Reg. No.															

Question Paper Code	13389

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

Eighth Semester

Electrical and Electronics Engineering

20EEEL802 - SMART GRID TECHNOLOGIES

Regulations - 2020

Duration: 3 Hours Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

		Marks	*K – Level*	*CO*
1.	What is emphasized in the Smart Grid that contrasts with the 'Failures and Blackouts' of a Conventional Grid? (a) No Resiliency (b) Frequent Blackouts (c) Unstable Network (d) Adaptive and islanding	*1*	*K1*	*CO1*
2.	What feature differentiates the Smart Grid's response to power disruptions compared to the Conventional Grid? (a) Manual Restoration (b) Frequent Failures (c) Self-healing (d) Longer Restoration Time	*1*	*K1*	*CO1*
3.	How does a feedback loop benefit a feeder automation system? (a) It supports only initial setup checks (b) It makes permanent adjustments (c) It limits data collection (d) It continuously optimizes feeder performance	*1*	*K1*	*CO2*
4.	What is the function of a Phasor Data Concentrator (PDC) in WAMS? (a) Collects and synchronizes data from multiple PMUs (b) Generates electricity from wind power (c) Converts AC power to DC power (d) Reduces power consumption in households	*1*	*K1*	*CO2*
5.	How do Plug-in Hybrid Electric Vehicles (PHEVs) contribute to a smart grid? (a) By increasing the demand for fossil fuels (b) By acting as energy storage units through Vehicle-to-Grid (V2G) technology (c) By reducing the need for power generation (d) By eliminating the need for battery storage	*1*	*K1*	*CO3*
6.	Which device helps to determine the fault location quicker thus enhancing reliability? (a) Fault-passage indicators (b) Voltage regulation indicators (c) Weir indicators (d) Load forecast indicators	*1*	*K1*	*CO3*
7.	What is the primary purpose of Advanced Metering Infrastructure (AMI) in smart grids? (a) Enhance data security (b) Improve grid stability (c) Automate billing process (d) Equipment cost	*1*	*K1*	*CO4*
8.	Why are separate recording IEDs used despite meter and protection IEDs having data storage capability? (a) Meter and protection IEDs lack data storage capability (b) Separate recording IEDs offer higher resolution recording (c) Meter and protection IEDs cannot record status changes (d) Separate recording IEDs are cheaper	*1*	*K1*	*CO4*
9.	What is the purpose of Home Area Networking technologies in the context of smart homes? (a) Interconnect homes and connect homes to grid operators and utilities (b) Facilitate video gaming (c) Enhance internet speed (d) Improve television signal	*1*	*K1*	*CO5*

10.	Which protocol is responsible for putting the packets back in the right order when they are received in a different order? (a) Internet Protocol Version 4 (IPv4) (b) Internet Protocol Version 6 (IPv6) (c) Transmission Control Protocol (TCP) (d) Gateway Control Protocol (GCP)	*1*	*K1*	*CO5*

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

11.	Outline the advantages of smart grid technology.	*2*	*K2*	*CO1*
12.	Classify the smart grid drivers.	*2*	*K2*	*CO1*
13.	Infer the role of cyber security in smart grid.	*2*	*K2*	*CO1*
14.	Outline the components of substation automation.	*2*	*K2*	*CO2*
15.	List the components used in HVDC transmission automation.	*2*	*K1*	*CO2*
16.	Infer the significance of digital fault recorder.	*2*	*K2*	*CO2*
17.	Write the merit of a high efficiency distribution transformer.	*2*	*K1*	*CO3*
18.	Differentiate isolation and service restoration.	*2*	*K2*	*CO3*
19.	Compare conventional meter and smart meter.	*2*	*K2*	*CO4*
20.	Outline the need of Intelligent Electronic Devices (IED) in Smart Grid.	*2*	*K2*	*CO4*
21.	What is the application of web service in smart grid?	*2*	*K1*	*CO5*
22.	Differentiate BPL and LAN.	*2*	*K2*	*CO5*

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23.	a)	Explain the conceptual model of smart grid in the power system network.	*11*	*K2*	*CO1*
		OR			
	b)	Illustrate about the challenges and benefits of smart grid technology.	*11*	*K2*	*CO1*
24.	a)	Summarize the role of smart substation in smart grid.	*11*	*K2*	*CO2*
		OR			
	b)	Describe the Demand Side management (DSM) of smart grid.	*11*	*K2*	*CO2*
25.	a)	Discuss about an Outage Management System and explain how it functions during a power outage scenario.	*11*	*K2*	*CO3*
		OR			
	b)	Discuss about electric vehicles in detail.	*11*	*K2*	*CO3*
26.	a)	In detail explain the concept of Phasor Measurement Unit (PMU) with a neat block diagram.	*11*	*K2*	*CO4*
		OR			
	b)	Explain about Intelligent Electronic Devices (IED) application for monitoring and protection.	*11*	*K2*	*CO4*
27.	a)	Demonstrate authentication, authorization services, system Integrity and network integrity in Cyber Security of smart grid.	*11*	*K2*	*CO5*
		OR			
	b)	Explain the internet protocol layers in smart grid communication.	*11*	*K2*	*CO5*
28.	a) (i)	Enumerate about the applications of phase measuring unit (PMU) in the smart grid.	*6*	*K2*	*CO4*
	(ii)	Illustrate about Wide Area Network (WAN).	*5*	*K2*	*CO5*
		OR			
	b) (i)	Summarize about the AMI protocols.	*6*	*K2*	*CO4*
	(ii)	Outline about the Confidentiality and Integrity in Security system.	*5*	*K2*	*CO5*