

U.S.N.

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

May / June 2025 Semester End Main Examinations**Programme: B.E.****Semester: VIII****Branch: Electrical and Electronics Engineering****Duration: 3 hrs.****Course Code: 22EE8PE4SS****Max Marks: 100****Course: Smart Grid and Energy Storage System**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.			UNIT - I	CO	PO	Marks
	1	a)	With a neat diagram, discuss the evolution of smart grid starting from 19th century to 22 nd Century.	CO2	PO2	10
		b)	Explain the benefits and challenges of Smart Grid.	CO1	PO1	10
			OR			
	2	a)	What are the technology drivers of the smart grid? Explain in detail.	CO1	PO1	10
		b)	with a neat figure explain the concept of smart Grid and discuss why we need smart cities? Illustrate mission strategy of smart cities.	CO2	PO2	10
			UNIT - II			
	3	a)	Describe in detail about Solar Energy technology and wind power systems with respect to sustainable energy options for Smart Grid.	CO2	PO2	10
		b)	Explain the Protocols of Intelligent Electronic Devices.	CO2	PO2	10
			OR			
	4	a)	Discuss the objectives of SCADA in Energy Management System and mention the benefits of SCADA.	CO2	PO2	10
		b)	Illustrate with a neat diagram Smart Substation and Feeder Automation.	CO2	PO2	10
			UNIT - III			
	5	a)	Compare conventional and smart meters and hence explain the Short- term and long-term benefits of advanced metering with respect to supplier and consumer.	CO2	PO6	10

	b)	Discuss in detail AMI standards.	CO2	PO6	10
		OR			
6	a)	Describe in detail the benefits of AMI.	CO2	PO6	10
	b)	Explain the following: (i)Demand Response Program (ii)Demand Pricing (iii)Time of Use(iv)Real Time Pricing (v) Peak Time Pricing	CO2	PO6	10
		UNIT - IV			
7	a)	How do energy storage systems help reduce electricity bills for consumers?	CO3	PO7	08
	b)	What are the main categories of energy storage systems? Give an example for each category.	CO3	PO7	05
	c)	Describe the role of energy storage in microgrids.	CO3	PO7	07
		OR			
8	a)	What are the major advantages and drawbacks of Superconducting Magnetic Energy Storage (SMES) systems?	CO3	PO7	07
	b)	What are flow batteries, and how do they differ from conventional batteries?	CO3	PO7	07
	c)	Discuss State of Charge (SoC) and why is it important?	CO3	PO7	06
		UNIT - V			
9	a)	How does compressed air energy storage (CAES) operate?	CO3	PO7	07
	b)	Explain the working principle of flywheel energy storage?	CO3	PO7	07
	c)	What are the key components of a pumped hydro storage system? Explain all the components.	CO3	PO7	06
		OR			
10	a)	How does water electrolysis produce hydrogen using renewable electricity?	CO3	PO7	07
	b)	What is a fuel cell and how does it generate electricity?	CO3	PO7	07
	c)	Discuss the typical applications of flywheel systems?	CO3	PO7	06
