

Subject Code: 1ET4030606	Subject Title: SPECIAL ELECTRICAL MACHINES
Pre-Requisite	--

RATIONALE:

Due to research and development the specialized electrical machines have been developed for specialized applications. They play an important role in industries such as production, processing, fabrications and renewable energy applications, etc. Some special electrical machines have higher efficiency, small size and useful for specific applications. This course refers to such machines which have not been considered in the earlier semesters. The most significant development in recent years in the allied area of motor control also plays an important role. Essential efforts are made in this course to familiarize the students with advanced technology in such machines which is a necessary to maintain them.

COURSE OBJECTIVE:

The theory should be taught and practical should be undertaken in such a manner that students are able to

1. Types of transformers used efficiently for various applications.
2. Types of induction machines used for different applications
3. Types of synchronous machines for different applications.
4. Types of fractional horsepower motors.
5. Types of Small special electric machines.

TEACHING AND EVALUATION SCHEME:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)			
Lecture	Tutorial	Practical	Credit	Theory		Practical	
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment
4	-	2	5	60	40	20	30

DETAILS OF COURSE CONTENTS:

Sr No	Topics and Sub-topics	Total Hours	% Weightage
1	SPECIAL TRANSFORMER	16	30
	1.1 Different types of connections of power and distribution transformers, vector groups, cooling methods		
	1.2 Welding transformers		
	1.3 Construction, working and application of isolation transformer & audio transformer		
	1.4 Instrument transformers : current transformers and potential		

	transformers and related theories 1.5 Name plate of power transformer and specification.		
2	SPECIAL INDUCTION MACHINES 2.1 Dual winding Squirrel cage induction generator 2.2 Cogging and crawling in induction machines. 2.3 Soft starters 2.4 Wound rotor induction generator (WRIG) 2.5 Doubly fed induction generator (DFIG)	14	30
3	FRACTIONAL HORSE POWER MOTORS 3.1 Fractional horse power (FHP) motor 3.2 Hysteresis motor 3.3 Permanent magnet motor 3.4 Reluctance motor	12	20
4	OTHER SPECIAL MOTORS 4.1 Stepper motor and its types. 4.2 Brushless DC motors 4.3 Servomotors 4.4 Synchros	14	20

COURSE OUTCOME:

The course content should be taught and implemented with an aim to develop different skills leading to the achievement of the following competencies and course learning outcomes:

1. Types of transformers used efficiently for various applications.
2. Types of induction machines used for different applications
3. Types of synchronous machines for different applications.
4. Types of fractional horsepower motors.
5. Types of Small special electric machines.

LIST OF PRACTICAL:

SR NO	PRACTICALS/EXPERIMENTS
1	Identify the various parts of a squirrel cage induction generator (SCIG)
2	Operate the squirrel cage induction motor as a SCIG to test the performance.
3	Operate the wound rotor induction motor as a WRIG to test the performance.
4	Identify the various parts of a doubly-fed induction generator (DFIG).
5	Identify the various parts of a permanent magnet synchronous generator (PMSG)
6	Dismantle/assemble/test a Hysteresis motor
7	Dismantle/assemble/test a Permanent magnet motor
8	Dismantle/assemble/test a Reluctance motor
9	Dismantle/assemble/test a Stepper motor and its types
10	Dismantle/assemble/test a Synchros

LIST OF REFERENCES:

1. Electrical Technology Vol. II Theraja ,B. L. S Chand and Co., New Delhi
2. Theory and performance of Electrical Machines Gupta, J.B. S.K. Kataria and sons, New Delhi
3. http://www.learnabout-electronics.org/ac_theory/transformers04.php
4. <http://www.tpub.com/celec/5.htm>
5. <http://www.wisegeek.com/what-is-a-fractional-horsepower-motor.htm>
6. www.sskphdmm.com
7. www.nptel.iitm.ac.in
8. www.electricalandelectronics.org