Reg. No.															

Question Paper Code	13391

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2025

Eighth Semester

Electrical and Electronics Engineering

20EEEL809 - BIG DATA ANALYTICS FOR SMART GRID

Regulations - 2020

Duration: 3 Hours Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

		Marks	*K – Level*	*CO*
1.	Which of the following is a key feature of a smart grid? (a) Centralized energy distribution (b) Use of fossil fuels (c) Two-way communication C (d) Manual meter reading	*1*	*K1*	*CO1*
2.	What technology is essential for monitoring and managing a smart grid? (a) Analog meters (b) IoT (Internet of Things) (c) Coal-fired power plants (d) Gas turbines	*1*	*K1*	*CO1*
3.	Which method is commonly used for scheduling in power systems? (a) Stochastic optimization (b) Deterministic optimization (c) Heuristic optimization (d) Genetic algorithms	*1*	*K1*	*CO2*
4.	What is the primary goal of Online Dynamic Security Assessment (DSA) in power systems? (a) Reduce operational costs (b) Enhance market efficiency (c) Ensure system stability in real-time (d) Increase power generation	*1*	*K1*	*CO2*
5.	Which of the following best defines analytics? (a) The process of collecting raw data (b) The systematic computational analysis of data (c) Guessing future trends based on intuition (d) Manually processing data without tools	*1*	*K1*	*CO3*
6.	Which is NOT a typical stage in the analytics process? (a) Data Collection (b) Data Cleaning (c) Data Guessing (d) Data Visualization	*1*	*K1*	*CO3*
7.	Which component in big data architecture is primarily responsible for storing large volumes of raw data? (a) Data Lake (b) Data Warehouse (c) Stream Processing Engine (d) Data Visualization Tool	*1*	*K1*	*CO4*
8.	Physics-based Numerical Weather Prediction (NWP) is primarily used for forecasting which of the following in smart grids? (a) Electricity Prices (b) Renewable Energy Generation (c) Customer Demand Patterns (d) Cybersecurity Threats	*1*	*K1*	*CO4*
9.	Which of the following is NOT a common cause of bad data in machine learning applications? (a) Sensor failures (b) Data corruption during transmission (c) Properly labeled training data (d) Human entry errors	*1*	*K1*	*CO5*
10.	What is one of the major emerging trends in Big Data Analytics at the distribution level grid? (a) Manual meter reading (b) Integration of artificial intelligence and machine learning (c) Increased reliance on fossil fuels (d) Disconnection of renewable energy sources	*1*	*K1*	*CO6*

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

11.	Define Smart Grid.	*2*	*K1*	*CO1*
12.	State the satellite communication enhances modern power systems.	*2*	*K1*	*CO1*
13.	Differentiate between data and analytics.	*2*	*K2*	*CO2*
14.	Define an analytical model and explain why it is important.	*2*	*K1*	*CO2*
15.	List the main objective of analytics in decision-making.	*2*	*K1*	*CO3*
16.	Differentiate between data and analytics.	*2*	*K2*	*CO3*
17.	State the role of Data Lakes in big data architecture for smart grids.	*2*	*K1*	*CO4*
18.	State the Missing Sensor Restoration (MSR) and give its important in smart grids.	*2*	*K1*	*CO4*
19.	Why is bad data detection crucial in machine learning applications?	*2*	*K1*	*CO5*
20.	How can machine learning improve bad data detection?	*2*	*K1*	*CO5*
21.	Recall the techniques are used for real-time data analysis in distribution grids.	*2*	*K1*	*CO6*
22.	Summarize the methods used for anomaly detection in Smart Grids.	*2*	*K2*	*CO6*

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23.	a)	Explain the concept of a Smart Grid and discuss its key features, advantages, and how it differs from a traditional power grid.	*11*	*K2*	*CO1*
		OR			
	b)	Describe in detail about Phasor Measurement Unit, and explain how it functions as an intelligent data collection device in the Smart Grid.	*11*	*K2*	*CO1*
24.	a)	Explain the deterministic optimization methods be used to improve power scheduling efficiency in smart grids.	*11*	*K2*	*CO2*
		OR			
	b)	Explain the strategies can optimize wide-area power flow control to minimize congestion.	*11*	*K2*	*CO2*
25.	a)	Describe the fundamental differences between descriptive, diagnostic, predictive, and prescriptive analytics in the context of energy systems.	*11*	*K2*	*CO3*
		OR			
	b)	Explain the analytical models support decision-making processes in utility management and energy distribution.	*11*	*K2*	*CO3*
26.	a)	Indentify how the Artificial Neural Networks are used for short-term load forecasting in smart grids.	*11*	*K3*	*CO4*
		OR			
	b)	Build the process of Missing Sensor Restoration (MSR) in intelligent sensing for smart grids.	*11*	*K3*	*CO4*
27.	a)	Build the effectiveness of machine learning models in detecting and classifying bad data in real-time systems.	*11*	*K3*	*CO5*
		OR			
	b)	Contrast the effectiveness of SVM, nearest neighbor, RNNs, and LSTMs for detecting anomalies in datasets.	*11*	*K3*	*CO5*
28.	a)	Demonstrate how key methods and technologies are used in fault detection and isolation in Smart Grids.	*11*	*K2*	*CO6*
		OR			
	b)	Describe the impact of big data and artificial intelligence on the future of smart grids.	*11*	*K2*	*CO6*