Format K1

Maharashtra State Board of Technical Education, Mumbai

TEACHING PLAN (TP) Academic Year: **2025-26 (ODD)**

Date :15.12.2025

Institute Code and Name: 0078- K K Wagh Polytechnic, Nashik
Semester: SIXTH

Program me and Code: Electrical Engineering (EE)
Course Index:

Course and Code: 316330-INDUSTRIAL DRIVES AND CONTROL
Course Code: 316330

Scheme: K **Allocated Hrs.** 45 **Name of Faculty:** Mr. N.S. Gorhe
CLASS: TYEE (Ohm)

COURSE LEVEL LEARNING OUTCOMES (COS)

CO1 - Apply the basics of electric drive for precise motor control operation.
CO2 - Use appropriate braking method for different AC and DC motors.
CO3 - Control precisely the speed of a given DC motor using appropriate phase-controlled converter and chopper.
CO4 - Control precisely the speed of a given Induction Motor using appropriate AC Drive technique.
CO5 - Control precisely the speed of a given motor using advanced techniques.

IV. TEACHING-LEARNING & ASSESSMENT SCHEM

Course Code	Course Title	Abbr	Course Category /s	Learning Scheme					Credits	Assessment Scheme											
				Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TL				Based on SL		Total Marks
															Practical						
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
316330	INDUSTRIAL DRIVES AND CONTROL	IDC	DSE	3	-	2	1	6	3	3	30	70	100	40	25	10	25#	10	25	10	175

Total IKS Hrs for Sem. : 0 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)	Program me 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	2	1	1	2	3	3
CO2	3	1	2	1	2	1	1	3	3	3
CO3	3	1	2	2	2	2	2	1	3	3
CO4	3	1	2	2	1	1	1	1	3	3
CO5	3	1	1	1	1	1	1	2	3	3

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

*PSOs are to be formulated at institute level

SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (SpecificationTable)

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	I	Basics of Electric Drives	CO1	7	2	4	6	12
2	II	Braking of Electric Motors	CO2	6	2	4	4	10
3	III	DC Drives	CO3	13	4	6	10	20
4	IV	AC Drives	CO4	12	4	6	6	16
5	V	Advanced Techniques for Motor Control	CO5	7	2	4	6	12
Grand Total				**45**	**14**	**24**	**32**	**70**

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	Rem
01. (07)	CO-1	TLO 1.1	**Unit - I Basics of Electric Drives** 1.1 Electric Drive – Definition, block diagram and basic building blocks of an electric drive system.	15/12/2025 to 15/12/2025 (01)		Lecture Using Chalk-Board Presentations Video Demonstrations Flipped Classroom	
		TLO 1.2	1.2 Classification of Drives – AC, DC, Permanent Magnet Synchronous Motor (PMSM), Special motor drives.	16/12/2025 to 16/12/2025 (01)		Lecture Using Chalk-Board Presentations Video Demonstrations Flipped Classroom	
		TLO 1.3	1.3 Fundamental torque Equation	17/12/2025 to 17/12/2025 (01)		Lecture Using Chalk-Board Presentations Video Demonstrations Flipped Classroom	

		TLO 1.4	1.4 Multi-quadrant operation	22/12/2025 to 22/12/2025 (01)		Lecture Using Chalk-Board Presentations Video Demonstrations Flipped Classroom	
		TLO 1.5	1.5 Components of Load torque	23/12/2025 to 23/12/2025 (01)		Lecture Using Chalk-Board Presentations Video Demonstrations Flipped Classroom	
		TLO 1.6	1.6 1. Nature and classification of Load torque	24/12/2025 to 24/12/2025 (01)		Lecture Using Chalk-Board Presentations Video Demonstrations Flipped Classroom	
			1.7 Steady State Stability (No derivation)	29/12/2025 to 29/12/2025 (01)		Lecture Using Chalk-Board Presentations Video Demonstrations Flipped Classroom	
02. (06)	CO-2	TLO 2.1	**Unit - II Braking of Electric Motors** 2.1 Braking – Definition, types and advantages.	30/12/2025 to 31/12/2025 (02)		Lecture Using Chalk-Board Presentations Video Demonstrations Flipped Classroom	
		TLO 2.2 TLO 2.3	2.2 Braking of DC Series and DC Shunt Motor - Dynamic braking/Rheostat braking, Regenerative braking and Plugging.	05/01/2025 to 06/01/2025 (02)		Lecture Using Chalk-Board Video Demonstrations Site/Industry Visit Case Study	
		TLO 2.4	2.3 Braking of induction motor (Three Phase)- Rheostatic braking, Regenerative braking and Plugging.	07/01/2025 to 12/01/2025 (01)		Lecture Using Chalk-Board Video Demonstrations Site/Industry Visit Case Study	
		TLO 2.5	2.4 Eddy current braking- Principle and application	13/01/2025 to 14/01/2025 (01)		Lecture Using Chalk-Board Video Demonstrations Site/Industry Visit Case Study	

