GUJARAT TECHNOLOGICAL UNIVERSITY

Master of Engineering
Subject Code: 3720737
Semester – II
Subject Name: Dynamics of Electrical Machines

Type of course: Professional Elective Course

Prerequisite: NA

Rationale: Transient behavior of electrical power system is very important to understand the system stability and to design appropriate controllers. Transient stability analysis of large power system networks is done through digital computers. In order to simulate/analyze the system using digital computers, it is essential to obtain the mathematical model of the system. This subject deals with the mathematical models of various rotating machines and their applications for dynamic analysis.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	• Stability. • Primitive 4 Winding Commutator Machine. Commutator Primitive Machine. • Complete Voltage Equation of Primitive 4 Winding Commutator Machine.	06
2	• Torque Equation. Analysis of Simple DC Machines using the Primitive Machine Equations. • The Three Phase Induction Motor. Transformed Equations. • Different Reference Frames for Induction Motor Analysis Transfer Function Formulation.	10
3	• Three Phase Salient Pole Synchronous Machine. • Parks Transformation- Steady State Analysis. • Alternator/Synchronous motor system.	10
4	• Large Signal Transient. Small Oscillation Equations in State Variable form • Dynamical Analysis of Interconnected Machines.	06
5	• Large Signal Transient Analysis using Transformed Equations. • DC Generator /DC Motor System.	08

Reference Books:

1. D.P. Sengupta & J.W. Lynn," Electrical Machine Dynamics", The Macmillan Press Ltd. 1980.

2. Paul C. Krause, Oleg Wasynczuk and Scott D. Sudhoff, "Analysis of Electric Machinery and Drive Systems", John Wiley & Sons, New York, 2004
3. R Krishnan "Electric Motor Drives, Modeling, Analysis, and Control", Prantice Hall, 2001
4. Boldia & S.A. Nasar,,"Electrical Machine Dynamics", The Macmillan Press Ltd. 1992
5. C.V. Jones, "The Unified Theory of Electrical Machines", Butterworth, London. 1967
6. K. R. Padiyar, "Power System Dynamics Stability and Control", B S Publications
7. P. Kundur, "Power System Stability & Control", Tata Mcgraw hill

Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	Apply the principles of modeling and analysis of electrical machines	20
CO-2	Analyze the performance of primitive DC machine and induction machine.	25
CO-3	Evaluate the performance of salient pole and cylindrical synchronous machine	25
CO-4	Determine the large signal transient performance of machines using state variable form and transformed equations	30

List of Experiments: Experiments based on above curriculum.

Major Equipment:

List of Open Source Software/learning website:

E-materials available at the website of NPTEL- http://nptel.ac.in/

w.e.f. AY 2018-19