BVM ENGINEERING COLLEGE [AN AUTONOMOUS INSTITUTION]

2EE08: ELECTRICAL MACHINES –II
CREDITS - 3 (LTP:3,0,0)

Course Objectives:

At the end of this course, students will demonstrate the ability to

1. Understand the concepts of rotating magnetic fields.
2. Understand the operation of ac machines.
3. Analyse performance characteristics of ac machines.

Teaching and Assessment Scheme

Teaching Scheme (Hours per week)			Credits	Assessment Scheme				Total Marks
				Theory		Practical		
L	T	P	C	ESE	CE	ESE	CE	
3	0	0	3	60	40	00	00	100

Course Contents:

Unit No.	Topics	Teaching Hours
1	**Fundamentals of AC Machine Windings:** Physical arrangement of windings in stator and cylindrical rotor; slots for windings; single-turn coil - active portion and overhang; full-pitch coils, concentrated winding, distributed winding, winding axis, Air-gap MMF distribution with fixed current through winding-concentrated and distributed, Sinusoidal distributed winding, winding distribution factor	8
2	**Three phase Induction Machines:** Construction, Types (squirrel cage and slip-ring), Torque Slip Characteristics, Starting and Maximum Torque. Equivalent circuit. Phasor Diagram, Losses and Efficiency. Effect of parameter variation on torque speed characteristics (variation of rotor and stator resistances, stator voltage, frequency). Methods of starting, braking and speed control for induction motors. Generator operation. Self-excitation. Doubly-Fed Induction Machines.	10
3	**Single-phase Induction Motors:** Constructional features, double revolving field theory, equivalent circuit, determination of parameters. Split-phase starting methods and applications	6
4	**Synchronous Machines :** Constructional features, cylindrical rotor synchronous machine - generated EMF, equivalent circuit and phasor diagram, armature reaction, synchronous impedance, voltage regulation. Operating characteristics of synchronous machines, V-curves. Salient pole machine - two reaction theory, analysis of phasor diagram, power angle characteristics. Parallel operation of alternators - synchronization and load division.	8
5	**Special A.C. Machines:** Reluctance motor, hysteresis motor, permanent magnet ac motors, ac servomotors, universal motor, stepper motor, commutator motor	8
	Total	**40**

List of References:

1. D. P. Kothari and I. J. Nagrath, "*Electric Machines*", Tata McGraw Hill Publication,4th Edition 2010, Reprint 2012.
2. B.L. Theraja , "*A Textbook of Electrical Technology Volume II (MulticolourEdition*)", S.Chand Publication,
3. J.B.Gupta, " *Theory and Performance of Electrical Machines*" S.K Kataria& SonsPublication, fifteenth Edition 2015, Reprint 2017
4. N.K.Datta,"*Theory and practice of Electrical Machine Design*" S.KKataria & Sons Publication, first Edition 2016.
5. M. G.Say,"*Performance and design of AC machines*", CBS Publishers,2002.

E-resource:https://nptel.ac.in/courses/108106072; NPTEL: Electrical Engineering, Electrical Machines –II.

Course Outcomes

At the end of this course, students will demonstrate the ability to

1. Analyse and apply the energy conversion principles to AC rotating machines.
2. Evaluate the steady state parameters, basic operating characteristics and performance of AC Machine and its application.
3. Evaluate the steady state parameters, basic operating characteristics and performance of Special AC machines.