K1

For AICTE Diploma Engineering Courses wef - 2023-24

Maharashtra State Board of Technical Education, Mumbai

TEACHING PLAN (TP)

Academic Year: 2025-26 (EVEN) **Date:** 13/12/2026
Institute Code and Name: 0078- K. K. Wagh Polytechnic, Nashik **Semester:** Sixth
Programme and Code: Electrical Engineering (EE) **Course Index:** 602
Course: Emerging Trends in Electrical Engineering (ETE) **Course Code:** 316326
Scheme: K **Allocated Hrs:** 60 **Name of Faculty:** Mr. V. B. Rao **Class:** TYEE-OHM

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COURSE LEVEL LEARNING OUTCOMES (COS):

CO1 - Suggest the relevant IoT technologies for electrical systems.
CO2 - Elaborate the use relevant IoT and SCADA for Automation of electrical Grid systems.
CO3 - Implement electrical engineering related emerging trends to develop smart city.
CO4 - Suggest the relevant IMCC for the given application (s).
CO5 - Select the relevant improved tariff and billing solution for the specified type of consumer.

TEACHING-LEARNING & ASSESSMENT SCHEME:

Course Code	Course Title	Abbr	Course Category	Learning Scheme					Credits	Paper Duration	Assessment Scheme										Total Marks
				Actual Contact Hrs/Week			SLH	NLH			Theory				Based on LL & TSL Practical				Based on SL		
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
316326	Emerging Trends In Electrical Engineering	ETE	DSC	4	-	-	-	4	2	1.5	30	70*#	100	40	-	-	-	-	-	-	100

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
CO1	3	1	2	1	2	1	1	3	3
CO2	3	1	2	1	2	1	1	3	3
CO3	3	1	2	2	2	2	2	3	3
CO4	3	1	2	2	1	1	1	3	3
CO5	3	1	1	1	1	1	1	3	3

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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)	Pedagogy used (Teaching Method / Media)	Remark
I(12)	CO-1	1.1 1.2 1.3 1.4 1.5 1.6	**Unit - I Digitization beyond Automation** 1.1 Industrial Revolutions: Versions 1.0, 2.0, 3.0 and 4.0; the driving force for these revolutions.	2	15/12/2025		Chalk,Board + LCD Projector + Class room Demonstration+ PPT Presentations + MKCL ERA LMS	
			1.2 Components of Industrial Revolution 4.0: Digitization, CPS (Cyber Physical Systems), IoT (Internet of Things), Cloud Computing and Cloud Manufacturing.	2	16/12/2025 To 17/12/2025			
			1.3 Role of 5G Communication, Machine learning (ML) and AI in Industry 4.0.	2	22/12/2025			
			1.4 Industry Revolution 5.0: Introduction and Key Features.	2	23/12/2025 To 24/12/2025			
			1.5 IoT: Principle and features.	2	29/12/2025			
			1.6 Applications of IoT in Industrial drives, Transmission System, Distribution System, Illumination system and Renewable energy.	2	30/12/2025 To 31/12/2025			
II (10)	CO-2	2.1 2.2 2.3 2.4 2.5 2.6	**Unit - II Smart Grid** 2.1 Smart Grid: Need and evolution, layout and its components, advantages and barriers, Smart Grid projects in India.	1	05/01/2026		Chalk,Board + LCD Projector +	
			2.2 Micro-Grid: Need and formation of Micro Grid.	1	05/01/2025			

