GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY UNIVERSITY, ODISHA, GUNUPUR
(GIET UNIVERSITY)
M. Tech.(Second Semester) Examinations, July - 2025
24MPEPE12002 – SMARTGRIDS
(Power Electronics)

Time: 3 hrs   Maximum: 60 Marks

Answer ALL questions
(The figures in the right hand margin indicate marks)

PART – A   (2 x 5 = 10 Marks)

Q.1. Answer *ALL* questions

		CO #	Blooms Level
a.	Explain the concept of home automation and its relevance in modern households.	CO3	K2
b.	What are Intelligent Electronic Devices (IEDs), and how are they used in modern power systems?	CO4	K3
c.	Discuss the benefits and advantages of implementing a smart grid.	CO3	K4
d.	Discuss the concepts of "Vehicle to Grid" and "Grid to Vehicle."	CO2	K3
e.	Explain the concept of "Grid Resilience" in the context of Smart Grids and discuss one key technology or strategy used to enhance it.	CO1	K3

PART – B   (10 x 5 = 50 Marks)

Answer *ALL* the questions

		Marks	CO #	Blooms Level
2.a	Offer detailed insights into the block diagram of a smart substation, highlighting its various components and their functions.	5	CO4	K3
2.b	Describe the configuration and key components of an Energy Management System (EMS) within the framework of a smart grid.	5	CO4	K4
	(OR)			
2.c	Explain the architecture and working of an Intelligent Electronic Device (IED) in a smart grid system.	5	CO4	K3
2.d	Describe the layered communication architecture of smart grids and discuss the function of each layer.	5	CO4	K4
3.a	Discuss the importance of power quality audits within the context of a smart grid.	5	CO3	K3
3.b	Provide a brief overview of voltage regulation methods in smart distribution systems and their impact on power quality.	5	CO3	K3
	(OR)			
3.c	Explain the role of advanced control strategies used for voltage and frequency regulation in smart grids.	5	CO3	K4
3.d	Describe the function and importance of remote monitoring and diagnostics in improving power quality in smart distribution systems.	5	CO3	K3
4.a	Analyze how smart meters support energy management through real-time monitoring, two-way communication, and intelligent billing systems.	5	CO3	K4
4.b	Explain modern sensing, measurement, and control technologies used in smart grids, and their effect on reliability and operational efficiency.	5	CO4	K4
	(OR)			
4.c	Discuss the significance of synchrophasors (PMUs) and wide area measurement systems in modern power system monitoring.	5	CO4	K4
4.d	Describe how fault location, isolation, and service restoration (FLISR) systems are integrated into smart grid networks.	5	CO4	K3

5.a	Write an in-depth analysis of the opportunities and barriers in implementing smart grids from technological, economic, and policy perspectives.	5	CO1	K3
5.b	Explore the role of consumer engagement and behavior in successful deployment of smart grid infrastructure.	5	CO1	K3

(OR)

5.c	Examine the regulatory and standardization challenges faced during smart grid adoption across developing regions.	5	CO1	K3
5.d	Describe the importance of interoperability in smart grids. How does standard communication protocol affect system integration?	5	CO1	K4
6.a	Discuss key cybersecurity strategies and distributed storage techniques necessary to safeguard modern smart grids.	5	CO1	K3
6.b	Provide a comprehensive overview of smart sensor subsystems, including data acquisition, edge processing, and wireless communication modules.	5	CO3	K3

(OR)

6.c	Explore the importance of interoperability between smart grid components and describe how it is achieved through layered standards.	5	CO3	K4
6.d	Describe the control hierarchy in smart grids, from local automation to centralized system-wide decision-making.	5	CO4	K3

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