A **Reg. No. :** | | | | | | | | | | |

Question Paper Code: 99332

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2024

Professional Elective

Electrical and Electronics Engineering

19UEE932- SMART GRID

(Regulations 2019)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. What is the Evolution of Electric Grid? CO1- U

   (a) The development of decentralized power systems

   (b) The improvement of the electric power system over time

   (c) The integration of renewable energy sources into the existing power infrastructure

   (d) The reduction of greenhouse gas emissions

2. What is the purpose of a smart grid? CO1 -U

   (a) To improve energy efficiency

   (b) To reduce greenhouse gas emissions

   (c) To improve the quality and reliability of energy service

   (d) All of the above

3. Which of the following techniques is used for solving non-linear optimization problems in Smart Grid? CO1 -U

   (a) Evolutionary Algorithms (b) Artificial Intelligence

   (c) Computational Intelligence (d) None of the above

4. Which of the following techniques is used for Static Optimization in Smart Grid? CO1 -U

   (a) Artificial Intelligence (b) Evolutionary Algorithms

   (c) Computational Intelligence (d) None of the above

5. Which protocol is commonly used for AMI communications? CO1 -U

(a) Zigbee (b) Wi-Fi (c) Cellular (d) All of the above

6. Which of the following technologies is used for voltage and reactive power control in the smart grid? CO1- U

(a) Smart meters (b) Phasor Measurement Units

(c) Intelligent Electronic Devices (d) Volt/VAR control

7. Which of the following technologies is used for wide area monitoring in the smart grid? CO1- U

(a) Phasor Measurement Unit (b) Smart meters

(c) Distribution Management System (d) Volt/VAR control

8. What is a plug-in hybrid vehicle? CO1- U

(a) A vehicle that runs on both gasoline and electricity

(b) A vehicle that runs on gasoline only

(c) A vehicle that runs on electricity only

(d) None of the above

9. Which of the following is NOT a function of Load Frequency Control (LFC) in Micro Grid System? CO1- U

(a) To maintain the frequency of the system

(b) To ensure stable operation of the system

(c) To optimize the power generation of the system

(d) None of the above

10. What is the main objective of Load Frequency Control (LFC) in Micro Grid System? CO1- U

(a) To maintain the frequency of the system (b) To maintain the voltage of the system

(c) To maintain the power factor of the system (d) None of the above

PART – B (5 x 2= 10Marks)

11. What is the difference between a conventional grid and a smart grid? CO1 -U

12. Design an Artificial Intelligence (AI) system for predicting energy demand in a Smart Grid. How can this system be trained and tested to improve its accuracy? CO3-App

13. How the AMI System be utilized to optimize power generation and distribution systems while reducing peak demand. CO2- App

14. How does Wide Area Monitoring help in identifying potential faults and CO1- U

ensuring system stability?

15. Write the role of voltage control in a micro grid Smart Grid system. CO1- U

PART – C (5 x 16= 80Marks)

16. (a) Explain the evolution of the electric grid and its current status. CO1- U (16)

Or

(b) Discuss the role of smart grid technologies in reducing energy losses and increasing energy efficiency CO1- U (16)

17. (a) Use Artificial Intelligence Techniques to design a predictive maintenance system for Smart Grids. Describe the system architecture and explain how it can improve the reliability and availability of power systems. CO2 -App (16)

Or

(b) Analyze the potential impact of computational techniques on the reliability and stability of Smart Grid. Discuss how these techniques help in ensuring uninterrupted power supply CO2- App (16)

18. (a) A smart meter uses the same 16-bit analogue to digital converter for both current and voltage measurements. It uses a 100: 5 A CT for current measurements and 415: 10 V potential divider for voltage measurements. When the meter shows a current measurement of 50 A and a voltage measurement of 400 V, what is the maximum possible error in the apparent power reading due to the quantization of the voltage and current signals? CO2 -App (16)

Or

(b) Develop a strategy for ensuring the security and privacy of customer data in an AMI infrastructure. CO2 -App (16)

19. (a) Analyze the role of high-efficiency distribution transformers in reducing energy losses and improving power quality at the distribution level. Evaluate the potential benefits and challenges of using these technologies in the context of reducing carbon emissions and improving energy efficiency. CO4- Ana (16)

Or

(b) Analyze the significance of Protection and Control in the Smart Grid and discuss how it helps prevent power outages and protect critical infrastructure. CO4- Ana (16)

20. (a) Discuss the concept of load frequency control (LFC) in microgrid systems. How does LFC support grid stability and reliability, and CO1- U (16)

what are the key challenges associated with LFC implementation?

Or

(b)	Discuss the use of case studies and test beds in the development and implementation of smart grids. What are some examples of successful case studies and test beds, and what lessons can be learned from these experiences?	CO1- U	(16)