Reg. No.															

Question Paper Code	13943

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 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 type of generation describes a Conventional Grid? (a) Distributed Generation (b) Automated Generation (c) centralized generation (d) Multi-site Generation	1	K1	CO1
2.	What type of communication is used in a Smart Grid? (a) One-Way Communication (b) No Communication (c) Intermittent Communication (d) Two-Way communication	1	K1	CO1
3.	How does an EMS support industrial and commercial energy users? (a) By providing real-time data on energy consumption (b) By increasing power wastage (c) By disconnecting machines randomly (d) By eliminating the need for power backup	1	K1	CO2
4.	What is the main advantage of HVDC transmission over AC transmission? (a) Requires more conductors than AC transmission (b) Reduces transmission losses over long distances (c) Increases reactive power requirements (d) Decreases power transmission efficiency	1	K1	CO2
5.	Which device in a smart grid helps in isolating faults and restoring power automatically? (a) Circuit breaker (b) Recloser (c) Smart meter (d) Transformer	1	K1	CO3
6.	What is the main advantage of using high-efficiency transformers in a smart grid? (a) Reduces power losses and improves overall energy efficiency (b) Increases the cost of power distribution (c) Eliminates the need for voltage regulation (d) Makes the grid more dependent on fossil fuels	1	K1	CO3
7.	Consider a scenario where a utility wants to manage peak loads efficiently. Which feature of AMI would be useful for this purpose? (a) Time-based pricing (b) Bi-directional communication (c) Remote load limiting (d) Energy prepayment	1	K1	CO4
8.	Which of the following is a primary component of a PMU (Phasor Measurement Unit)? (a) Phasor Disk Concentrators (b) Phasor Disk Collectors (c) Phasor Data Collectors (d) Phasor Data Concentrators	1	K1	CO4
9.	Which IEC standard has adopted Ethernet as the communication network standard inside substations? (a) IEC 61830 (b) IEC 61850 (c) IEC 62559 (d) IEC 61580	1	K1	CO5
10.	The latest version of IP that is beginning to be supported and provides for much longer addresses is _____. (a) Internet Protocol Version 5 (IPv5) (b) Internet Protocol Version 4 (IPv4) (c) Internet Protocol Version 7 (IPv7) (d) Internet Protocol Version 6 (IPv6)	1	K1	CO5

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

11.	Infer the role of cyber security in smart grid.	2	K2	CO1
12.	Name a few regulatory authorities in the Indian Power sector.	2	K1	CO1
13.	List the factors affecting the performance of the existing grid.	2	K1	CO1
14.	Illustrate the role of FACTS in a power system network.	2	K2	CO2
15.	List the applications of WAMS.	2	K1	CO2
16.	Summarize the role of WAMPAC in a smart grid.	2	K2	CO2
17.	Write the merit of a high efficiency distribution transformer.	2	K1	CO3
18.	Compare EV and PHEV.	2	K2	CO3
19.	Define the term Phasor Measurement Unit (PMU).	2	K1	CO4
20.	Outline the need of Intelligent Electronic Devices (IED) in Smart Grid.	2	K2	CO4
21.	What is a Wide Area Network?	2	K1	CO5
22.	Compare BPL and LAN.	2	K2	CO5

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23.	a)	Explain in detail about the architecture of the smart grid.	11	K2	CO1
		OR			
	b)	Demonstrate about the International Initiatives in smart grid.	11	K2	CO1
24.	a)	Enumerate the role of EMS in monitoring, protection and control in transmission systems.	11	K2	CO2
		OR			
	b)	Summarize the role of WAMPAC in a smart grid.	11	K2	CO2
25.	a)	Make use of phase shifting transformer to control the real power flow on three phase electricity transmission networks.	11	K3	CO3
		OR			
	b)	Discuss about an outage management system and explain how it functions during a power outage scenario.	11	K3	CO3
26.	a)	Explain the concept of phasor measurement unit (PMU) with a neat block diagram.	11	K2	CO4
		OR			
	b)	Describe about intelligent electronic devices (IED) application for monitoring and protection.	11	K2	CO4
27.	a)	Explain in detail about the cyber security threats in Smart Grid.	11	K2	CO5
		OR			
	b)	Illustrate the internet protocol layers in smart grid communication.	11	K2	CO5
28.	a) (i)	Explain about the advantages of smart meters in smart grid.	6	K2	CO4
	(ii)	Enumerate confidentiality and integrity in Security system.	5	K2	CO5
		OR			
	b) (i)	Summarize about the AMI protocols.	6	K2	CO4
	(ii)	Interpret the major challenges in implementing broadband over power lines.	5	K2	CO5