			2.3 Distributed Energy Resources: Distributed generation systems and distributed generation technologies.	2	06/01/2026 To 07/01/2026		PPT Presentations + MKCL ERA LMS	
			2.4 Role of distributed generation in Smart Grid and Micro Grid.	2	12/01/2026			
			2.5 Substation Automation System (SAS): Need, layout and components, salient features of substation automation.	2	13/01/2026 To 14/01/2026			
			2.6 IoT and SCADA application in Grid systems.	2	19/01/2026			
III (12)	**CO-3**	**3.1 3.2 3.3 3.4 3.5**	**Unit - III Smart City (Electrical Features)** 3.1 Smart City: Features, components, objectives and challenges of smart cities in India.	2	20/01/2026 To 21/01/2026		Chalk,Board + LCD Projector + Class room Demonstration+ PPT Presentations	
			3.2 Intercity Transportation: EV / Metro: Types, data-driven operations, automated train operation (ATO), autonomous driving technology, efficient charging infrastructure, wireless charging: opportunities and challenges.	4	27/01/2026 To 02/02/2026			
			3.3 Comparison between various types of Electric Vehicles: technology, type of motor, efficiency, batteries etc.	2	03/02/2026 To 04/02/2026			
			3.4 Smart Home: Features and components, role of AI powered illumination system and advancement in luminaries. Smart appliance control principles (block diagram/s).	2	09/02/2026			
			3.5 Renewable Energy: Role, opportunities, government policies: center / state.	2	10/02/2026 To 11/02/2026			
IV (14)	**CO-4**	**4.1 4.2 4.3 4.4 4.5 4.6**	**Unit - IV Intelligent Motor Control Centers** 4.1 Conventional Motor Control Center (MCC): Role in motor protection and management, typical block diagram and architecture, components: symbols and	2	16/02/2026		Chalk,Board + LCD Projector + Class room	

			functions.				Demonstration+ PPT Presentations + MKCL ERA LMS	
			4.2 Intelligent or Smart MCCs (IMCCs): Need and evolution from traditional MCCs. Functional block diagram and general arrangement, integration of industrial IoT (IIoT) and cloud-based real-time monitoring.	2	17/02/2026 To 18/02/2026			
			4.3 Applications, advantages and limitations in modern MCCs including lack of networking and diagnostics.	2	23/02/2026			
			4.4 Basic Components of Intelligent Systems: Microprocessor / microcontroller-based control; networking technologies (Ethernet / IP, Modbus, PROFINET) replacing hard wiring, enhanced diagnostics, AI-based predictive maintenance, smart sensors, and edge computing for real-time diagnostics and wireless communication (Bluetooth, Zigbee) for remote control.	4	24/02/2026 To 02/03/2026			
			4.5 IMCC Components and Devices: Intelligent relays, digital fuses, cybersecurity features, dedicated software and advanced control devices.	2	03/03/2026 To 04/03/2026			
			4.6 Selection of MCC: Comparison between Intelligent and conventional MCC; Energy efficiency, cybersecurity, networking, and automation. Smart power management with power factor correction (PFC) and harmonic filtering for efficiency.	2	09/03/2026			
V(12)	**CO-5**	**5.1 5.2 5.3 5.4 5.5**	**Unit - V Tariff and Smart Billing** 5.1 Tariff: Power purchase, Power purchase agreements (PPA), Power purchase cost.	2	10/03/2026 To 11/03/2026		Chalk,Board + LCD Projector + Class room Demonst	
			5.2 Tariff Design: Key factors for tariff design, major components of an electricity bill, various slabs in billing,	2	16/03/2026			

			electricity duty, tax on electricity and cross subsidy.				ration+ PPT Presentations + MKCL ERA LMS	
			5.3 Smart Metering: Components working principle, types of smart meters, features, communication technologies, advantages, challenges, role in Grid System.	2	17/03/2026 To 18/03/2026			
			5.4 Metering and Bill Management: Working of net metering and gross metering, MERC rules for net-metering bill (Latest Amendment), application of net metering for integration of micro-generators with grid system.	2	23/03/2026			
			5.5 Meter reading techniques: use of deep learning model and communication methods in MRI / AMR.	4	24/03/2026 To 30/03/2026			

ASSESSMENT METHODOLOGIES/TOOLS

A. 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.

B. Summative Assessment (Assessment of Learning)

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

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

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)
8	https://www.youtube.com/watch?v=IEsmG83IxLs	IMCC Drawing, IMCC RDOL Drawing, IMCC Panel drawing, IMCC PRO V DRAWING, IMCC Simocode drawing

Signature of Faculty

Name: Mr.V. B. Rao

Signature of HoD

Name: Prof.S. B. Pawar