

GANPAT UNIVERSITY									
FACULTY OF ENGINEERING AND TECHNOLOGY (DIPLOMA PROGRAMMES)									
Programme	Diploma Engineering				Branch/Spec.	ElectricalEngineering			
Semester	VI				Version	1.0.0.0			
Effective from Academic Year		2020-21			Effective for the batch Admitted in			July 2018	
Subject code	1EE2602		Subject Name		COMMISSIONING, TESTING AND MAINTENANCE				
Teaching scheme					Examination scheme (Marks)				
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	4	0	1	0	5	Theory	40	60	100
Hours	4	0	2	0	6	Practical	30	20	50

Course Learning Outcomes:
<ul style="list-style-type: none"> <li>• Unload the electrical equipment's/machines based on scientific procedure</li> <li>• Commission various electrical equipment/machines</li> <li>• Prepare maintenance schedule of different equipment and machines</li> <li>• Prepare trouble shooting chart for various electrical equipment, machines and domestic appliances</li> <li>• Carry out different types of earthing</li> <li>• Apply electrical safety regulations and rules during maintenance.</li> </ul>

Theory syllabus				
UNIT	Unit Content	Unit Learning Outcomes	Marks	Hrs
Unit – I Installation of Electrical Equipment	1a. Unloading of Electrical equipment at site 1b. Inspection of electrical equipment at site 1c. Storage electrical equipment at site 1d. Foundation electrical equipment at site 1e. Alignment of electrical machines 1f. Tools/Instruments necessary for installation 1g. Technical report, Inspection, storage and handling of transformer, switchgear and motors	1.1 Describe the planning before unloading of heavy electrical equipments at site 1.2 Select appropriate tools for installation of electrical equipment 1.3 Explain the procedure for handling, inspection, storage and installation of static and rotating electrical equipment	8	8
Unit – II Commissioning and Testing	2a. Tests before commissioning of electrical equipment-Electrical and Mechanical test, Preparations before commissioning of power transformer, Instruments required	2.1 Describe various commissioning tests on electrical equipment/machines 2.2 Describe the specific	16	15

	<p>fortesting</p> <p>2b. Specific tests on -Transformer, Inductionmotor, alternator,synchronous motor</p> <p>2c. Commissioning of power transformer, three phase induction motor and switchgear</p> <p>2d. Transformer insulation oil: Properties as per IS, sampling, testing and filtering/purifying, standard tests as per IS, classification of insulationresistance</p> <p>2e. Measurement of insulation resistance and Polarization Index, Factorsaffecting the insulation resistance of insulating materials</p> <p>2f. Drying the winding of electrical equipment and itsrecord</p> <p>2g. Testsafter and before commissioning themachine</p> <p>2h. Test report on commissioning and test certificateGradually loading of electrical equipment</p>	<p>test on electrical equipment/machines</p> <p>2.3 Explain the standard tests performed on insulation oil</p> <p>2.4 Determine the insulation resistance of electrical equipment/machines</p> <p>2.5 Explain the procedure of drying the winding of electrical equipment/machines</p> <p>2.6 Explain the various factor affecting the insulationresistance</p> <p>2.7 Explain the need for gradual loading of electricalequipment</p>		
<p>Unit – III Maintenance of Electrical Equipment</p>	<p>3a. Functions of the Maintenance Department; Reasons of failure of electricalequipment</p> <p>3b. Preventive maintenance: need, classification, advantages, activities Frequency ofmaintenance</p> <p>3c. Breakdown maintenance: concept, advantages,activities</p> <p>3d. Factors for preparing maintenance schedule</p> <p>3e. Maintenance schedule of transformer below and above1000kVA</p> <p>3f. Maintenance schedule - induction motor,circuit Breaker, overhead line, storage Battery</p> <p>3g. Probable faults due to poor maintenance in transformer, induction motor, circuit breaker, overhead lines and battery</p>	<p>3.1 Explain the need of different types of maintenance</p> <p>3.2 Explain the reason of failure of electrical equipment due to poor maintenance</p> <p>3.3 Prepare maintenance schedule of different equipment</p> <p>3.4 State the probable faults due to poor maintenance in various electrical equipment.</p>	14	13
<p>Unit - IV Troubleshoo ting</p>	<p>4a. Causes of faults in electrical equipment (Internal andexternal)</p> <p>4b. Instruments and tools for troubleshooting</p>	<p>4.1 State various internal and external faults that occur in electrical equipment</p>	11	10

