

PET41102 ELECTRICAL MACHINES AND POWER DEVICES

Module- I(10 Hours)

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.

Module-II(8 Hours)

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, Brushless motors; Motor drive circuits.

Module-III (10 Hours)

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-IV (10 Hours)

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.

Additional Module (Terminal Examination-Internal) (6 Hours)

8. POWER SEMICONDUCTOR DEVICES: Switching and V-I characteristic of devices Thyristor family: SCR, DIAC, TRIAC, GTO; Different Triggering Methods of SCR.

Text Book

1. Electric Machines, D P Kothari & I J Nagrath, Tata McGraw Hill, 4th edition, 7 July 2010.
2. Electrical Machine, J.B.Gupta, S K Kataria and Sons publications, Reprint 2012 edition, 2012.
3. Electrical Machinery, P S Bimbhra, Khanna Publishers, 7th edition, 2009.
4. Power Electronics: Circuits, Devices and Applications, M H Rashid, Pearson Education, 4th edition.

Reference Books

1. Electrical Machine, Ashfaq Husain, Dhanpat Rai and Co. Publisher, 2nd edition, 2014.
2. Electrical Machines, Smarajit Ghosh, Pearson Education, 2nd edition. 2012
3. A Textbook of Electrical Technology: volume2 AC and DC machines, B.L. Theraja and A.K. Theraja, S. Chand publications, 1st June 2006.
4. Electrical Machines, Krishna Reddy, Scitech Publication.
5. Electric Machines and Drives, Ned Mohan, Wiley Publication, 2013.