank of three single phase transformers. Three-Phase Transformer connections, The per unit system for Three Phase Transformer, Transformer Ratings and Related problems, Two Single-Phase Transformers connected in Open Delta (V-Connection) and their rating. T-Connection (Scott Connection) of Two Single-Phase Transformers. Transformer Three phase Connections: Various Phase Displacements (0o, 180o, +30o and -30o), Connection Diagrams and Phasor Diagrams of various Vector Groups (Yy0, Dd0, Dz0, Yy6, Dd6, Dz6, Yd1, Dy1, Yz1, Yd11, Dy11, and Yz11)

### Module- III

#### University Portion (80%):

Three phase induction machines: Constructional features and types; 3-phase distributed winding production of rotating magnetic field, Principle of Operation, The Effect of Coil Pitch and distribution factor on A.C. Machines, winding factor, Concept of Slip, Slip Speed; Phasor diagram and Development of equivalent circuit and derivation of torque equation; Typical torque-slip characteristic and influence of different parameters on it, No-Load and Blocked Rotor tests, Determination of Parameters, power flow diagram, Losses and Efficiency, Methods of starting and speed control. Cogging, Crawling.

### Module- IV

#### University Portion (80%):

Single phase induction machines: Double field revolving theory, Methods of starting using auxiliary winding, development of equivalent circuit. No-Load and Blocked Rotor tests, Determination of Parameters Speed Control of Single Phase Induction Motors.

### Text Book:

1. *Theory and Performance of AC Machines – M G Say*
2. *Electric Machinery – Fitzgerald, Charles Kingsley Jr., S. D. Umans – Tata Mc Graw Hill.*

### Reference Book(s):

1. *Electrical Machinery – P S Bimbhra – Khanna Publishers*
2. *The Performance and Design of DC Machines – A E Clayton.*
3. *Electric Machines – D P Kothari and I J Nagrath – Tata McGraw Hill, Fourth Edition.*
4. *Electric Machines – Charles Hubert – Pearson Education.*
5. *Electrical Machines – P K Mukherjee and S Chakravorti – Dhanpat Rai Publications.*
6. *Electric Machinery and Transformers – Guru & Hiziroglu – Oxford University Press.*