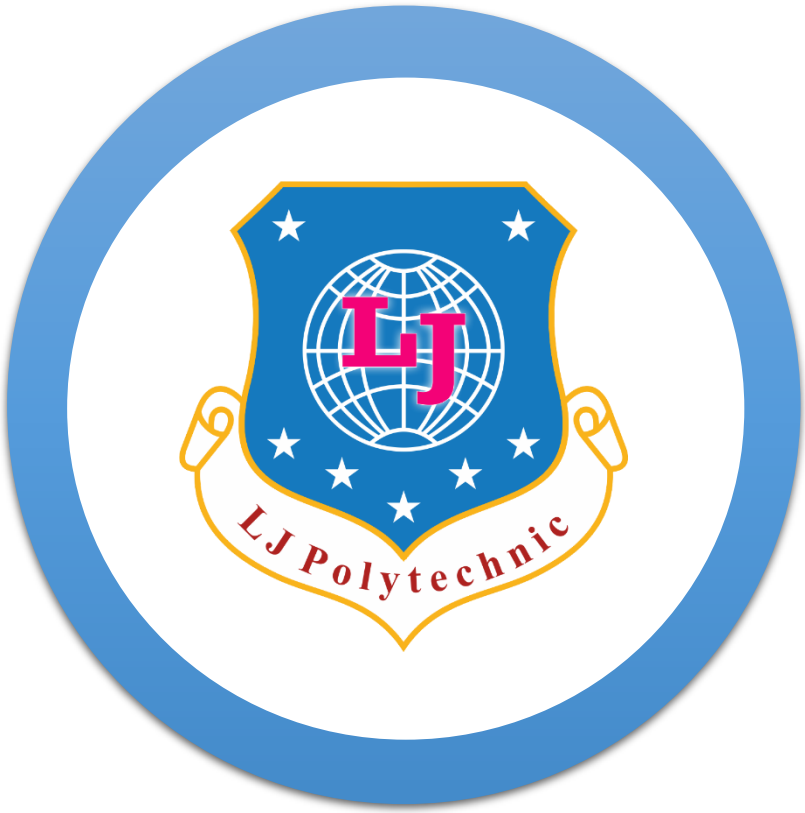
Lok Jagruti Kendra University
University with a Difference

Diploma
in
Electrical Engineering



Course Code: 025070602
Electrical Installation, Commissioning & Maintenance

Programme / Branch Name	Diploma in Electrical Engineering					
Course Name	Electrical Installation, Commissioning & Maintenance				**Course Code**	025070602
Course Type	HSSC	BSC	ESC	PCC	OEC	PEC

Legends: HSSC: Humanities and Social Sciences Courses BSC: Basic Science Courses
ESC: Engineering Science Courses PCC: Program Core Courses
OEC: Open Elective Courses PEC: Program Elective Courses

1. Teaching and Evaluation Scheme

Teaching Hours / Week / Credits				**Evaluation Scheme**			
L	**T**	**P**	**Total Credit**	**CCE**	**SEE (Th)**	**SEE (Pr)**	**Total Marks**
4	0	2	5	50	50	50	150

Legends:
L: Lectures T: Tutorial P: Practical
CCE: Continuous & Comprehensive Evaluation
SEE (Th): Semester End Evaluation (Theory)
SEE (Pr): Semester End Evaluation (Practical)

2. Prerequisite

- ✓ Basic electrical machine and wiring
- ✓ Basic of transmission system and substation

3. Rationale

Electrical Power system consists of a number of transformers, circuit breakers and other equipment which require installation, commissioning and regular maintenance to prevent permanent break down. Many times an engineering diploma holder has to carryout/supervises installation, commissioning and maintenance of various electrical equipment in power stations, substations and industry. This course will enable the diploma pass out student to understand the concepts, principles and acquire basic skills of installation, commissioning and maintenance of electrical equipment in power stations, substations and industry.

4. Objectives

The course content should be taught and with the aim to develop different types of skills so that students are able to acquire following competency:

- Undertake installation, commissioning and maintenance of various power system components and equipment.

