| Reg. No. | | | | | | | | | | | | | | | |
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| Question Paper Code | 13300 |
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**B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2024**

Eighth Semester

**Electrical and Electronics Engineering**

**20EEEL802 - SMART GRID TECHNOLOGIES**

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

**PART - A (MCQ) (20 × 1 = 20 Marks)**

Answer ALL Questions

| | | Marks | K – Level | CO |
|---|---|---|---|---|
| 1. | Smart grid comprise of the following<br>(a) AMI,PLM,OMS (b) DR,DSM (c) All the above (d) None of the above | 1 | K1 | CO1 |
| 2. | PLM means<br>(a) Peak Load Management (b) Power Load Management<br>(c) Power factor Load Management (d) Power Leakage Management | 1 | K1 | CO1 |
| 3. | What technology enables bidirectional communication between utilities and consumers in a smart grid?<br>(a) Smart meters (b) Transformers (c) Circuit breakers (d) Capacitors | 1 | K1 | CO1 |
| 4. | What smart grids reduces the energy bill of the consumer<br>(a) True (b) False (c) In some cases true and False (d) None of the above | 1 | K1 | CO1 |
| 5. | Power Grid has demonstrated the smart grids Technology capabilities in collaboration with various solution providers at<br>(a) Bangalore (b) Puducherry (c) Mysore (d) Delhi | 1 | K1 | CO2 |
| 6. | The concept of "Intelligent grid operations" in smart grids refers to:<br>(a) Manual operation and control (b) Dynamic and autonomous grid management<br>(c) Static grid infrastructure (d) Increased energy wastage | 1 | K1 | CO2 |
| 7. | DSM in smart grids means<br>(a) Demand side management (b) Demand sales management<br>(c) Decrease side management (d) None of the above | 1 | K1 | CO2 |
| 8. | In smart grids ECO system , a normal consumer is expected to be able to turn to<br>(a) a non-consumer (b) Prosumers<br>(c) a careful consumer (d) Both careful consumer and Prosumers | 1 | K1 | CO2 |
| 9. | Which of the following is a potential challenge in the integration of renewable energy sources into smart grids?<br>(a) Increased grid reliability (b) Grid stability issues<br>(c) Reduced energy storage options (d) Decreased operational costs | 1 | K1 | CO3 |
| 10. | The concept of "distributed energy resources" (DERs) in smart grids refers to:<br>(a) Centralized power plants<br>(b) Locally distributed sources of energy generation and storage<br>(c) Static communication networks<br>(d) Increased transmission losses | 1 | K1 | CO3 |
| 11. | Which of the following is a benefit of integrating electric vehicles (EVs) into smart grids?<br>(a) Increased greenhouse gas emissions<br>(b) Grid instability<br>(c) Grid stabilization through vehicle-to-grid (V2G) technology<br>(d) Higher energy bills | 1 | K1 | CO3 |
| 12. | OMS in smart grid means<br>(a) Outage Management System (b) Overall Management System<br>(c) Outage Maintenance System (d) Overall Maintenance System | 1 | K1 | CO3 |

13. Which technology enables real-time monitoring and control of grid assets in smart grids? *1 K1 CO4*
(a) Smart inverters (b) Static VAR compensators (SVCs)
(c) Phasor measurement units (PMUs) (d) Steam engines

14. PMU is _____. *1 K1 CO4*
(a) Power Measurement Unit (b) Phasor Management Unit
(c) Power Metering Unit (d) Phasor Making Unit

15. Which of the following is a characteristic of a self-optimizing grid in smart grids? *1 K1 CO4*
(a) Manual operation and control (b) Static power flow
(c) Adaptive and autonomous operation (d) Decreased reliability

16. AMI means *1 K1 CO4*
(a) Automated metering Instrument (b) Alternate metering Instrument
(c) Adaptive metering Instrument (d) Advanced metering Infrastructure

17. The concept of "cyber security" in smart grids refers to: *1 K1 CO5*
(a) Increased grid reliability
(b) Enhanced security of digital assets and communications
(c) Decreased renewable energy integration
(d) Higher operational costs

18. The smart grids will help the electric company to minimize *1 K1 CO5*
(a) Service interruptions (b) Quality (c) Efficiency (d) Transmission losses

19. Smart grids technology aimed to the improvement of *1 K1 CO5*
(a) Power transmission (b) Power Distribution
(c) Both Power and Distribution system (d) None of the above

20. The concept of "cyber-physical systems" in smart grids refers to: *1 K1 CO5*
(a)Traditional grid infrastructure
(b) Integration of physical devices with computer systems
(c) Static power flow
(d) Decreased grid reliability

**PART - B (10 × 2 = 20 Marks)**

Answer ALL Questions

21. What is the smart grid? *2 K1 CO1*
22. Compare the conventional electric grid and smart grid. *2 K2 CO1*
23. List the advantages of smart meters. *2 K1 CO2*
24. Summarize the application of SCADA in the power system. *2 K2 CO2*
25. What is V2G technology in smart grid? *2 K1 CO3*
26. What are high efficiency distribution transformers? *2 K1 CO3*
27. Why AMI is needed in Smart Grid? *2 K1 CO4*
28. What is PMU in Smart Grid? *2 K1 CO4*
29. Define HAN. *2 K1 CO5*
30. List out the uses of cloud computing applications for smart grid. *2 K1 CO5*

**PART - C (6 × 10 = 60 Marks)**

Answer ALL Questions

31. a) Explain in detail about requirements of self-healing grid and the main features of smart grid. *10 K2 CO1*

**OR**

b) Elucidate national, International Initiatives in smart grid and road map for Smart grid in India. *10 K2 CO1*

32. a) Explicate about the EMS in smart grid. *10 K2 CO2*

**OR**

| | | | | | | |
|---|---|---|---|---|---|---|
| | b) | Demonstrate the Demand Side Management (DSM) of smart grid. | *10* | *K2* | *CO2* |
| 33. | a) | Make use of Volt/VAr control equipment discuss about distribution feeder. | *10* | *K3* | *CO3* |
| | | **OR** | | | |
| | b) | Construct PHEV diagram in smart grid and explain the merits of the system. | *10* | *K3* | *CO3* |
| 34. | a) | Explain about the advantages and challenges of smart meters in smart grid. | *10* | *K2* | *CO4* |
| | | **OR** | | | |
| | b) | Elucidate in detail the applications of phase measuring unit (PMU) in the smart grid. | *10* | *K2* | *CO4* |
| 35. | a) | Explain about Wide Area Network (WAN) with the help of neat sketch. | *10* | *K2* | *CO5* |
| | | **OR** | | | |
| | b) | Enlighten in detail about basics of Web Service and how cyber security is enhanced in smart grid. | *10* | *K2* | *CO5* |
| 36. | a) i) | Explain about Intelligent Electronic Devices (IED) application for monitoring and protection in smart grid. | *5* | *K2* | *CO4* |
| | ii) | Explicate authentication, authorization services, system Integrity and network integrity in cyber security of smart grid. | *5* | *K2* | *CO5* |
| | | **OR** | | | |
| | b) i) | Explain about smart metering in smart grid with the help of neat diagram. | *5* | *K2* | *CO4* |
| | ii) | Elucidate the concept of Broadband over Power line (BPL) for smart grid. | *5* | *K2* | *CO5* |