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Question Paper Code : 11254

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2026.

Fifth/Sixth/Seventh/Eighth Semester

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Electrical and Electronics Engineering

EE3007 — SMART GRID

(Regulations 2021)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State two limitations of conventional power grid.
2. What is meant by self-healing property of Smart Grid?
3. What is a Phasor Measurement Unit, and how does it complement AMI in grid monitoring?
4. Name two initiatives promoting AMI deployment in India.
5. What is the significance of IEC 61850 in Smart Grid substations?
6. Mention two functions of Wide Area Monitoring Systems (WAMS).
7. What is Volt/VAr Control (VVC)?
8. Define Outage Management System (OMS)
9. What is the significance of IPv6 in Smart Grid networking?
10. Mention two uses of IoT in Smart Grid applications.

PART B — (5 × 13 = 65 marks)

11. (a) (i) Describe the main components of a Smart Grid and their roles. (9)
(ii) How does the Smart Grid improve power quality and reliability? (4)

Or

- (b) (i) Describe the National Initiatives in Smart Grid systems. (8)
(ii) Enumerate the major technical and regulatory challenges in deploying Smart Grids. (5)

12. (a) Explain the operational and consumer-level benefits of implementing AMI in power distribution networks.

Or

- (b) Describe the integration of AMI with distributed energy resources (DERs) and electric vehicles (EVs).

13. (a) (i) Enumerate the steps involved in substation automation. (7)
(ii) Write a detailed note on Energy Management System (EMS) and its functions in Smart Grid. (6)

Or

- (b) (i) Explain the concept of Feeder Automation and its role in improving grid reliability. (7)
(ii) Explain how integration of renewables and energy storage affects Smart Transmission systems. (6)

14. (a) Discuss the impact of Electric Vehicles (EVs) on distribution systems and Smart Grid solutions for managing EV integration.

Or

- (b) Describe the process of Fault Detection, Isolation, and Service Restoration(FDIR) with a neat diagram.

15. (a) Describe the roles of LAN, HAN, and WAN in Smart Grid communication architecture.

Or

- (b) Describe the key cybersecurity measures used to protect Smart Grid data and operations.

PART C — (1 × 15 = 15 marks)

16. (a) Design a conceptual framework that integrates AMI, PMU, and real-time control systems to optimize grid performance.

Or

- (b) Evaluate the role of Wide Area Monitoring, Protection and Control (WAMPAC) in preventing large-scale blackouts. Give a case example.