Format K1

Maharashtra State Board of Technical Education, Mumbai

TEACHING PLAN (TP)

Academic Year: **2025-26 (Even)** **Date :15/12/2025**

Institute Name and Code: K K Wagh Polytechnic, Nashik (0078) **Semester**: Fourth
Programme and Code: Electrical Engineering (EE) **Course Index:** 209
Course and Code: Utilization Of Electrical Energy (UEE) **Course Code:**314324
Scheme: K **Allocated Hrs.** 60 **Class:** SYEE (OHM)
Name of Faculty: Mr.N.S.Gorhe

COURSE LEVEL LEARNING OUTCOMES (COS)

CO1 - Design simple lighting scheme.
CO2 - Select type of electric furnaces according to applications
CO3 - Operate the different electric welding system
CO4 - Select suitable electric drive for a particular application
CO5 - Maintain different electric traction system.

TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title & Abbr	Course Category	Learning Scheme					Credits	Paper Duration (Hrs.)	Assessment Scheme										
			Actual Contact Hrs/Week			SLH	NLH			Theory				Based on LL & TSL Practical				Based on SL		Total Marks
			CL	TL	LL					FA TH	SA TH	Total		FA-PR		SA-PR		SLA		
										Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
314323	**Utilization of Electrical Energy (UEE)**	**DSC**	**4**	**-**	**2**	**2**	**8**	**4**	**3**	**30**	**70**	**100**	**40**	**25**	**10**	**25@**	**10**	**25**	**10**	**175**

Total IKS Hrs for Sem. : 60 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
Note:

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs.* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.
7. * Self learning includes micro project / assignment / other activities.

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	2	-	-	1	3	3	3
CO2	3	-	2	2	-	1	1	3	3	3
CO3	3	-	-	1	-	2	1	3	3	3
CO4	3	3	3	2	1	2	2	3	3	3
CO5	3	3	3	2	1	2	2	3	3	3

Legends :- High:03, Medium:02,Low:01, No Mapping: -
*PSOs are to be formulated at institute level

Teaching Plan:

Chap No. (Allotted Hrs.)	CO Mention only Num	TLO Mention only Number	Title/Topic Details and Course Outcome (CO)	Plan (From-To & No. of Lectures)	Actual Execution (From-To & No. of Lectures)	Teaching Method/ Media/ Tools	Remark
01. (12)	CO-1		**Unit - I ILLUMINATION** 1.1 Definitions of various illumination terminology Luminous flux, Lumens, Candela, solid angle, luminous intensity, lux, candlepower,	18/12/2025 to 19/12/2025 (02)			

			MHCP, MSCP, MHSCP, illumination, lamp efficacy, glare, shadow. Brightness.				
		TLO 1.1 **TLO 1.2** **TLO 1.3** **TLO 1.4** **TLO 1.5** **TLO 1.6** **TLO 1.7**	1.2 Various types of Lamps: Fluorescent Tube, CFL, Metal Halide and LED.	19/12/2025 to 19/12/2025 (01)		Chalk Board, Flipped Classroom Video, Demonstrations Model, Demonstration Presentations.	
			1.3 Laws of illumination: Inverse squares and Lambert's Cosine law	20/12/2025 to 20/12/2025 (01)			
			1.4 Various lighting schemes: Direct, Indirect, Semi direct and Semi indirect: features and application.	25/12/2025 to 26/12/2025 (02)			
			1.5 Design of Lighting Scheme: Factors considered designing such as- Space height ratio, Utilization factor, depreciation factor, reflection factor, Waste light factors, coefficient of utilization (Numerical on design of indoor lighting scheme)	26/12/2025 to 27/12/2025 (02)			
			1.6 Domestic and industrial lamp fittings.	01/01/2025 to 02/01/2025 (02)			
			1.7 Factors affecting on quality of lighting system	02/01/2025 to 03/01/2025 (02)			
02. **(14)**	CO-2	**TLO 2.1** **TLO 2.2** **TLO 2.3** **TLO 2.4** **TLO 2.5**	**Unit - II ELECTRIC HEATING** 2.1 Concept of electrical heating, Advantages and classification of electric heating, modes of heat transfer	08/01/2026 to 08/01/2026 (01)		Chalk Board, Flipped Classroom Video, Demonstrations Model, Demonstration Presentations.	
			2.2 Resistance Heating: Construction and Operation of Direct Resistance Heating - Salt Bath Furnace, Indirect Resistance Heating: Resistance Ovens, Requirements of Heating Element Material, Causes Heating Elements, Methods of Temperature Control, Applications of Resistance Heating, Design of Heating Element. (Simple Numerical problems on heating elements) of Failure of	09/01/2026 to 10/01/2026 (03)			

