

Gandhi Institute of Engineering and Technology University, Odisha, Gunupur (GIET University)

M.Tech. (Second Semester - Regular) Examinations, May - 2026

24MPEPE12002– Smart Grids

(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. What is meant by a self-healing grid?	CO1	K1
b. Define demand-side integration.	CO2	K1
c. What is the function of a meter data management system?	CO3	K1
d. Define outage management system.	CO4	K2
e. What is the function of a bay controller?	CO5	K1

PART – B

(10 x 5 = 50 Marks)

Answer **ALL** the questions

	Marks	CO #	Blooms Level
2. a. Explain the opportunities and barriers associated with smart grid implementation.	5	CO1	K2
b. Explain the role of distributed energy resources in improving smart grid reliability and flexibility.	5	CO1	K2
(OR)			
c. Explain whether smart grid can be considered a green grid. Justify your answer.	5	CO1	K2
d. A conventional distribution feeder has annual energy losses of 18,000 kWh. After smart grid automation, losses are reduced by 15%. Calculate the energy saved annually and the remaining energy loss.	5	CO1	K4
3.a. Explain the evolution of electricity metering from conventional meters to smart meters.	5	CO2	K2
b. Describe the key components of smart metering infrastructure.	5	CO2	K3
(OR)			
c. Explain the role of Advanced Metering Infrastructure (AMI) in two-way communication between utilities and consumers.	5	CO2	K2
d. Discuss signal acquisition, signal conditioning, and analog-to-digital conversion in smart meters.	5	CO2	K3
4.a. Explain vehicle-to-grid and grid-to-vehicle concepts with suitable diagrams.	5	CO3	K2
b. A plug-in hybrid electric vehicle battery has a capacity of 12 kWh. If it is charged from 20% to 90%, calculate the energy required for charging.	5	CO3	K4
(OR)			
c. Explain how smart sensors improve monitoring and control in smart grid.	5	CO3	K2
d. Discuss the role of home and building automation in demand-side management	5	CO3	K3
5.a. Explain the role of current transformers and voltage transformers in smart substations.	5	CO4	K2
b. Discuss the functions of intelligent electronic devices in substation automation.	5	CO4	K2
(OR)			

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| c. | Explain the role of SCADA systems in monitoring, control, and automation of smart substations. | 5 | CO4 | K2 |
| d. | Discuss fault location, isolation, and restoration in smart distribution systems. | 5 | CO4 | K4 |
| 6.a. | A distribution feeder supplies 230 V to a consumer. Due to voltage drop, the received voltage is 218 V. Calculate the percentage voltage regulation. | 5 | CO5 | K4 |
| b. | Explain the function and application of phase shifting transformers in smart grid. | 5 | CO5 | K2 |
| (OR) | | | | |
| c. | Compare home-area network, neighborhood-area network, and data concentrator in smart grid communication. | 5 | CO5 | K3 |
| d. | Explain how smart grid supports low-carbon central generation and renewable energy integration. | 5 | CO5 | K2 |

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