

Branch Name:	Electrical Engineering
Program Code	ET403
Course Name:	Special Electrical Machine
Course Code:	2ET4030606
Pre-requisite Course:	

COURSE OBJECTIVES

The practical exercises, the underpinning knowledge and the relevant soft skills associated with the identified competency are to be developed in the student for the achievement of the following COs:

1. Use different types of transformers efficiently for various applications.
2. Maintain different types induction machines for different applications.
3. Maintain different types synchronous machines for different applications.
4. Maintain different types of fractional horse power motors.
5. Maintain various types of Small specialized electric machines.

TEACHING AND EVALUATION SCHEME:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	-	2	4	60	40	20	30	150

DETAILS OF COURSE CONTENTS:

Sr No	Topics and Sub-topics	Total Hours	% Weightage
1	SPECIAL TRANSFORMER 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, audio, Pulse transformer 1.4 Instrument transformers: current transformers and potential Transformers and related theories 1.5 Constant Voltage Transformer (CVT) and Constant Current Transformer (CCT)	08	20

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) 2.6 Brushless doubly fed induction generator (BDFIG)	08	15
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 3.5 Linear motor 3.6 Repulsion motor	08	25
4	OTHER SPECIAL MOTORS 4.1 Stepper motor and its types. 4.2 Brushless DC motors 4.3 Servomotors 4.4 Synchro	12	25
5	Special Synchronous Machines 5.1 Wound rotor synchronous generators for renewable energy applications 5.2 Wound rotor synchronous generators in large and small direct drive wind turbines 5.3 PMSM (Permanent magnet synchronous machine)	06	15

LIST OF REFERENCES:

1. Electrical Technology Vol. II Theraja, B.L.S Chandand Co., New Delhi
2. Theory and performance of Electrical Machines Gupta, J.B. S.K. Kataria and sons, New Delhi
3. <http://www.wisegeek.com/what-is-a-fractional-horsepower-motor.htm>
4. www.nptel.iitm.ac.in

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 synchro

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Identify types of transformers used efficiently for various applications	5 Creating 2 Understanding
CLO2	Discuss the Types of induction machines used for different applications	2 Understanding 3 Applying
CLO3	List the Types of Small special electric machines	1 Remembering
CLO4	Discuss the Types of fractional horse power motors.	2 Understanding
CLO5	Learn basic about synchronous machines for different applications	3 Applying, 2 Understanding
CLO6	Evaluate different special machine Compare characteristics	5,3, 4 Evaluate,Applying, Analyze

Mapping of CLOs with Pos & PSOs

Course Learning Outcomes	Program Outcomes(POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO1	H	M	H		M		H	L	H	L		M	H	L	L
CLO2	L				M				L		M		H	M	L
CLO3	L		L			M				L			L		M
CLO4				M	L		H	L				M	M		M
CLO5		M			L				M		L		M		
CLO6	M			L		M				L		L	L	L	

H: High, M: Medium, L: Low