		TLO 2.6	2.3 Arc Heating - Construction and Operation of Direct Arc Furnace, Indirect Arc Furnace. Applications of Arc Heating	15/01/2026 to 16/01/2026 (02)			
			2.4 Induction Heating - Construction and Operation of Core Type Induction Furnaces: Ajax Wyatt Furnace, Coreless Induction Furnace, Applications of Induction Heating, High frequency eddy current heating. Radiant and infrared heating, Estimation of Heat data (Simple Numerical to estimate rating of furnace)..	16/01/2026 to 22/01/2026 (03)			
			2.5 Dielectric Heating: Principle of Dielectric Heating, Advantages of Dielectric Heating	23/01/2026 to 24/01/2026 (03)			
			2.6 Limitations of Dielectric Heating, Applications of Dielectric Heating (Simple Numericals)	29/01/2026 to 30/01/2026 (02)			
03 (08)	CO-3	**TLO 3.1 TLO 3.2 TLO 3.3 TLO 3.4 TLO 3.5 TLO 3.6 TLO 3.7**	**Unit - III ELECTRIC WELDING** 3.1 Electric Welding: Principles of electric resistance welding	30/01/2026 to 30/01/2026 (01)		Chalk Board, Flipped Classroom Video, Demonstrations Model, Demonstration Presentations.	
			3.2 Methods of Electric Welding – Electric arc welding, resistance welding.	31/01/2026 to 31/01/2026 (01)			
			3.3 Resistance Welding – Principles, Advantages, types of resistance welding	05/02/2026 to 05/02/2026 (01)			
			3.4 Electric Arc Welding- Formation and Characteristics of electric arc, effects of arc length.	06/02/2026 to 06/02/2026 (01)			

			3.5 Principle of electric arc welding: Types, advantages, disadvantages and applications of all types.	07/02/2026 to 07/02/2026 (01)			
			3.6 Comparison with resistance welding and Electric Arc Welding	12/02/2026 to 13/02/2026 (01)			
			3.7 2.7 Modern welding techniques like Ultrasonic, Laser, under water welding, IGBT controlled welding	13/02/2026 to 14/02/2026 (02)			
04 (14)	CO-4	**TLO 4.1 TLO 4.2 TLO 4.3 TLO 4.4 TLO 4.5 TLO 4.6 TLO 4.7 TLO 4.8 TLO 4.9 TLO 4.10**	**Unit - IV ELECTRIC DRIVES AND ELEVATORS** 4.1 Electric drives: Concept, factors governing selection of electric drives (motor).	19/02/2026 to 19/02/2026 (01)		Chalk Board, Flipped Classroom Video, Demonstrations Model, Demonstration Presentations.	
			4.2 Types of electrical drives: Individual and Group drive, Applications.	20/02/2026 to 20/02/2026 (02)			
			4.3 Mechanical features of drives: Types and applications various types of enclosures.	21/02/2026 to 26/02/2026 (02)			
			4.4 Transmission of Mechanical Power: Direct and Indirect drive (Belt, Rope, Chain, Gear), Vertical drives and its applications.	27/02/2026 to 28/02/2026 (02)			
			4.5 Bearing: Types and applications.	05/03/2026 to 06/03/2026 (02)			
			4.6 Size and Rating of motor : (Simple numerical on this topic)	06/03/2026 to 07/03/2026 (01)			

