

3EE83: INSTALLATION AND COMMISSIONING OF ELECTRICAL EQUIPMENT
CREDITS - 3 (LTP:3,0,0)

Course Objective:

It is required to carry out/supervise installation, commissioning and maintenance of various electrical equipment in power stations, substations and industry. This course will enable the students to understand the concepts, principles and acquire basic skills of installation, commissioning and maintenance of electrical equipment in power stations, substations and industry.

Teaching and Assessment Scheme:

Teaching Scheme (Hours per Week)			Credits	Assessment Scheme				Total Marks
L	T	P		C	Theory Marks		Practical Marks	
			ESE		CE	ESE	CE	100
3	0	0	3	60	40	--	---	

Course Contents:

Unit No.	Topics	Teaching Hours
1	Installation of Electrical Equipment: Introduction unloading of electrical equipment at site, inspection storage foundation alignment of electrical machines, Tools/Instruments necessary for installation inspection, storage and handling of transformer, switchgear and induction motor preparation of technical report.	04
2	Commissioning and Testing: Tests before commissioning of electrical equipment; Electrical and Mechanical test, specific tests on – transformer, induction motor, alternator, need of gradually loading of various machines, tests to be performed after commissioning and before starting the machine, various instruments required for testing, commissioning of switchgear, test report on commissioning and test certificate of electrical equipment, preparations before commissioning of power transformer, commissioning-power transformer, three phase induction motor, transformer insulation oil: properties as per IS, sampling, testing and filtering/purifying, standard tests as per IS, measurement of insulation resistance of different equipment's/machines, methods of Drying the winding of electrical equipment's and its record, classification and measurement of insulation resistance, Polarization Index, appropriate insulation test for specific purpose	08

Unit No.	Topics	Teaching Hours
3	Maintenance of Electrical Equipments: General aspect of maintenance, classification, preventive maintenance-concept, classification, advantages, activities, functions of the maintenance department, breakdown maintenance-concept, advantages, activities reasons of failure of electrical equipment due to poor maintenance, factors for preparing maintenance schedule, frequency of maintenance, maintenance schedule of transformer below and above 1000kVA, maintenance schedule - induction motor, circuit breaker, overhead line, storage Battery, probable faults due to poor maintenance in transformer, induction motor, circuit breaker, overhead lines and battery	08
4	Trouble Shooting: Causes of fault in electrical equipment's, Internal and external Instruments and tools for trouble shooting, common troubles in electrical equipment – DC Machines, AC Machines, Transformers, Circuit-breaker, underground cable, electrical installation, need of trouble shooting chart, advantages, trouble shooting chart – DC Motor, DC Generator, Transformer, Synchronous Motor, Induction Motor, Circuit-breaker, troubleshooting chart for Domestic appliances- electrical iron, ceiling fan, Washing machine, Air cooler, Vacuum cleaner Fluorescent tube light: Construction, working and troubleshooting chart.	06
5	Earthing: Necessity of earthing, system earthing; advantage of neutral earthing of generator in power station, equipment earthing: Objective Types of earth electrodes, Methods of earthing; plate earthing, pipe earthing and coil earthing, Earthing in extra high voltage and underground cable Earthing resistance, factor affecting Determination of maximum permissible resistance of the earthing system, measurement of earth resistance: voltmeter-ammeter method, earth tester method, ohm meter method and earth loop tester method Earthing, grounding and bonding, Comparison between equipment earthing and system grounding Earthing procedure – Building installation, Domestic appliances, Industrial premises Earthing in substation, generating station and overhead line	06
6	Electrical Accidents and Safety: Causes of electrical accidents, Factors affecting the severity of electrical shock, Actions to be taken when a person gets attached to live part, Safety regulations and safety measures, Indian electricity supply act 1948- 1956, Factory act 1948, Procedure of shut down for substation and power lines, Permit to work : certificate of (i)requisition for shut down(ii) Permit to work and (iii) Line clear certificate Instruction for the safety of persons working on a job with a permit to work, Fire extinguishers- For fixed installation and portable devices	04
Total		36

List of References:

1. Rao, S., “Testing, commissioning, operation and maintenance of electrical equipment”, 6/E., Khanna Publishers, New Delhi
2. Ramesh. L, Chakrasali, “Testing & Commissioning of Electrical Equipment”, Prism Books Pvt. Ltd., 2014.
3. Paul Gill, “Electrical power equipment maintenance and testing”, CRC Press, 2008.
4. Singh Tarlok, "Installation, commissioning and maintenance of Electrical Equipment's. K. Kataria and Sons, New Delhi,
5. Philip Kismet, “Electrical Equipment Handbook: Troubleshooting and Maintenance”, McGraw- Hill, 2003.
6. Relevant Indian Standards (IS Code) and IEEE Standards for-Installation, maintenance and commissioning of electrical equipment/machines.

Course Outcomes (COs):

After learning the course, the students will be able to

1. Installation of Electrical Equipment's
2. Perform commissioning and testing of electrical equipment's
3. Preparation of maintenance schedule of different equipment and machines
4. Trouble shooting chart for various electrical equipment, machines and domestic appliances
5. Procedure of different types of earthing for different types of electrical installations
6. To become familiar about electrical safety regulations and rules during maintenance.