

Branch Name:	Electrical Engineering
Program Code	ET403
Course Name:	ELECTRICAL INSTALLATION, COMMISSIONING AND MAINTENANCE
Course Code:	2ET4030601
Pre-requisite Course:	

COURSEOBJECTIVE:

1. To Install various electrical equipment's /machines.
2. Understand Commission and test various electrical equipment/machines
3. To Carry out maintenance of different electrical equipment and machines
4. Understand Troubleshoot various electrical equipment/machines and domestic electrical appliances.
5. Apply electrical earthing, safety rules and safety practices

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	
4	-	2	5	60	40	20	30	150

DETAILSOFCOURSECONTENTS:

Sr No	Topics and Sub-topics	Total Hours	% Weightage
1 Installation of Electrical Equipment	1.1 Unloading of Electrical equipment at site 1.2 Inspection of electrical equipment at site 1.3 Storage electrical equipment at site 1.4 Foundation electrical equipment at site 1.5 Alignment of electrical machines 1.6 Tools/Instruments necessary for installation 1.7 Technical report, Inspection, storage and handling of transformer, switch gear and motors	06	15

2 Commissioning and Testing	2.1 Tests before commissioning of electrical equipment-Electrical and Mechanical test, Preparations before commissioning of power transformer, Instruments required for testing 2.2 Specific tests on -Transformer, Induction motor, alternator, synchronous motor 2.3 Commissioning of power transformer, three phase induction motor and switchgear 2.4 Transformer insulation oil: Properties as per IS, sampling, testing and filtering/purifying, standard tests as per IS, classification of insulation resistance 2.5 Measurement of insulation resistance and Polarization Index, Factors affecting the insulation resistance of insulating materials 2.6 Drying the winding of electrical equipment and its record 2.7 Tests after and before commissioning the machine 2.8 Testing of Relays Factory test, commissioning test and preventive periodic maintenance test. Testing of circuit breakers, voltage test, type test	14	20
3 Maintenance Of Electrical Equipment	3.1 Functions of the Maintenance Department; Reasons of failure of electrical equipment 3.2 Preventive maintenance: need, classification, advantages, activities Frequency of maintenance 3.3 Breakdown maintenance: concept, advantages, activities 3.4 Factors for preparing maintenance schedule 3.5 Maintenance schedule of transformer below and above 1000kVA 3.6 Maintenance schedule-induction motor, circuit Breaker, overhead line, storage Battery 3.7 Probable faults due to poor maintenance in transformer, induction motor, circuit breaker, Overhead lines and battery 3.8 Solar Inverter Maintenance, Maintenance of Automated distribution system	12	15

4 Trouble Shooting	4.1 Causes of faults in electrical equipment internal and external) 4.2 Instruments and tools for troubleshooting 4.3 Common troubles in electrical equipment- DC Machines, AC Machines, Transformers, Circuit-breaker, under-ground cable, electrical Installation 4.4 Need of trouble shooting chart, 4.5 Troubleshooting chart for DC Motor, DC Generator, Transformer, Synchronous Motor, Induction Motor, Circuit-breaker 4.6 Troubleshooting chart for Domestic Appliances- Electrical iron, ceiling fan, washing machine, Air cooler, Vacuum cleaner, fluorescent tube light Construction, working and trouble shooting chart	09	20
5 Earthing & Electrical Safety	5.1 Necessity of earthing 5.2 System earthing: advantage of neutral earthing of generator in PowerStation 5.3 Equipment earthing: Objective 5.4 Types of earth electrodes 5.5 Methods of earthing: plate earthing, pipe earthing and coil earthing 5.6 Earthing in extra high voltage and underground cable, Earthing resistance-factors affecting, Determination of maximum permissible resistance of the earthing system 5.7 Measurement of earth resistance: voltmeter-ammeter method, earth tester method, ohm meter method and earth loop 5.8 Comparison between equipment earthing and system grounding. 5.9 Earthing procedure- Building Installation, Domestic appliances, Industrial premises, Earthing of substation, generating station and overhead line 5.10 Safety regulation and safety Measures. 5.11 Substation Shutdown Procedure 5.12 Permit to work 5.13 Safety Instructions for Working on Low, Medium and High Voltage Mains and Apparatus. 5.14 Fire Extinguishers	15	30

LIST OF REFERENCES:

1. Testing Commissioning operation and maintenance of Electrical Equipment's by Rao S, Khanna Publication New Delhi.
2. Testing Commissioning operation and maintenance of Electrical Equipment's. By Singh Tarlok, S.K. Kataria and Sons, New Delhi, Second edition-2012.
3. Electrical Power System By Wadhwa C.L, New Age international Publications, New Delhi
4. <http://cercind.gov.in/ElectSupplyAct1948.pdf>

LIST OF PRACTICAL:

Sr no	Name of Practical
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 troubleshooting of ceiling fan.
8	To study dismantling and troubleshooting of fluorescent tube light.
9	Prepare plate/pipe earthing as per IS and measure earth resistance.
10	Interpret Indian electricity rules pertaining to safety.
11	Study of different Fire Extinguishers.
12	Undertake drill operation for using fire extinguisher for safety against fire

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

CLO	Description	Bloom's Taxonomy Level
CLO1	Understand the Procedure of Installation of various electrical equipment's /machines.	2 Understanding
CLO2	Understand and analyze the Commissioning and testing of various electrical equipment /machines	4 Analyze 1 Remembering
CLO3	Able to Prepare maintenance schedule of different equipment and machines	1 Remembering 2 Understanding
CLO4	Understand and able to Prepare trouble shooting chart for various electrical equipment, machines and domestic	2 ,3,5 Understanding, Applying, evaluate

CLO5	Understand the necessity of earthing and its Methods	2 Understanding 3 Applying
CLO6	Understand the Electrical safety regulations and rules.	1 Remembering 2 Understanding

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		L		M		H	L		L		M	H	L	L
CLO2	L				M				M		H		H	M	L
CLO3	L	M	H	L								M	L		M
CLO4					L	M		L					M		M
CLO5	L	M			L		H			M	M		M		
CLO6			L					M					L	L	

H:High, M:Medium, L:Low