

Maharashtra State Board of Technical Education, Mumbai

TEACHING PLAN (TP)

Academic Year: 2025-26 (EVEN)

Institute Code and Name: 0078- K. K. Wagh Polytechnic, Nashik**Semester:** Fourth**Programme and Code:** Electrical Engineering (EE)**Course Index:** 402**Course and Code:** DC Machines & Transformers (DMT)**Course Code:** 314322**Scheme:** K**Allocated Hrs:** 64**Name of Faculty:** Mr.S.R.Pawar**CLASS: SYEE (Ohm)**

COURSE LEVEL LEARNING OUTCOMES (COS)

CO1 – Test the performance of DC generators.

CO2 - Test the performance of DC motors.

CO3 - Test the performance of single phase transformers.

CO4 – Use three phase transformer for different applications.

CO5 – Use relevant special purpose transformers for different applications.

TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abb r	Course Catego ry	Learning Scheme			P a p e r D u r a t i o n	C r e d i t s	Assessment Scheme						T o t a l M a r k s						
				Actual Contact Hrs / Week					Theory			Based on LL & TSL Practical									
				CL	TL	LL			FA-TH	SA-TH	Total	FA-PR	SA-PR	SLA							
				M a x	M a x	M a x			M a x	M a x	M a x	M a x	M a x	M a x							
334322	DC Machines & Transformer	DM T	DSC	4	-	4	-	8	4	3	30	70	100	40	25	10	25#	10	-	-	150

Total IKS Hrs for Sem.: 1 Hrs

Abbreviations: CL- Classroom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment Legends: @ Internal Assessment, # External Assessment, **# On Line Examination , @\\$ Internal Online Examination

SUGGESTED COS - POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	3	1	1	2	1	1	1			
CO2	3	2	2	2	3	1	2			
CO3	3	1	1	2	2	1	1			
CO4	3	2	2	2	3	1	1			
CO5	3	1	1	2	2	1	1			

Legends :- High:03, Medium:02, Low:01, No Mapping: -

*PSOs are to be formulated at institute level

Unit No	Unit Title	Marks
1	D.C. Generator	8
2	D.C. Motor	20
3	Single Phase Transformer	20
4	Three Phase Transformer	16
5	Special Purpose Transformer	6

Maharashtra State Board of Technical Education **K-1**
Teaching Plan (TP)

Academic Year: 2025-26

Program: EE (Ohm)

Course: DC Machines & Transformers (DMT)

Name of faculty: Mr.S.R.Pawar

Institute Code: 0078

Course Code: 314322

Semester: Fourth (EE-4K)

Unit No. (Allotted Hrs.)	CO Mention only Number	TLO Mention only Number	Unit Name and Learning Content Title/ Details	No. of Lecture	Plan (From-To)	Actual Execution (From-To)	Teachin g method / Media	Re ma rk
1 (8)	CO-1	TLO 1.1, TLO 1.2	Unit - I Dc Generator <p>1.1 DC machine: construction, parts, function & material, types of winding.</p> <p>1.2 D.C. Generator: Principle of operation, Faraday's law of electromagnetic induction, Fleming's right hand rule.</p> <p>1.3 E. M. F. equation of D.C. Generator (derivation)</p> <p>1.4 Types of D.C. Generator and its applications.</p> <p>1.5 Characteristics - internal and external.</p>	8	15-12-2025	26-12-2025	Chalk-Board, Flipped Classroom Video, Demonstrations Model, Demonstration Presentations.	
2 (16)	CO-2	TLO 2.1, TLO 2.2	Unit - II D.C. Motor <p>2.1 D.C. Motor: Principle of operation, Lorentz force, Fleming's Left-hand rule, Back emf and it's significance, Armature reaction.</p>	16	29-12-2025	23-01-2026	Chalk-Board, Flipped	

			<p>2.2 Types of D.C. Motors, Torque: armature torque, shaft torque, Break Horse Power (BHP).</p> <p>2.3 D. C. Motor characteristics- speed-armature current, torque-armature current, speed-torque.</p> <p>2.4 Speed control: D.C. shunt and series motor-flux and armature control.</p> <p>2.5 Starters, necessity of starters, two-point starters, three-point starters and four-point starters.</p> <p>2.6 Testing: Break load test, Different types of losses, efficiency</p> <p>2.7 D.C. Motors applications, advantages and disadvantages</p> <p>2.8 Brushless D.C. Motor: construction working, applications, advantages and disadvantages</p>				<p>Classroom Video, Demonstrations</p> <p>Model, Demonstration</p> <p>Presentations.</p>
3 (17)	CO-3	TLO 3.1, TLO 3.2, TLO 3.3	<p>Unit – III Single Phase Transformer</p> <p>3.1 Single phase transformer: Introduction, construction, parts-functions and material.</p> <p>3.2 Principle of operation, EMF equation, voltage transformation ratio, turns ratio.</p> <p>3.3 Types and losses, significance of transformer ratings.</p> <p>3.4 No-load and On-load test on transformer and it's phasor diagram, Leakage reactance.</p> <p>3.5 Equivalent circuit of transformer with equivalent resistances and reactances.</p>	17	31-01-2026	27-02-2026	<p>Chalk-Board, Flipped Classroom Video, Demonstrations</p> <p>Model, Demonstration</p> <p>Presentations.</p>

