

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. SEMESTER: VI

Electrical Engineering

Subject Name: **Electrical Machines- III**

Subject Code: **160901**

Teaching Scheme				Evaluation Scheme		
Theory	Tutorial	Practical	Total	University Exam (Theory) (E)	Mid Sem Exam (Theory) (M)	Practical (I)
3	0	2	5	70	30	50

Sr. No	Course Content	Total Hrs.
1.	Testing of DC machine: Hopkinson test, Field Test, Separation of losses, Brake test,	10
2.	Synchronous Machines: Introduction, generated emf, Harmonics in voltage waveforms, MMF of distributed windings, rotating magnetic field, Torque, Operations, Machine efficiency, Armature reaction and its compensation, Short circuit ratio, Effect of increase in excitation, Effect of change in torque and speed, Determination of Synchronous reactance, regulation by ZPF method, AIEE methods, Synchronizing & load shadding between two machines Operating characteristics, Load angle and Power flow equations, Capability curves, Two reaction model of Salient pole machines, Parallel operations, Load sharing between generators, Effect of unequal voltages & percentage impedance, Governor characteristics, Hunting, Short circuit transients, single phase generators, Slip test for measurement of X_d and X_q , Sudden short circuit of Synchronous machine. Methods of starting of synchronous motors, Different torques in Synchronous motor, Stability, Synchronous condenser, Synchronous phase modifiers, V-curves and O-curves of Synchronous motors., hunting of sy. machines and its prevention,	20
3.	Methods of starting of synchronous motors, Different torques in Synchronous motor, Stability, Synchronous condenser, Synchronous phase modifiers, V-curves and O-curves of Synchronous motors., hunting of sy. machines and its prevention,	04

4.	Auto Synchronous Motor: Construction, principle of operation, equivalent excitation current for different rotor connections, circle diagrams	04
5.	Special Machines: Special synchronous motors : Hysteresis & Reluctance motor. Miniature motors, Automobile electric systems. Induction Regulator, Inverted Induction machine, Boosters & Balancers, AC & DC Servo motors. Permanent Magnet Materials : Characteristics, B-H loop and demagnetization characteristics, Residual flux density, Coercivity, Concepts of Maximum energy product and its unit MGO (Mega Gauss Orsted), Recoil line, Minor loop, temperature effects. Applications of PM materials. Permanent Magnet Machines: General construction, working and applications of following PM machines : PMBLDC motors, PM synchronous motors, Axial flux PM machines and Doubly salient PM machines. Switched Reluctance Motor: General construction, working and applications of SRM	10

Text Books:

1. Electrical Machines by P S Bhimbra
2. Electrical Machines by J. B. Gupta

Reference Books:

1. Electrical Technology Vol II. B. L. Theraja
2. Electrical Machines. By Nagarath & Kothari
3. Performance and Design of A.C. machines by M. G. Say
4. Electrical Machines By Mukharji & Chakravarthy
5. PM and Reluctance Motor Drives By T. J. E. Miller Clarendon Press Oxford
6. Electric Motor Drives by R. Krishnan PHI
7. Principles of Electrical Machines and Power Electronics By P. C. Sen
8. Performance Design Testing of Electrical Machines by Clayton, IEEE Press