03 (13)	CO-3	**TLO 3.1**	**Unit - III DC Drives** 3.1 Single phase controlled converter fed separately excited DC motor drive 3.1.1 Single phase half wave converter drive. 3.1.2 Single phase semi converter drive. 3.1.3 Single phase full converter drive. 3.1.4 Single phase dual converter drive.	19/01/2025 to 21/01/2025 (03)		PPT, Black Board,YouTube Videos	
		TLO 3.2 **TLO 3.3**	3.2 Three phase controlled converter fed separately excited DC motor drive 3.2.1 Three phase half wave converter drive. 3.2.2 Three phase semi converter drive. 3.2.3 Three phase full converter drive. 3.2.4 Three phase dual converter drive.	26/01/2025 to 27/01/2025 (02)		PPT, Black Board,YouTube Videos	
		TLO 3.4	3.3 Basic chopper circuit using SCR.	28/01/2025 to 02/02/2025 (02)		PPT, Black Board,YouTube Videos	
			3.4 Classification of chopper based on output voltage and quadrant operation.	03/02/2025 to 04/02/2025 (02)		Lecture Using Chalk-Board Video Demonstrations Presentations Site/Industry Visit	
		TLO 3.5	3.5 Classification of chopper based on quadrant operation. 3.5.1 Class A Chopper Drive. 3.5.2 Class B Chopper Drive. 3.5.3 Class C Chopper Drive. 3.5.4 Class D Chopper Drive. 3.5.5 Class E Chopper Drive.	09/02/2025 to 10/02/2025 (02)		Lecture Using Chalk-Board Presentations Video Demonstrations Flipped Classroom	
		TLO 3.6	3.6 Application of chopper control drive in solar and battery powered electric vehicle (Block diagrams	11/02/2025 to 16/02/2025 (02)		PPT, Black Board,YouTube Videos	
04 (12)	CO-4	**TLO 4.1**	4.1 Stator voltage control using AC voltage controller.	17/02/2025 to 18/02/2025 (02)		Lecture Using Chalk-Board Video Demonstrations Site/Industry Visit Case Study	

		TLO 4.2				Lecture Using Chalk-Board Video Demonstrations Site/Industry Visit Case Study	
			4.2 Variable Frequency Control (VFD).	23/02/2025 to 24/02/2025 (02)		Lecture Using Chalk-Board Video Demonstrations Site/Industry Visit Case Study	
		TLO 4.3	4.3 Voltage Source Inverter Control.	25/02/2025 to 02/03/2025 (02)		Lecture Using Chalk-Board Video Demonstrations Site/Industry Visit Case Study	
		TLO 4.4	4.4 AC drives using sinusoidal PWM technique.	03/03/2025 to 04/03/2025 (02)		Lecture Using Chalk-Board Video Demonstrations Site/Industry Visit Case Study	
			4.5 Current Source Inverter Control.	04/03/2025 to 09/03/2025 (01)		Lecture Using Chalk-Board Video Demonstrations Site/Industry Visit Case Study	
		TLO 4.5	4.6 Basics of Slip power recovery - static Kramer drive and static Scherbius drive.	10/03/2025 to 11/03/2025 (01)		PPT, Black Board,YouTube Videos	
		TLO 4.6	4.7 Rotor Resistance Control	16/03/2025 to 17/03/2025 (01)		PPT, Black Board,YouTube Videos	
			4.8 Soft starters - Need, significance and working.	18/03/2025 to 23/03/2025 (01)		PPT, Black Board,YouTube Videos	
05(07)	CO-5	**TLO 5.1**	**Unit - V Advanced Techniques for Motor Control** 5.1 Servo motor drive – introduction, working principle, types, advantages, disadvantages.	23/03/2025 to 23/03/2025 (01)		Lecture Using Chalk-Board Video Demonstrations Site/Industry Visit Presentations	

