

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

Programme and Code: Electrical Engineering (EE)

Course and Code: DC Machines & Transformers (DMT)

Scheme: K

Allocated Hrs: 64

CLASS: SYEE (Ohm)

Semester: Fourth

Course Index: 402

Course Code: 314322

Name of Faculty: Mr.S.R.Pawar

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 Category	Learning Scheme							P a p e r D u r a t i o n	Assessment Scheme										T o t a l M a r k s		
				Actual Contact Hrs / Week			C L	T L	L L	S L H		N L H	C r e d i t s	Theory				Based on LL & TSL Practical					Based on SL	
				C L	T L	L L								F A - T H	S A - T H	Total		FA-PR		SA-PR			SLA	
																M a x	M a x	M a x	M i n	M a x	M i n		M a x	M i n
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)	Teachi ng method / Media	Re ma rk
1 (8)	CO-1	TLO 1.1, TLO 1.2	Unit - I Dc Generator 1.1 DC machine: construction, parts, function & material, types of winding. 1.2 D.C. Generator: Principle of operation, Faraday's law of electromagnetic induction, Fleming's right hand rule. 1.3 E. M. F. equation of D.C. Generator (derivation) 1.4 Types of D.C. Generator and its applications. 1.5 Characteristics - internal and external.	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 2.1 D.C. Motor: Principle of operation, Lorentz force, Fleming's Left-hand rule, Back emf and it's significance, Armature reaction.	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 Model, Demonstration 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 Model, Demonstration 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	Unit - IV Three Phase Transformer 4.1 Three phase transformer: Introduction, construction, bank of three single phase transformers. Single unit of three phase transformer. 4.2 Working principle of three phase transformer. Types of transformers. 4.3 Connections as per IS: 2026 (part IV)-1977. Three phases to two phase conversion (Scott Connection). 4.4 Selection criteria as per IS: 10028 (Part I)-1985 Of distribution transformer and power transformer, amorphous core type distribution transformer, specifications of three-phase distribution transformers as per IS:1180 (part I)-1989. 4.5 Need of parallel operation, conditions for parallel operation. 4.6 Polarity tests on mutually inductive coils, Phasing out test on Three-phase transformer 4.7 Harmonics and their effects on transformer operation. 4.8 'K' factor of transformers: overheating due to non-linear loads and harmonics.	13	27-02-2026	20-03-2026	Chalk-Board, Flipped Classroom Video, Demonstrations Model, Demonstration Presentations.	

5 (6)	CO-5	TLO 5.1 TLO 5.2 TLO 5.3	Unit - Special Purpose Transformer 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 5.3 Isolation transformer: Construction, features and applications. 5.4 Single phase welding transformer: Construction, features and applications. 5.5 Pulse transformer: Construction, features and applications.	6	23-03-2026	04-04-2026	Chalk-Board, Flipped Classroom Video, Demonstrations Model, Demonstration Presentations.	
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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=bwN9d7ESIV2Utz6	D.C. Motors.
3	https://youtu.be/6dF3LDzb-tE?si=OYZMdgs2I5d7bqAa	D.C. Generator.
4	https://youtu.be/qmcricUdYBW0?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)