K. K. Wagh Institute of Engineering Education & Research, Nashik

(An Autonomous Institute From A.Y. 2022-23)

WINTER-2025	
Exam Seat No.:	
Academic Year:2025-2026	Semester: VII
Class: FINAL	Program: B.Tech
Branch Code: ELE	Pattern:2022
Name of Course: Smart Grid	Course Code:ELE224002A
Max. Marks:60	Duration:2.30 Hrs.

Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains 02 page(s).
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.

		Marks	CO
Question No. 1			
1a)	Differentiate between the Smart Grid and the Conventional Grid by explaining how their features, operation, and capabilities differ in modern power systems	(6)	CO1
Question No. 2			
2a)	Explain why cybersecurity is essential in Smart Grid systems and describe the different measures used to achieve secure and reliable grid operations	(6)	CO2
Question No. 3			
3a)	Explain the IEC 61850 communication standard and describe how its main functions support automation, interoperability, and efficient communication in modern substations	(8)	CO3
	OR		
3b)	Describe the importance of GIS in a Smart Grid and explain how it supports utilities in better planning, operation, and management of grid assets	(8)	CO3
3c)	Explain the concept of Substation and Feeder Automation and describe how their key functions help improve monitoring, protection, and control in modern power systems.	(8)	CO2, CO3
	OR		
3d)	Describe the key functions of Intelligent Electronic Devices (IEDs) and explain how their use enhances protection, control, and monitoring in today's power systems	(8)	CO3
Question No. 4			
4a)	Explain the different types of smart appliances used in homes and buildings, and describe how connecting them to the Smart Grid improves automation, energy efficiency, and demand management	(8)	CO4
	OR		
4b)	Explain what Real-Time Pricing (RTP) is in a Smart Grid and how changing electricity prices affect consumer power usage, demand control, and the efficiency of the grid	(8)	CO4

4c)	Explain how an Outage Management System (OMS) works and describe how its main functions help utilities find faults, restore power, and improve grid reliability	(8)	CO4

OR

4d)	Explain the functional block diagram of a Smart Meter by describing its main blocks and how each one helps improve monitoring, communication, and control in a Smart Grid	(8)	CO4

Question No. 5

5a)	Explain the protection needs of a Microgrid and describe how different protection schemes help ensure safe and reliable operation in various conditions	(8)	CO3

OR

5b)	Explain the structure of a Hybrid Microgrid and describe how its AC and DC components work together to maintain stable operation, share energy efficiently, and ensure reliable power management	(8)	CO3
5c)	Compare Pumped Hydro Energy Storage (PHES) and Compressed Air Energy Storage (CAES) by outlining their working principles, important characteristics, and practical uses in today's power systems	(8)	CO3

OR

5d)	Explain the structure and functioning of a Plug-in Hybrid Electric Vehicle and list its main advantages. How do PHEVs help in reducing fuel usage and improving overall transport performance?	(8)	CO1

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