

\*PSOs are to be formulated at institute level

# Maharashtra State Board of Technical Education

**K-1**

## Teaching Plan (TP)

**Academic Year:** 2025-26

**Institute Code:** 0078

**Program:** Electrical Engineering (Ohm)

**Course Code:** 316328

**Course:** Maintenance of Electrical Equipments (MEE)

**Semester:** Fifth (EE-6K)

**Name of faculty:** Mr.S.R.Pawar

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Unit No. (Allotted Hrs.)	CO	TLO aligned to COs	Unit Name and Learning Content Title/ Details	No. of Lecture	Plan (From-To)	Actual Execution (From-To)	Pedagogy Used (Teaching method/ Media)	Remark
<b>1</b> (08)	<b>CO-1</b>	<b>1.1</b>	<b>Unit - I Safety and prevention of accidents</b>	<b>01</b>	<b>15/12/2025</b>		Chalk, Board + LCD Projector + MKCL ERA LMS	
		<b>1.2</b>	1.1 Hazards, accidents, safety					
		<b>1.3</b>	1.2 Dos and Don'ts for electrical supervisors.	<b>01</b>	<b>16/12/2025</b>			
		<b>1.4</b>	1.3 Electric shock: factors influencing severity of shock, rescuing a person from electric shock, different CPR Technique to employed under accidental condition.	<b>01</b>	<b>17/12/2025</b>			
		<b>1.5</b>						
		<b>1.6</b>						
		<b>1.7</b>	1.4 Artificial respiration: types & procedures.	<b>01</b>	<b>20/12/2025</b>			
			1.5 Precautions against electric fire.	<b>01</b>	<b>22/12/2025</b>			
			1.6 Types of fire extinguishers, "PASS" & "RACE" in case of fire.	<b>01</b>	<b>21/08/2025</b>			
			1.7 Objectives of earthing. Earthing of electrical equipment as per IS 3043-1987	<b>01</b>	<b>23/12/2025</b>			
			1.8 Protection of electrical equipment against electric shock (class 0 to class III).	<b>01</b>	<b>24/12/2025</b>			
			1.9 Causes of failure of electrical Equipment: internal and external	<b>01</b>	<b>27/12/2025</b>			
			1.10 Role of BIS in testing of electrical Equipment.	<b>01</b>	<b>29/12/2025</b>			
<b>2</b> (18)	<b>CO-2</b>	<b>2.1</b>	<b>Unit - II Testing and Maintenance</b>	<b>01</b>	<b>30/12/2025</b>		Chalk, Board + LCD Projector +	
		<b>2.2</b>	2.1 Objectives of testing.					
		<b>2.3</b>	2.2 Methods of testing: direct, indirect and regenerative.	<b>02</b>	<b>31/12/2025</b> <b>03/01/2026</b>			
		<b>2.4</b>						
		<b>2.5</b>						

		2.6 2.7 2.8 2.9 2.10 2.11	2.3 Categories of Tests: routine, type, special and supplementary tests.	02	05/01/2026 06/01/2026		MKCL ERA LMS	
			2.4 Tolerance.	01	07/01/2026			
			2.5 Ingress protection, IP marking.	02	10/01/2026 12/01/2026			
			2.6 Significance of maintenance of electrical equipment.	02	13/01/2026 14/01/2026			
			2.7 Types of maintenance-routine, preventive, breakdown maintenance.	02	17/01/2026 19/01/2026			
			2.8 Factors affecting the preventive maintenance schedule.	01	20/01/2026			
			2.9 Procedure for developing preventive maintenance schedule.	02	21/01/2026 31/01/2026			
			2.10 Foundations: requirements and factors affecting rotating machine foundation.	02	02/02/2026 03/02/2026			
			2.11 Tools/instruments: bearing puller, filler gauge, dial indicator, spirit level, megger, earth tester, growler, test lamps, multimeter, spanner sets, and screwdrivers.	02	04/02/2026 07/02/2026			
3 (08)	CO-3		<b>Unit - III Procedure for developing preventive maintenance schedule of Rotating Machines</b>	02	07/02/2026 09/02/2026		Chalk, Board + LCD Projector + Class room Demonstration+ PPT Presentations	
		3.1	3.1 Recommended maintenance schedules: Single phase and three phase induction motors (IS 900 – 1992), three phase alternators and synchronous motors.					
		3.2	3.2 Induction motor testing: Routine, type and special test of single phase induction motor as per IS 7572 – 1974 and three phase induction motor as per IS4029 - 2010.	02	10/02/2026 11/02/2026			
		3.3						
		3.4	3.3 Alternator and synchronous motor testing: Routine, type and special test of three phase alternator and synchronous motor as per IS 7132-1973.	02	14/02/2026 16/02/2026			
			3.4 Trouble shooting chart for single phase and three phase induction motor (IS 900 – 1992).	02	16/02/2026 17/02/2026			