	<p>4c. Common troubles in electrical equipment- DC Machines, AC Machines, Transformers, Circuit-breaker, under- ground cable, electrical Installation</p> <p>4d. Need of trouble shooting chart,</p> <p>4e. Trouble shooting chart for DC Motor, DC Generator, Transformer, Synchronous Motor, Induction Motor, Circuit-breaker</p> <p>4f. Trouble shooting chart for Domestic appliances- electrical iron, ceiling fan, Washing machine, Air cooler, Vacuum cleaner, Fluorescent tube light: Construction, working and trouble shooting chart</p>	<p>4.2 State common troubles in various electrical equipment and machines</p>		
<p>Unit – V Earthing</p>	<p>5a. Necessity of earthing</p> <p>5b. System earthing: advantage of neutral earthing of generator in power station</p> <p>5c. Equipment earthing: Objective</p> <p>5d. Types of earth electrodes</p> <p>5e. Methods of earthing : plate earthing, pipe earthing and coil earthing</p> <p>5f. Earthing in extra high voltage and underground cable, Earthing resistance- factors affecting, Determination of maximum permissible resistance of the earthing system</p> <p>5g. Measurement of earth resistance: voltmeter-ammeter method, earth tester method, ohm meter method and earth loop tester method</p> <p>5h. Comparison between equipment earthing and system grounding.</p> <p>5i. Earthing procedure- Building Installation, Domestic appliances, Industrial premises, Earthing of substation, generating station and overhead line.</p>	<p>5.1 Explain the need of earthing and the different methods of earthing</p> <p>5.2 Explain the various factors affecting the earth resistance</p> <p>5.3 Describe the various methods of measuring the earth resistance</p> <p>5.4 Differentiate between equipment earthing and system grounding</p>	<p>11</p>	<p>10</p>

<b>List of Practical</b>	
1	Prepare complete layout of wiring for installation of given machine with specifications.
2	To prepare test report after commissioning of an electrical machine.
3	Perform various tests on insulating oil.
4	Measurement of insulation resistance of a wiring installation with the help of megger.
5	Prepare maintenance schedule for power transformer.
6	Prepare maintenance schedule for induction motor.
7	To study dismantling and trouble shooting of ceiling fan.
8	Prepare plate / pipe earthing as per is and measure earth resistance.
9	Interpret indian electricity rules pertaining to safety.
10	To study of the action to be taken when a person comes in contact with a live wire.

<b>List of Instruments/Equipments/ Trainer Board</b>	
1	Megger
2	Ammeter
3	Voltmeter
4	Watt meter
5	Variac
6	Techometer

<b>List of Text Books</b>			
1	Testing Commissioning operation and maintenance of Electrical Equipment's.	Rao. S	Khanna Publication (Latest edition), New Delhi
2	Installation, commissioning and maintenance of Electricalequipment	Singh Tarlok	S.K.Kataria and Sons, New Delhi, Second edition-2012

<b>List of Reference Books</b>			
1	Process Plants- shutdown and turnaround management	Trinath Sahoo	CRC Press

<b>Link of Learning Resources</b>	
	I. <a href="http://cercind.gov.in/ElectSupplyAct1948.pdf">http://cercind.gov.in/ElectSupplyAct1948.pdf</a> II. <a href="http://www.lce.com/pdfs/The-PMPdM-Program-124.pdf">www.lce.com/pdfs/The-PMPdM-Program-124.pdf</a> III. <a href="http://www.iapa.ca/pdf/prevent.pdf">www.iapa.ca/pdf/prevent.pdf</a> IV. <a href="http://cercind.gov.in/ElectSupplyAct1948.pdf">http://cercind.gov.in/ElectSupplyAct1948.pdf</a> V. <a href="http://www.pfeiffereng.com/Principals%20of%20Electrical%20Grounding.pdf">www.pfeiffereng.com/Principals%20of%20Electrical%20Grounding.pdf</a>