GUJARAT TECHNOLOGICAL UNIVERSITY

ELECTRICAL ENGINEERING (07)
ADVANCED CONTROL TECHNIQUES FOR ELECTRICAL MACHINES
SUBJECT CODE: 2730708
M.E. SEM-III

Type of course: Engineering Science (Electrical)

Prerequisite: None

Rationale: NA

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
				Theory Marks		Practical Marks				
L	T	P	C	ESE (E)	PA (M)	ESE (V)		PA (I)		
						ESE	OEP	PA	RP	
3	2#	2	5	70	30	20	10	10	10	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	Generalized theory and Kron's primitive machine model	2	10
2	Modeling of dc machines Modeling of induction machine Modeling of synchronous machine Reference frame theory and per unit system	8	20
3	Control of Induction Motor Drive Scalar control of induction motor Principle of vector control and field orientation Sensorless control and flux observers Direct torque and flux control of induction motor Adaptive Control Multilevel converter-fed induction motor drive Utility friendly induction motor drive	12	15
4	Control of Synchronous Motor Self controlled synchronous motor Vector control of synchronous motor Cycloconverter-fed synchronous motor drive Control of synchronous reluctance motor	8	10
5	Control of Special Electric Machines Permanent magnet synchronous motor Brushless dc motor Switched reluctance motor Stepper motors and control	10	10

Reference Books:

1. P.C. Krause, O. Wasynczuk, and S. D. Sudhoff, "Analysis of Electric Machinery", McGraw-Hill Book Company.
2. R. Krishnan, "Electric Motor Drives: Modeling, Analysis and Control", Prentice Hall.
3. P. S. Bhimbra, "Generalized Theory of Electric Machines", Khanna Publication.
4. B. K. Bose, "Modern Power Electronics and AC Drives", Pearson Education.

Course Outcome:

After learning the course the students should be able to:

1. Comprehend various control techniques applicable to electric motors.
2. Understand concept of Sensorless drive and Model reference adaptive system
3. Understand control of special electrical machines like PMSM, BLDC, SRM, stepper motor.

List of Experiments:
Practical based on above topics

Design based Problems (DP)/Open Ended Problem:
Prepare model of any electric motor and apply the various control techniques to it. Observe the dynamic performance for each control techniques and compared them.

List of Open Source Software/learning website:

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

Review Presentation (RP): The concerned faculty member shall provide the list of peer reviewed Journals and Tier-I and Tier-II Conferences relating to the subject (or relating to the area of thesis for seminar) to the students in the beginning of the semester. The same list will be uploaded on GTU website during the first two weeks of the start of the semester. Every student or a group of students shall critically study 2 papers, integrate the details and make presentation in the last two weeks of the semester. The GTU marks entry portal will allow entry of marks only after uploading of the best 3 presentations. A unique id number will be generated only after uploading the presentations. Thereafter the entry of marks will be allowed. The best 3 presentations of each college will be uploaded on GTU website.