			4.7 Load Cycles : Concept with graphical representation.	12/03/2026 to 12/03/2026 (01)			
			4.8 Load Equalization : Concept , and methods and condition of load equalization.	13/03/2026 to 13/03/2026 (01)			
			4.9 Elevators: Function, Application, types, safety and precautions, case study of latest Elevator.	14/03/2026 to 14/03/2026 (01)			
			4.10 Factors on which shape and size of car depends.	19/03/2026 to 19/03/2026 (01)			
05(12)	CO-5	**TLO 5.1 TLO 5.2 TLO 5.3 TLO 5.4 TLO 5.5 TLO 5.6 TLO 5.7**	**Unit-V ELECTRIC TRACTION** 5.1 Introduction of electric traction system, Requirements of ideal traction system	20/03/2026 to 20/03/2026 (01)		Chalk Board, Flipped Classroom Video, Demonstrations Model, Demonstration Presentations.	
			5.2 System of Track Electrification: DC; Single phase 25kV AC, Composite system.	21/03/2026 to 21/03/2026 (01)			
			5.3 Traction Mechanics: Block diagram of AC electric locomotive and function of each part, Nomenclature of Locomotive	26/03/2026 to 26/03/2026 (01)			
			5.4 Crest, Average and Schedule Speed; definition and factors affecting them.	27/03/2026 to 27/03/2026 (01)			
			5.5 Traction services : Urban, suburban, main line service (Main features and comparison between the three of them),Speed Time curve, Concept and applications of Trapezoidal and quadrilateral speed time curve(simple numerical based on Trapezoidal speed time curve)	27/03/2026 to 02/04/2026 (04)			

			5.6 Concept and function of Catenary wire ,Contact wire and Dropper, Material used for them, Simple Catenary construction, Definition and Need of Neutral Section, Current Collecting system: Diamond type pantograph and Faiveley type pantograph(Construction and Working)	03/04/2026 to 04/04/2026 (02)			
			5.7 Introduction of Metro and Mono Rail (main features between the two of them).	03/04/2026 to 04/04/2026 (02)			
			Total	**60**			

I. ASSESSMENT METHODOLOGIES/TOOLS

1. Formative assessment (Assessment for Learning)

Two unit tests of 30 marks will be conducted and average of two unit tests are conducted. For formative assessment of Laboratory learning 25marks.
Each practicle will be assessed considering appropriate % weightage to process and product and other instructions of assessment.

2. Summative Assessment (Assessment of Learning)

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

II. SUGGESTED LEARNING MATERIALS / BOOKS

Sr.No	Author	Title	Publisher with ISBN Number
1	H.Pratab	Art and Science of Utilization of Electrical Energy	Dhanpat Rai & Sons,New Delhi, ISBN: 9788177001440
2	J.B. Gupta	Utilization of Electric Power and Electric Traction.	S.K. Kataria & Sons, New Delhi, ISBN: 978- 9350142585
3	G. C. Garg	Utilization of Electric Power and Electric Traction.	Khanna Publishers, New Delhi, ISBN: 8174091645
4	J. Upadhaya and S.N. Mahendra	Electric Traction	Allied Publisher Ltd., New Delhi, ISBN: 8177640054
5	G.K. Dubey	Fundamentals of Electric Drive	Narosa Publishing House, New Delhi, ISBN: 8173190410 , 9788173190414
6	V. K. Mehta	Principles of Power System	S. Chand, New Delhi, ISBN: 9788121924962

7	H.Pratab	Modern Electric Traction	Dhanpat Rai & Sons,New Delhi, ISBN: 1234567147206
8	S. Sivanagaraju & M. Balasubba Reddy & B. Srilatha	Generation and Utilization of Electrical Energy	Personal Education, New Delhi, ISBN: 9789332515673

III. LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://www.youtube.com/watch?v=CoHVA7nr82A	Complete description of Arc Welding
2	https://www.youtube.com/watch?v=7GLiBwgVBLQ	Videos on Electric Traction
3	https://www.youtube.com/watch?v=fakGLu03jYg	Videos on Electric Traction
4	https://www.youtube.com/watch?v=BDMFsYnTdVI	Videos on Electric Locomotive with full description
5	https://www.youtube.com/watch?v=49rH3buD0bc	Video showing the working of Diesel Locomotive
6	https://www.youtube.com/watch?v=82EFMvYcbN4	Videos on Electric Multiple Unit
7	https://www.youtube.com/watch?v=AAyLKnz4UJY	Videos to describe Electric Heating system
Note : Teachers are requested to check the creative common license status/financial implications of the suggested online educational resources before use by the students		

Sr.No.	Unit	Unit Title	Aligned COs	Learning Hours	R Level	U Level	A Level	Total Marks
1	I	Illumination	CO1	12	4	4	6	14
2	II	Electric Heating	CO2	14	4	6	6	16
3	III	Electric Welding	CO3	8	2	4	4	10
4	IV	Electric Drives And Elevators	CO4	14	4	6	6	16
5	V	Electric Traction	CO5	12	2	6	6	14
GRAND TOTAL				**60**	**16**	**26**	**28**	**70**

Mr. N.S.GORHE
(Name & signature of staff)

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