GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Semester: 2

Electrical Engineering

Subject Name : Advanced Electrical machines

Sr. No.	Course Content
1.	Brushless DC Machines: Construction and working principle, Equivalent magnetic circuit, Type of converter and speed control, Comparison between the axial and radial permanent magnet motors, applications.
2.	Stepper Motors: Definition and types of stepper motors, Various modes of operation of Variable reluctance (VR) stepper motors, Micro stepping control of stepper motor, Multi stack VR stepper motor construction and working, Construction and working of Permanent Magnet (PM) stepper motor, Construction and working of Hybrid stepper motor, Torque-angle characteristics of the stepper motor.
3.	Switched Reluctance Motor: Construction, operating performance, Type of converter and speed control, applications.
4.	Linear Induction Machines: Construction, operation, performance, control and applications.
5.	Energy Efficient motors: Standard motor efficiency, concept of Energy efficient motor. Efficiency evaluation technique, Direct Measurement method, Loss, Segregation method, Comparison, motor efficiency labeling, Energy efficient motor standards. Motor life cycle, Direct Savings and pay back analysis, Efficiency evaluation factor.
6.	Wind mill Generator: Comparision with synchronous generator , constant voltage & frequency generation, reactive power compensation,
7.	Condition Monitoring of Electrical Machines: Concept of condition monitoring, benefit of condition monitoring, Fault detection & diagnosis techniques for Transformer and Induction motor, Recent trends in condition monitoring.
8.	Basic principle of electric machine analysis: Introduction, magnetically coupled circuits, electromechanical energy conversion, machine windings and air-gap MMF-Winding inductances and voltage equations.
9.	Reference frame theory: Introduction, Equation of transformation, stationary c ircuit variables transformed to the arbitrary reference frame- commonly used reference frames- transformation between reference frames, transformation of a

	balanced set, balanced steady state phasor relationships, balanced steady state voltage equations, variables observed from several frames of reference.

Text Books/References:

1. "Brushless Permanent-Magnet Motor Design", Mcgraw Hill- D. C. Hanselman
2. "Stepper Motors: Fundamentals, Applications and Design", New Age International Pvt. Ltd, 2002- V. V. Athani
3. "Electric Machinery", TMH Publication, 2002- A. E. Fitzerald, Charles Kingsley and Stephen D Umans
4. "Condition Monitoring of Electrical Machines", John Wiley & Sons. 1987 - P. Tavner and J. Penam
5. "Principles of Power Electronics", John Wiley and Sons, 2003- P. C. Sen
6. "Alternating Current Machines" (ELBS publication) - M.G.Say
7. Analysis of electric machinery and drive systems, Second edition, Wiley interscinece- Paul C.Krause, Oleg Wasynnczuk, and S.D. Sudhoff
8. Dynamic simulation of electric machinery, Prentice Hall PTR, 1997- C.M.Ong
9. Wind Electrical Systems By Bhadra, Kastha & Benerajee (OXFORD Higher Education)