

Branch Name:	Electrical Engineering
Program Code	ET403
Course Name:	D.C. Machine and Transformer
Course Code:	2ET4030302
Pre-requisiteCourse:	

COURSE OBJECTIVE:

1. Understand about the Different Test Perform on the Single-phase Transformer
2. Understand the Principles of Energy Conversion & Energy Conservation
3. Understand the Principles of DC Motor, Generator, & Transformer.
4. Understand the function of accessories of three phase transformer.

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
04	00	04	06	60	40	40	60

DETAILS OF COURSE CONTENTS:

Sr. No	Topic and Subtopic	Total Hours	Weightage %
UNIT-I	ENERGY CONVERSION PRINCIPLES 1.1 Law of conservation of energy 1.2 Role of electrical energy and uses 1.3 Electro-mechanical energy conversion principle, 1.4 Singly excited and doubly excited electrical machines.	04	8
UNIT-II	D.C.GENERATORS 2.1 Working principle, construction and types of 2.2 Materials used for various parts of DC generator 2.3 Functions of various parts of DC generator, 2.4 EMF equation of DC generator, 2.5 Simplex lap and wave winding, 2.6 Characteristics of various types DC generators, 2.7 Efficiency and losses of DC generator, 2.8 Losses and efficiency, 2.9 Armature reaction and its effects and commutation, 2.10 Numericals	14	25
UNIT-III	D.C. MOTORS 3.1 Working principle of DC motor, 3.2 back emf, 3.3 Voltage and Torque equation for DC motor. 3.4 Classify different types of D.C. Motors, Construction & working of Series, Shunt and Compound DC Motors, 3.5 Performance characteristics of DC Series, Shunt and Compound motor, 3.6 Speed control of D.C. motor, 3.7 Need of DC motor starters & Construction and working of DC motor starter, 3.8 Losses and efficiency 3.9 Testing, Brake test, Swinburne's test, field test 3.10 Applications of DC Series, Shunt and compound motor.	12	25

UNIT-IV	SINGLE PHASE TRANSFORMERS& TESTING 4.1 Principle of working, construction and types 4.2 Material Used in different parts of transformer 4.3 EMF equation of transformer and transformation ratio 4.4 Differentiate between core and shell type transformer with sketches 4.5 NO load and ON load Vector diagrams 4.6 Voltage drop in transformer 4.7 Equivalent Circuit 4.8 Losses and efficiency 4.9 condition for Maximum Efficiency 4.10 Regulation of transformer 4.11 Direct load test, O.C and S.C test, Sumpner's Test 4.12 Parallel Operation 4.13 Auto transformer	18	27
UNIT-V	POLY PHASE TRANSFORMER 5.1 Construction and working of polyphase transformer 5.2 Comparison of three phase transformer with bank of three single phase transformers 5.3 Different types of connection 5.4 Parallel operation 5.5 Accessories of Transformer 5.6 Tapping and Tap changers 5.7 Cooling of transformer	08	15

REFERENCE BOOKS :

A text book of Electrical Technology vol.II	B. L. Theraja	S.Chand Publication, New Delhi
Electrical Machines-II	J. B. Gupta	S. K. Kataria & Sons, New Delhi

LIST OF PRACTICAL:

SR NO	PRACTICALS/EXPERIMENTS
1	Identify various parts of DC machine
2	Identify various parts of single-phase transformer
3	Test the performance Characteristics of DC shunt generator
4	Test the performance Characteristics of DC series generator
5	Test the performance Characteristics of DC compound generator
6	Study about three-point starter and identify all the parts of starter
7	Perform the speed control of DC Shunt motor by armature and field control.
8	Perform Swinburne's test of DC machine.
9	Perform Load test on single phase transformer.
10	Perform OC and SC test of single-phase transformer
11	Perform polarity test on single phase transformer

Course Learning Outcomes (CLO):

CLO	Description	Bloom's Taxonomy Level
CLO1	Performing various tests on single phase transformer for finding losses	5,3, 4 Evaluate, Applying, Analyze
CLO2	List the various Parts of D.C. Generator & Fundamental about D.C. Generator.	1 Remembering
CLO3	Analyze & solve the Different speed control method of D.C. motor.	5,3, 4 Evaluate, Applying, Analyze
CLO4	Able to understand all the fundamentals terminology related to Transformer	2 Understanding
CLO5	Able to understand about dc generator principle and related theories	4 Understanding 6 Creating
CLO6	Able to understand about dc Motor principle and related theories.	5 Creating 2 Understanding

Mapping of CLOs with Pos & PSOs

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

H:High, M:Medium, L:Low