Reg. No.															

Question Paper Code	13767

M.E. - DEGREE EXAMINATIONS, APRIL / MAY 2025

Second Semester

M.E. - Power Electronics and Drives

24PPEEL211 - SMART GRID

Regulations - 2024

Duration: 3 Hours | Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	State the smart grid vision for India.	2	K1	CO1
2.	Compare the existing grid and smart grid.	2	K2	CO1
3.	What are the functions of distribution SCADA?	2	K1	CO2
4.	List the major WAMPAC activities.	2	K1	CO2
5.	Compare conventional meter and smart meter.	2	K2	CO3
6.	List out the components of Phasor Measurement Unit.	2	K1	CO3
7.	Name two causes of voltage sag in power systems.	2	K1	CO4
8.	What is the function of a Dynamic Voltage Restorer?	2	K2	CO4
9.	Compare HAN and WAN.	2	K2	CO5
10.	List out the characteristics of smart grid communications technology.	2	K1	CO5

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

			Marks	K – Level	CO
11.	a)	Explain the conceptual model of smart grid in the power system network.	13	K2	CO1
		OR			
	b)	Explain in detail about requirements of self-healing grid.	13	K2	CO1
12.	a)	As cities move toward green mobility, the local transport department is evaluating Plug-in Hybrid Electric Vehicles for public transport. As an engineer, explain the working of a PHEV with its major components. Compare it with traditional and pure electric vehicles. Also, highlight its role in reducing carbon footprint and grid integration challenges.	13	K3	CO2
		OR			
	b)	Identify the role of automated substations in managing variability and ensuring efficient integration of renewable energy sources into the power grid.	13	K3	CO2
13.	a)	How do PMUs contribute to real-time grid control and decision-making, and what are some practical applications where PMUs have enhanced operational visibility?	13	K3	CO3
		OR			

	b)	Identify the major security vulnerabilities in AMI deployments, and how do these threats impact smart grid reliability, consumer data privacy, and operational continuity.	*13*	*K3*	*CO3*
14.	a)	How is web-based power quality monitoring implemented in smart grid infrastructure, and what practical advantages does it offer for real-time analysis and decision-making?	*13*	*K3*	*CO4*
		OR			
	b)	How can FACTS and custom power devices be strategically applied in smart grids to manage dynamic load conditions and enhance power quality?	*13*	*K3*	*CO4*
15.	a)	The design team is tasked with selecting a suitable communication network for different segments of the smart grid. Classify the types of smart grid communication networks and explain their roles, technologies used, and key characteristics. Match each network type to a specific smart grid application.	*13*	*K3*	*CO5*
		OR			
	b)	A smart grid communication system uses multiple devices, including smart meters, PMUs, and SCADA systems, communicating over an IP-based network. Discuss on how the Internet Protocol layers support communication in this context. Give examples of protocols used at each layer.	*13*	*K3*	*CO5*

PART - C (1 × 15 = 15 Marks)

16.	a) (i)	How are various power quality conditioners like DVR, DSTATCOM, and UPQC applied in smart grids to mitigate voltage and current disturbances?	*8*	*K3*	*CO4*
	(ii)	Differentiate between system integrity and network integrity. Recommend how integrity at both levels can be preserved in smart grid operations.	*7*	*K2*	*CO5*
		OR			
	b) (i)	How do real-world smart grids address power quality challenges arising from renewable energy integration, and what lessons can be learned from existing case studies?	*8*	*K3*	*CO4*
	(ii)	Discuss on Confidentiality and Integrity in Cyber Security system.	*7*	*K2*	*CO5*