		TLO 5.2	5.2 Applications of servo motor drive with block diagram: - Robotics, CNC machine.	24/03/2025 to 24/03/2025 (01)		Lecture Using Chalk-Board Video Demonstrations Site/Industry Visit Presentations	
		TLO 5.3	5.3 BLDC motor drive - Introduction, Basic building block diagram, Application.	25/03/2025 to 25/03/2025 (01)		Lecture Using Chalk-Board Video Demonstrations Site/Industry Visit Presentations	
		TLO 5.4	5.4 Phase Locked Loop (PLL) control for DC Motor.	30/03/2025 to 30/03/2025 (01)		Lecture Using Chalk-Board Video Demonstrations Site/Industry Visit Presentations	
		TLO 5.5 **TLO 5.6**	5.5 AC/DC drive using microcontroller control.	31/03/2025 to 31/03/2025 (01)		PPT, Black Board,YouTube Videos	
		TLO 5.7	5.6 Microcontroller based stepper motor control.	01/04/2025 to 01/04/2025 (01)		PPT, Black Board,YouTube Videos	
			5.7 PLC controlled AC/DC motor drives.	02/04/2025 to 02/04/2025 (01)		PPT, Black Board,YouTube Videos	
			Total	45			

I. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

Formative assessment (Assessment for Learning) Two unit tests of 30 marks will be conducted and average of two unit tests considered.

Summative Assessment (Assessment of Learning)

End semester assessment of 70 marks through Online mode of examination.

II. SUGGESTED LEARNING MATERIALS / BOOKS

Sr.No	Author	Title	Publisher with ISBN Number
1	S K Bhattacharya	Control of Electrical Machines	New Age International ISBN13: 8122409970, 9788122409970
2	Akihiko Yokoyama	Smart Grid: Fundamentals, Design, Technology, Applications, Communication and Security, An Indian Adaptation	Wiley, 1 April 2021 Edition ISBN-13: 978-9354243219
3	Frank D. Petruzella	Electrical Motor Control Systems	McGraw-Hill College, 22 November 2019, ISBN-13: 978-1260439397
4	Merizalde	Encyclopaedia of Applied Intelligent Control of Induction Motor Drives	Auris Reference (1 April 2018) ISBN-13: 978-1788022651
5	P K Pandey	IOT (Internet of things) and Its Application	T Balaji Publication (1 January 2020) ISBN 13:978-8194136385
6	Pandian Vasant	Artificial Intelligence in Industry 4.0 and 5G Technology	Wiley 30 June 2022 ISBN-13: 978-1119798767

III. LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	41.-30.12.2019-Grid-Interactive-RRE-Regulations2019-English. pdf	MERC rules for net-metering bill
2	https://youtu.be/Xpb9XKmRsyw?si=0oLY-lKVyvPWiBSE	History of Industrial Revolution
3	https://www.geeksforgeeks.org/introduction-to-internet-of-things-iot-set-1/	Introduction to Internet of Things (IoT)
4	https://www.researchgate.net/publication/321529309_Sustainable_Smart_Cities_in_India_Challenges_and_Future_Perspectives	Sustainable Smart Cities in India: Challenges and Future Perspectives
5	https://www.iea.org/energy-system/electricity/smart-grids	Electricity smart grid
6	https://electricalengineerpro.com/latest-trends-in-electrical-engineering/	Trends in Electrical Engineering
7	https://www.youtube.com/watch?v=MTqML_JCpsY	Intelligence motor control system for engineers (Hindi)

Sr. No	Link / Portal	Description
8	https://www.youtube.com/watch?v=IEsmG83IxLs	IMCC Drawing, IMCC RDOL Drawing, IMCC Panel drawing, IMCC PRO V DRAWING, IMCC Semacode drawing

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.N.S. Gorhe
(Name & signature of staff)

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