

GANPAT UNIVERSITY									
FACULTY OF ENGINEERING AND TECHNOLOGY (DIPLOMA PROGRAMMES)									
Programme		Diploma Engineering				Branch/Spec.		Electrical Engineering	
Semester		IV				Version		1.0.0.0	
Effective from Academic Year			2019-20			Effective for the batch Admitted in			June 2018
Subject code		1EE2401		Subject Name		Electrical Machines - II			
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:
Electrical Machines - I

Learning Outcomes:
After successful completion of the course, student will be able to
<ul style="list-style-type: none"> • Know various transformer accessories. • Know 3 phase induction motor principle and related theories. • Know alternator and related theories. • Know synchronous motor and related theories. • Know 1 phase induction motor and related theories.

Theory syllabus				
UNIT	Unit Content	Unit Learning Outcomes	Marks	Hrs
Unit - I Poly Phase Transformer	1a. Advantages of 3-phase transformer over a bank of 3 single phase transformers 1b. Major parts of the 3 phase transformer- Main tank, bushings, conservator with breather, oil level gauge, radiators, buchholz relay, explosion vent, temperature indicators, junction box 1c. Different types of connections of 3-phase transformer including vector groups 1d. Various	1.1 Comparison of three phase transformer with bank of three single phase transformers. 1.2 Arrangement of Core and windings in transformer, use of tap changer. Types of losses in transformers. 1.3 Construction - Accessories of 3 phase transformer: Star delta connections and vector groups 1.4 Cooling of transformer: Natural cooling, Forced cooling	10	10

	cooling methods 1e. Need of parallel operation of 3 phase transformers .	1.5 Parallel operation – Essential and desirable Conditions		
Unit – II Poly Phase Induction Motors	2a. Rotating field produced by 3 phase induction motor. 2b. Squirrel cage and wound rotor induction motor with their salient features. 2c. Torque slip characteristics of 3-phase I.M. 2d. Testing of 3 phase induction motor. 2e. Various methods of speed control of 3 phase induction motor.	2.1 Construction, types - Squirrel cage -Single and double cage, Wound rotor 2.2 Working principle with Torque-slip curve, equivalent circuit and phasor diagram 2.3 Torque equation , Starting, running and condition for the maximum torque 2.4 Necessary and types of starters- DOL, Star delta, autotransformer type and rotor resistance starter. 2.5 No load test and Blocked rotor test, Losses and efficiency 2.6 Speed control of squirrel cage and slip-ring induction motor	16	16
Unit – III Alternator	3a. Working principle of an alternator 3b. Turbo generator and hydro-generators 3c. EMF equation 3d. Determination of Voltage regulation of an alternator 3e. Synchronize an alternator with infinite bus bar.	3.1 Principle of working and construction.-Salient and Cylindrical rotor 3.2 Equivalent circuit and phasor diagram 3.3 Voltage regulation by synchronous impedance method, OC, SC characteristics 3.4 Synchronization of alternator with bus bar/alternator 3.5 Cooling system of alternator	12	12
Unit - IV Synchronous	4a. Connect and operate synchronous motor using proper	4.1 Principle of working, starting methods	12	12

Motor	<p>starting method</p> <p>4b. Improve the power factor of the system using synchronous condenser</p> <p>4c. Features between the synchronous and induction motor</p>	<p>4.2 Equivalent circuit and phasor diagram</p> <p>4.3 Effect of change in excitation 'V'-curves</p> <p>4.4 Synchronous condenser</p> <p>4.5 Hunting and its prevention</p> <p>4.6 Different torque of a synchronous motor</p>		
Unit – V Single Phase Induction Motors	<p>5a. Working principle of different types of single phase motors.</p> <p>5b. Working principle of different types of fractional horse power motors</p> <p>5c. Troubleshoot single phase induction motor in a ceiling fan/ cooler</p>	<p>5.1 Working of different types of single phase induction motors</p> <p>5.2 Fractional horse power motors</p> <p>5.3 Speed torque characteristic</p>	10	10

List of Practical	
1	Construction of 3-phase induction motor.
2	Different parts of three phase transformer.
3	Load test on 3-phase induction motor.
4	No load and block rotor test on induction motor.
5	Measurement of power with and without capacitor in single phase induction motor.
6	Reverse direction of single and three phase induction motor.
7	Different types of single phase induction motor.
8	Measurement of voltage regulation of alternator using direct loading method.
9	Measurement of voltage regulation of alternator using synchronous impedance loading method.
10	Measurement of voltage regulation of alternator using ampere turns method.
11	Determine V-curve of synchronous motor.

List of Instruments/Equipments/ Trainer Board	
1	Cut section of 3-phase I.M.
2	3-Phase I.M. 5 HP, 7.5 A, 1440 RPM, 415 V
3	3-phase I.M. 3 HP, 4.5 A, 1440 RPM, 415 V
4	3-phase Alternator 3.5 KVA, 220 V, 8.1 A, 1500 RPM
5	3-Phase Load & 3-Phase Variac

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
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