5. Contents

Unit No.	Topics	Sub-Topics	Learning Outcome	% Weightage	Hours
1	**Installation of Electrical Equipment**	1.1.Describe the planning before unloading of heavy electrical equipment 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.	• Unloading of electrical equipment at site • Inspection of electrical equipment at site • Storage electrical equipment at site • Foundation electrical equipment at site • Alignment of electrical machines • Tools/Instruments necessary for installation	11	6
2	**Commissioning and Testing**	2.1.Describe various commissioning tests on electrical equipment/machines 2.2.Describe the specific test on electrical equipment/machines 2.3.Explain the standard tests performed on insulation oil 2.4.Determine the insulation resistance of electrical equipment/machines 2.5.Explain the procedure of drying the winding of electrical equipment/machines 2.6.Explain the various factor affecting the insulation resistance 2.7.Explain the need for gradual loading of electrical equipment	• Tests before commissioning of electrical equipment- Electrical and Mechanical test, Preparations before commissioning of power transformer, Instruments required for testing • Specific tests on - Transformer, Induction motor, alternator, synchronous motor • Commissioning of power transformer, three phase induction motor and switchgear • Transformer insulation oil: Properties as per IS.	25	14
3	**Maintenance of Electrical Equipment**	3.1 Explain the need of different types of maintenance 3.2 Explain the reason of failure of electrical equipment due to poor maintenance	• Functions of the Maintenance Department; Reasons of failure of electrical equipment • Preventive maintenance: need, classification,	21	12

		3.3 Prepare maintenance schedule of different equipment 3.4 State the probable faults due to poor maintenance in various electrical equipment	advantages, activities Frequency of maintenance • Breakdown maintenance: concept, advantages, activities		
4	**Troubleshooting**	4.1 State various internal and external faults that occur in electrical equipment 4.2 State common troubles in various electrical equipment and machines 4.3 Prepare trouble shooting chart for various electrical equipment, machines and domestic appliances.	• Causes of faults in electrical equipment (Internal and external) • Instruments and tools for trouble shooting • Common troubles in electrical equipment • – DC Machines, AC Machines, Transformers, Circuit-breaker, under-ground cable, electrical Installation • Need of trouble shooting chart, • Trouble shooting chart for DC Motor, DC Generator, Transformer, Synchronous Motor, Induction Motor, Circuit-breaker	16	9
5	**Earthing and Electrical Accidents**	5.1 Explain the need of earthing and the different methods of earthing 5.2 Explain the various factors affecting the earth resistance 5.3 Describe the various methods of measuring the earth resistance 5.4 Differentiate between equipment earthing and system grounding 5.5 Explain the earthing procedure in different types of electrical installations	• 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 • Comparison between equipment earthing and system grounding • Earthing procedure - Building installation, Domestic appliances, Industrial premises, Earthing of substation,	26	15

			generating station and overhead line.		
				Total Hours	**56**

6. List of Practical's / Exercises

The practical/exercises should be properly designed and implemented in an attempt to develop different types of skills that students can acquire the competencies/programme outcomes. Following is the list of practical exercises for guidance.

Sr. No	Practical / Exercises	Key Competency	Hours
1	Prepare layouts of wiring for installation of given machine with specification.	Installation of given machine	2
2	Prepare test reports of an electrical machine after Commissioning.	Reports of an electrical machine	2
3	Perform various tests on insulating oil.	Tests on insulating oil	2
4	Measure insulation resistance of a winding/cables/wiring Installation.	IR	2
5	Prepare maintenance schedule for power transformer.	Power transformer	2
6	Prepare maintenance schedule for induction motor.	Induction motor	2
7	Trouble shoot a ceiling fan.	Ceiling fan	2
8	To study about the different method for measurement of earth resistance.	Earth resistance	2
9	To study plate and pipe earthing.	Plate and pipe earthing	2
10	Read And Interpret Indian Electricity Rules pertaining to safety.	IE Rules	2
		Total Hours	20

7. Suggested Specification Table for Evaluation Scheme

Unit No.	Unit Name	Teaching Hours	Distribution of Topics According to Bloom's Taxonomy					
			R %	U %	App %	C %	E %	An %
1	Installation of Electrical Equipment	6	20	20	20	10	10	20
2	Commissioning and Testing	14	10	30	20	10	10	20
3	Maintenance of Electrical Equipment	12	20	20	25	15	10	5
4	Troubleshooting	9	20	20	15	20	10	15
5	Earthing and Electrical Accidents	15	20	10	20	0	10	30

Legends: R - Remembering App – Applying E- Evaluating
U - Understanding C – Creating An- Analyzing

8. Textbooks

1) Testing Commissioning operation and maintenance of Electrical Equipments by Rao. S.
2) Installation, commissioning and maintenance of Electrical equipment by Singh Tarlok.

9. Reference Books

1) Testing Commissioning operation and maintenance of Electrical Equipments by Rao. S.
2) Installation, commissioning and maintenance of Electrical equipment by Singh Tarlok.
3) Electrical power system by Wadhwa C.L.

10. Open Sources (Website, Video, Movie)

1) http://cercind.gov.in/ElectSupplyAct1948.pdf
2) www.lce.com/pdfs/The-PMPdM-Program-124.pdf
3) www.iapa.ca/pdf/prevent.pdf