

GANPAT UNIVERSITY									
FACULTY OF ENGINEERING AND TECHNOLOGY (DIPLOMA PROGRAMMES)									
Programme	Diploma Engineering				Branch/Spec.	Electrical Engineering			
Semester	III				Version	1.0.0.0			
Effective from Academic Year		2019-20			Effective for the batch Admitted in			June 2018	
Subject code	1EE2302		Subject Name		Electrical Machines - I				
Teaching scheme					Examination scheme (Marks)				
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	4	0	2	0	6	Theory	40	60	100
Hours	4	0	4	0	8	Practical	60	40	100

Pre-requisites:
None

Learning Outcomes:
After successful completion of the course, student will be able to <ul style="list-style-type: none"> • Know energy conversion principle. • Know dc generator principle and related theories. • Know dc motor principle and related theories. • Know single phase transformer and related theories. • Perform various tests on single phase transformer.

Theory syllabus					
UNIT	Unit Content		Unit Learning Outcomes	Marks	Hrs
Unit – I Energy Conversion Principles	1a.	Law of conservation of energy	1.1 Energy conservation law	04	04
	1b.	Role of electrical energy	1.2 Electrical energy and its uses		
	1c.	Conditions for EMF production	1.3 Electro-mechanical energy conversion principle and EMF		
	1d.	Singly and doubly excited field system	1.4 Singly excited and doubly excited electrical machines.		
Unit – II DC Generators	2a.	Different parts of DC machine	2.1 Construction and materials used for various parts of DC generator.	15	15
	2b.	EMF equation of DC generator	2.2 EMF equation of DC generator		
	2c.	Working DC Generator.	2.3 Working principle of DC generator		
	2d.	Different types of armature winding.	2.4 Simplex lap		

	<p>2e. Classify different types of DC generator with sketches</p> <p>2f. Performance characteristic of different types of DC Generators</p> <p>2g. Losses and efficiency.</p> <p>2h. Armature reaction and commutation</p>	<p>2.5 and wave winding. Different types of DC generators</p> <p>2.6 Characteristics of various types DC generators.</p> <p>2.7 Efficiency and losses of DC generator.</p> <p>2.8 Armature reaction and its effects and commutation</p>		
Unit – III DC Motors	<p>3a. Working of DC motor</p> <p>3b. Torque equation of DC motor</p> <p>3c. Need of DC motor starter</p> <p>3d. Working of DC motor starter</p> <p>3e. Different types of DC motors</p> <p>3f. Performance of different types of DC motors</p> <p>3g. Speed control of DC motor</p> <p>3h. Losses and efficiency</p> <p>3i. Brake test, Swinburne’s test and field test.</p> <p>3j. Applications of various types of DC motors</p>	<p>3.1 Working principle of DC motor, back emf.</p> <p>3.2 Torque equation for DC motor.</p> <p>3.3 Need DC motor starters</p> <p>3.4 Construction and working of DC motor starters</p> <p>3.5 Series, Shunt and Compound DC motors</p> <p>3.6 Performance characteristics of DC Series, Shunt and Compound motor.</p> <p>3.7 Speed control of D.C. motor</p> <p>3.8 Losses in DC motors and its computation</p> <p>3.9 Brake test, Swinburne’s test, field test.</p> <p>3.10 Applications of DC Series, Shunt and compound motor.</p>	15	15
Unit - IV Single Phase Transformers	<p>4a. Working of a single phase transformer with sketches</p> <p>4b. EMF equation of transformer and transformation ratio</p> <p>4c. Core and shell type transformer</p>	<p>4.1 Single phase transformer: Working principle, construction, materials used for different parts.</p> <p>4.2 EMF equation and transformation ratio.</p> <p>4.3 Core and</p>	18	18

	<p>with sketches.</p> <p>4d. Performance of the transformer on no load, resistive, inductive and capacitive loads with phasor diagrams</p> <p>4e. Losses in transformer.</p> <p>4f. Efficiency and condition for maximum efficiency of a single phase transformer</p> <p>4g. Significance of voltage regulation</p> <p>4h. Various parameters for the transformer equivalent circuit</p>	<p>shell type of transformers.</p> <p>4.4 Phasor diagram for load and different types of loads</p> <p>4.5 Losses in transformer: Iron loss, Copper loss, Hysteresis loss and eddy current loss</p> <p>4.6 Efficiency Condition for maximum efficiency of single phase transformer.</p> <p>4.7 Voltage regulation</p> <p>4.8 Equivalent circuit of single phase transformer.</p>		
<p>Unit - V Testing of Single Phase Transformers</p>	<p>5a. Need for conducting different types of tests on single phase transformers.</p> <p>5b. OC and SC tests of the single phase transformer</p> <p>5c. Need and conditions for parallel operation of transformers</p> <p>5d. Working of an autotransformer with sketches.</p> <p>5e. Autotransformer and welding transformer</p>	<p>5.1 Direct load test, OC and SC test and Sumpner Test along with connection diagrams, efficiency and regulation of transformer</p> <p>5.2 Derivation of equivalent circuit and its related parameters</p> <p>5.3 Need of parallel operation, essential and desirable conditions for parallel operation.</p> <p>5.4 Parallel operation and load sharing of single phase transformer</p> <p>5.5 Construction and working of autotransformer; welding transformer</p>	08	08

List of Practical	
1	Identify various parts of DC machine
2	Identify various parts of single phase transformer
3	Performance characteristic of dc shunt generator.
4	Performance characteristic of dc series generator.
5	Performance characteristic of dc compound generator.

6	Connect three point and four point starter.
7	Speed control of dc shunt motor.
8	Perform Swinburn's test.
9	Perform OC and SC Test on single phase transformer.
10	Perform load test on single phase transformer.
11	Perform polarity test on single phase transformer.

List of Instruments/Equipments/ Trainer Board	
1	Cut section of dc machine.
2	DC Shunt Generator – 3 KW, 230 V, 13.5 A, 1500 RPM
3	DC Series Generator – 3 KW, 230 V, 13.5 A, 1500 RPM
4	DC Compound Generator – 3 KW, 230 V, 18 A, 1500 RPM
5	DC Shunt Motor - 3 KW, 230 V, 11.8 A, 1500 RPM
6	1-phase transformer – 1 KVA, 230 V / 115 V

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

Link of Learning Resources	
1	https://electrical-engineering-portal.com