4 (18)	CO-4		<b>Unit - IV Testing and troubleshooting of transformers</b> 4.1 Recommended maintenance schedules: transformers (IS 10028, part III – 1981)	02	18/02/2026 21/02/2026		Chalk, Board + LCD Projector + Class room Demonstration+ PPT Presentations	
		4.1	4.2 Routine, type, supplementary, special tests of transformers, nomenclature of transformer terminals as per IS 2026-1981.	02	23/02/2026 24/02/2026			
		4.2						
		4.3	4.4 Polarity test.	02	24/02/2026 25/02/2026			
		4.4						
		4.5	4.5 Phasing out test.	02	28/02/2026 02/03/2026			
		4.6	4.6 Back-to-Back test.	03	04/03/2026 To 07/03/2026			
			4.7 Trouble-shooting chart for single phase and three phase transformers.	03	09/03/2026 To 11/03/2026			
5 (08)	CO-5		<b>Unit - V Testing and reconditioning of electrical machine insulation</b> 5.1 Classification of insulating materials as per IS 8504- 1994.	01	17/03/2026		Chalk, Board + + MKCL ERA LMS	
			5.2 Factors affecting life of insulating materials.	01	18/03/2026			
		5.1	5.3 Measurement of insulation resistance by megger, voltmeter, dielectric absorption, polarisation index.	01	23/03/2026			
		5.2						
		5.3	5.4 Transformer oil: properties, contaminating agents.	01	24/03/2026			
		5.4	5.5 Testing of transformer oil as per IS 1866: Dielectric strength test, acidity test, sludge test, crackle test, flashpoint and fire point test.	02	25/03/2026 28/03/2026			
		5.5						
		5.6	5.6 Reconditioning of insulation: centrifugal purifiers, streamline filter (Vacuum type) for purification and filtering of insulating oil. Cleaning and drying, re-varnishing, construction and working of vacuum Impregnation plant.	01	28/03/2026			
		5.7	5.7 History sheets of transformers and induction motors: [Part A: machine specifications with component specifications	01	04/04/2026			

		(installation information, bearings, oil type, core weight etc. as applicable); Part B: date wise: observations of parameters such as voltage, current, temperature etc., symptoms, works carried out under maintenance).					
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## ASSESSMENT METHODOLOGIES/TOOLS

### A. Formative assessment (Assessment for Learning) (FA-TH)

1. For formative assessment of laboratory learning 25 marks.
2. Each practical will be assessed considering appropriate % weightage to process and product and other instructions of assessment.
3. Two unit tests of 30 marks will be conducted and an average of two unit tests considered.

### B. Summative Assessment (Assessment of Learning) (SA-TH)

1. End semester summative assessment of 25 marks for laboratory learning.
2. End semester assessment of 70 marks through offline mode of examination.

## SUGGESTED LEARNING MATERIALS / BOOKS

Sr. No	Author	Title	Publisher with ISBN Number
1	Bhattacharya S. K.	Electrical Machines	McGraw Hill Education. New Delhi, ISBN : 9789332902855
2	Theraja B.L.	Electrical Technology Vol-II (AC and DC machines)	S.Chand and Co.Ltd., New Delhi ISBN : 9788121924375
3	Bandyopadhyay M. N.	Electrical Machines Theory and Practice	PHI Learning Pvt. Ltd., New Delhi, ISBN :9788120329973 VI
4	Jean-Claude Trigeassous	Electrical Machine Diagnosis	John Wiley & Sons, Inc ISBN:978-1-84821-263-3.

**LEARNING WEBSITES & PORTALS**

<b>Sr. No</b>	<b>Link / Portal</b>	<b>Description</b>
1	<a href="https://www.youtube.com/watch?v=w4jHpHoYZhk">https://www.youtube.com/watch?v=w4jHpHoYZhk</a>	How to Use a Fire Extinguisher
2	<a href="https://www.youtube.com/watch?v=wrawEAaJrrY">https://www.youtube.com/watch?v=wrawEAaJrrY</a>	Artificial respiration methods
3	<a href="https://www.youtube.com/watch?v=CvuDFgFFOa8">https://www.youtube.com/watch?v=CvuDFgFFOa8</a>	Fundamentals of Transformer Commissioning and Maintenance Testing
4	<a href="https://www.youtube.com/watch?v=ntOc4h792UE">https://www.youtube.com/watch?v=ntOc4h792UE</a>	Motor Maintenance & Troubleshooting
5	<a href="https://www.youtube.com/watch?v=uMxK6djp_rI">https://www.youtube.com/watch?v=uMxK6djp_rI</a>	Electric Motor Repair & Rebuild Instructions
6	<a href="https://youtu.be/JvsPnGbUH5M">https://youtu.be/JvsPnGbUH5M</a>	power transformer oil filtration and treatment
7	<a href="https://nptel.ac.in/">https://nptel.ac.in/</a>	Relevant information from NPTEL
8	<a href="https://www.electricaltechnology.org/">https://www.electricaltechnology.org/</a>	Relevant information
9	<a href="https://www.electrical4u.com/">https://www.electrical4u.com/</a>	Relevant information

**Mr. S. R. Pawar****(Name & Signature of Faculty)****Prof. S. B. Pawar****(Name & Signature of HOD)**