



**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:III
Class:PG-II	Program:M.Tech
Branch Code:ELE	Pattern:2024
Name of Course:Smart Grid	Course Code:2406601 (A)
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) Explain the key functions of a Smart Grid in detail. (6) CO1

**Question No. 2**

- 2a) Explain how a Phasor Measurement Unit (PMU) is used in power systems and how it helps improve monitoring and system stability. (6) CO4

**Question No. 3**

- 3a) Explain how a Geographical Information System (GIS) helps utilities manage and operate the power distribution network more effectively. (8) CO4

**OR**

- 3b) Explain how a Distribution Management System (DMS) helps improve the working and performance of an electricity distribution network. (8) CO4

- 3c) Illustrate how an Outage Management System (OMS) is applied in power utilities to improve fault detection and power restoration. (8) CO4

**OR**

- 3d) 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) CO2

**Question No. 4**

- 4a) Explain the role of Advanced Metering Infrastructure (AMI) in a Smart Grid and how it helps improve energy monitoring, communication, and grid efficiency (8) CO2

**OR**

- 4b) 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) CO2

- 4c) 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

**OR**

- 4d) Explain how Demand Pricing and Time-of-Use (ToU) tariffs affect the way consumers use electricity and how utilities manage their load. (8) CO4

**Question No. 5**

- 5a) Explain the communication architecture of a Smart Grid in detail (8) CO2

**OR**

- 5b) Explain what is a Home Area Network (HAN) is and describe its role in smart grid communication systems (8) CO4
- 5c) Explain the Zigbee communication protocol and describe why it is suitable for smart grid and home automation applications (8) CO2

**OR**

- 5d) Explain the need for cyber security in Smart Grid systems and describe the major security measures used (8) CO2

**..... End of question paper.....**