			3.6 Voltage regulation and Efficiency: Direct loading. O.C. / S.C. method. All day efficiency, applications.				
4 (13)	CO-4	TLO 4.1, TLO 4.2, TLO 4.3, TLO 4.4	<p>Unit - IV Three Phase Transformer</p> <p>4.1 Three phase transformer: Introduction, construction, bank of three single phase transformers. Single unit of three phase transformer.</p> <p>4.2 Working principle of three phase transformer.</p> <p>Types of transformers.</p> <p>4.3 Connections as per IS: 2026 (part IV)-1977.</p> <p>Three phases to two phase conversion (Scott Connection).</p> <p>4.4 Selection criteria as per IS: 10028 (Part I)-1985</p> <p>Of distribution transformer and power transformer, amorphous core type distribution transformer, specifications of three-phase distribution transformers as per IS:1180 (part I)-1989.</p> <p>4.5 Need of parallel operation, conditions for parallel operation.</p> <p>4.6 Polarity tests on mutually inductive coils, Phasing out test on Three-phase transformer</p> <p>4.7 Harmonics and their effects on transformer operation.</p> <p>4.8 'K' factor of transformers: overheating due to non-linear loads and harmonics.</p>	13	27-02-2026	20-03-2026	Chalk-Board, Flipped Classroom Video, Demonstration Model, Demonstration Presentations.

5 (6)	CO-5	TLO 5.1 TLO 5.2 TLO 5.3	Unit - Special Purpose Transformer	6	23-03-2026	04-04-2026	Chalk-Board, Flipped Classroom Video, Demonstrations Model, Demonstration Presentations.
			5.1 Auto transformer: Construction, working and applications for single and three phases.				
			5.2 Instrument Transformers: Construction, working and applications of current transformer and potential transformer				

ASSESSMENT METHODOLOGIES/TOOLS

A. Formative assessment (Assessment for Learning)

1. Continuous assessment based on laboratory performance.

B. Summative Assessment (Assessment of Learning)

1. End term exam- Theory
2. End term exam- Practical (Lab performance)

SUGGESTED LEARNING MATERIALS / BOOKS

Sr. No	Author	Title	Publisher with ISBN Number
1	Bhattacharya,S. K	Electrical Machines	McGraw Hill Education, New Delhi ISBN-13:978-0070669215
2	Mehta, V. K. and Mehta, Rohit	Principles of Electrical Machines	S.Chand and Co.Ltd., New Delhi ISBN13: 978-8121921916
3	Theraja B. L	Electrical Technology Vol-II (AC and DC machines)	S.Chand and Co.Ltd., New Delhi ISBN13: 978-8121924375
4	Bandyopadhyay M. N	Electrical Machines Theory and Practice	PHI Learning Pvt. Ltd., New Delhi ISBN13:978-8120329973
5	Mittle, V.N. and Mittle, Arvind	Basic Electrical Engineering	McGraw Hill Education, New Delhi ISBN-13: 978-0070593572
6	Kothari, D. P. and Nagrath, I. J.	Electrical Machines	McGraw Hill Education, New Delhi ISBN-13:978-9352606405
7	Murugesh Kumar K.	DC Machines and Transformers	S. Chand, ISBN-13: 978-8125916055

Sr. No	Author	Title	Publisher with ISBN Number
8	J. B. Gupta	Theory & Performance of Electrical Machine	S-K-Kataria, ISBN-13: 978-9350142776

LEARNING WEBSITES & PORTALS

Sr. No	Link / Portal	Description
1	https://youtu.be/D4RFFnzRdkk?si=d5iNRWSZbl01NvT3	Construction & Working Principle of a D.C. Machine.
2	https://youtu.be/1OfLgpFq6Rc?si=bwN9d7ESIV2Utzb6	D.C. Motors.
3	https://youtu.be/6dF3LDzb-tE?si=OYZMdgs2I5d7bqAa	D.C. Generator.
4	https://youtu.be/qmcriUdYBW0?si=ea5Sa1G9R9m7aRTm	Transformer.
5	www.nptel.ac.in	About construction, working principle and operation of D.C. Machine, single phase transformer, three phase transformer and special purpose transformer.
6	www.electricaltechnology.org	About construction, working principle and operation of D.C. Machine, single phase transformer, three phase transformer and special purpose transformer.
7	www.electrical4u.com	About construction, working principle and operation of D.C. Machine, single phase transformer, three phase transformer and special purpose transformer.

Note: Teachers are requested to check the creative common license status/financial implications of the suggested online educational resources before use by the students.

Mr. S. R. Pawar
(Name & Signature of Faculty)

Prof. S. B. Pawar
(Name & Signature of HOD)