Reg. No.																

Question Paper Code	14309

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2026

Eighth Semester

Electrical and Electronics Engineering

20EEEL802 - SMART GRID TECHNOLOGIES

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART – A (i) (MCQ)
(16 × 1 = 16 Marks)
Answer ALL Questions

		Marks	K – Level	CO
1.	Tell the main purpose of a Smart Grid	1	K1	CO1
	a) To increase electricity theft	b) To supply electricity in a smarter and efficient way		
	c) To stop power generation	d) To reduce the number of consumers		
2.	Show the key difference between a conventional grid and a smart grid.	1	K2	CO1
	a) Conventional grid uses the internet	b) Smart grid allows two-way communication		
	c) Conventional grid uses renewable energy only	d) Smart grid does not use meters		
3.	Apply the concept of smart grid technologies to reduce peak load. Which option is most suitable?	1	K3	CO1
	a) Manual control	b) Demand Response		
	c) Fixed tariff system	d) Isolated generation		
4.	Recall which FACTS system is mainly used	1	K1	CO2
	a) Generation system	b) Transmission system		
	c) Distribution system	d) Consumer system		
5.	Show which of the following represents a smart substation	1	K2	CO2
	a) Manual control system	b) Automated substation with communication and control		
	c) Isolated transformer	d) Conventional switching station		
6.	Apply the concept of Wide Area Monitoring System (WAMS) and choose essential-component	1	K3	CO2
	a) Manual relays	b) Phasor Measurement Units (PMU)		
	c) Mechanical switches	d) Isolated sensors		
7.	Define the function of Distribution Management System	1	K1	CO3
	a) Manual power control system	b) Automated system for monitoring and controlling distribution networks		
	c) Only transmission control system	d) Isolated grid system		
8.	Interpret the purpose of Volt/Var control in smart grids	1	K2	CO3
	a) Increase voltage fluctuations	b) Maintain voltage profile and reduce losses		
	c) Eliminate transformers	d) Reduce communication		
9.	Apply the concept of fault detection and isolation. What is the primary objective?	1	K3	CO3
	a) Increase outage duration	b) Quickly detect faults and isolate affected sections		
	c) Reduce automation	d) Avoid protection systems		

10.	Choose the component used in AMI for communication between meter and utility. a) Transformer b) Communication network c) Circuit breaker d) Capacitor	*1*	*K1*	*CO4*
11.	Interpret the role of AMI protocols in smart grids. Which statement is correct? a) They prevent data transmission b) They standardize communication between devices c) They eliminate meters d) They reduce grid automation	*1*	*K2*	*CO4*
12.	Apply the concept of Phasor Measurement Units (PMU).What is their primary function? a) Measure only voltage magnitude b) Provide synchronized real-time measurements of electrical parameters c) Replace transformers d) Eliminate communication systems	*1*	*K3*	*CO4*
13.	Which of the following best defines a Home Area Network? a) Network connecting transmission substations b) Network connecting devices within a consumer's home c) Network used only for generation systems d) Isolated communication system	*1*	*K1*	*CO5*
14.	Relate the role of Cloud Computing in smart grids a) It reduces data storage capability b) It enables large-scale data storage and remote processing c) It eliminates communication networks d) It works only offline	*1*	*K2*	*CO5*
15.	Apply the concept of Broadband over Power Line to identify its primary function. a) Transmit power only b) Enable data communication over power lines c) Reduce voltage levels d) Eliminate internet usage	*1*	*K3*	*CO5*
16.	Apply the importance of cyber security to identify its role in protecting smart grid communication systems. a) Increases system vulnerability b) Protects data and communication from cyber attacks c) Eliminates communication d) Reduces system reliability	*1*	*K3*	*CO5*

PART – A (ii) (Short Answer Questions)
(8 × 3 = 24 Marks)
Answer ALL Questions

17.	Identify the enabling technologies used in a smart grid.	*3*	*K3*	*CO1*
18.	Apply the concept of smart grid drivers to justify the need for modernization of conventional power systems.	*3*	*K3*	*CO1*
19.	Make use of FACTS devices to enhance the performance of a power system network.	*3*	*K3*	*CO2*
20.	Utilize Wide Area Monitoring System to improve real-time monitoring in transmission networks.	*3*	*K3*	*CO2*
21.	Apply the concept of Vehicle-to-Grid (V2G) technology in a smart grid system.	*3*	*K3*	*CO3*
22.	Examine the function of Phasor Measurement Unit (PMU) in smart grid applications.	*3*	*K3*	*CO4*
23.	Distinguish between AMI and conventional metering systems in terms of functionality and communication.	*3*	*K4*	*CO4*
24.	Compare Local Area Network and Wide Area Network in terms of their application in smart grid communication.	*3*	*K4*	*CO5*

PART - B (Descriptive Answer Questions)
(5 × 12 = 60 Marks)
Answer ALL Questions

25.	a)	Construct the architecture of a Smart Grid with a neat diagram and specify the function of each layer.	*12*	*K3*	*CO1*

OR

	b)	Organize the national Smart Grid initiatives to design a roadmap for Smart Grid implementation in India.	*12*	*K3*	*CO1*
26.	a)	Construct the architecture of a substation automation system with a neat diagram and specify the function of each component.	*12*	*K3*	*CO2*
		OR			
	b)	Apply HVDC concepts and explain their operation in a smart grid with a neat sketch.	*12*	*K3*	*CO2*
27.	a)	Utilize Plug-in Hybrid Electric Vehicles (PHEV) to support smart grid operation.	*12*	*K3*	*CO3*
		OR			
	b)	Apply the concept of distribution automation in smart grid systems.	*12*	*K3*	*CO3*
28.	a)	Analyze the working of smart metering in a smart grid with a neat diagram.	*12*	*K4*	*CO4*
		OR			
	b)	Examine the building blocks of Advanced Metering Infrastructure (AMI) in a smart grid using a neat sketch.	*12*	*K4*	*CO4*
29.	a)	Analyze the role of Broadband over Power Line (BPL) in smart grid communication infrastructure.	*12*	*K4*	*CO5*
		OR			
	b)	Analyze the cyber security threats in a smart grid system.	*12*	*K4*	*CO5*