

# BEEC2214 Energy Conversion Devices

## MODULE- I

(14 Hrs)

1. GENERAL PRINCIPLES OF DC MACHINES: Constructional Features, Methods of Excitation, Expression for EMF Induced and Torque Developed in the Armature.
2. DC GENERATORS: No Load Characteristics for Separately Excited DC Generator and DC Shunt Generator, Conditions for Self Excitation, Critical Resistance and Critical Speed, Losses and Efficiency.
3. DC MOTORS: Speed~Armature Current, Torque~Armature Current and Speed~Torque Characteristic for (i) Separately Excited DC Motor, (ii) DC Shunt Motor, (iii) DC Series Motor, and (iv) DC Compound Motor, Speed control and Starting of DC shunt and DC series motors, Comparison Between Different types of DC Motors and their Application.

## MODULE- II

(13 Hrs)

4. TRANSFORMERS: Constructional Features, EMF Equation, Turns Ratio, Determination of Parameters From Tests (Open Circuit Test and Short Circuit Test), Equivalent Circuit, Losses and Efficiency, Introduction to Three Phase Transformers: Three Single Phase Transformers Connected as a Bank of Three Phase Transformer.
5. THREE PHASE SYNCHRONOUS MACHINES: Constructional Features, Principle of operation as Alternator and Synchronous Motor, Synchronous Impedance, Voltage Regulation by Synchronous Impedance Method, Power-Angle curve, Synchronization of Alternators, Torque Expression and Phasor Diagram for Synchronous Motor, Electrical Power and Mechanical Power, Starting of Synchronous Motor.

## MODULE- III

(13 Hrs)

6. THREE PHASE INDUCTION MOTORS: Constructional Features of Squirrel Cage Rotor type and Slip Ring/Wound Rotor type of Induction Motors, Principle of Operation, Concept of Slip, Slip~Torque Characteristics, Starting of Squirrel Cage Rotor type and Slip Ring/Wound Rotor type of Induction Motors, Speed Control of Induction Motors
7. SINGLE PHASE INDUCTION MOTORS and COMMUTATOR MOTORS: Revolving Field Theory, Split Phase (capacitor start and run) and Shaded Pole Starting of Single Phase Induction Motors, Speed~Current, Torque~Current and Speed~Torque Characteristic for Single Phase AC Series Motor.

### Text Book :

1. Electric Machines – D P Kothari & I J Nagrath – Tata McGraw Hill.

### Reference Book(s):

2. The Performance and Design of DC Machines – A E Clayton
3. Theory and Performance of AC Machines – M G Say – CBS Publication.
4. Electrical Machinery – P S Bimbhra – Khanna Publishers.
5. Electrical Machines – P K Mukherjee and S Chakravorti – Dhanpat Rai Publications.
6. Electric Machinery – Fitzgerald, Charles Kingsley Jr., S. D. Umans – Tata McGraw Hill.
7. Electric Machinery And Transformers –Guru & Hiziroglu –Oxford University Press.
8. Electric Machines – Charles Hubert – Pearson Education.