QP Code: RN21BTECH567 | Reg. No | | | | | | | | | | | AR 21

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

B. Tech (Seventh Semester - Regular) Examinations, November – 2024

21BELPE47011/21BEEPE47011 – Smart Grid

(EE/EEE)

Time: 3 hrs | Maximum: 70 Marks

Answer ALL questions

(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

		CO #	Blooms Level
Q.1.	Answer ***ALL*** questions		
a.	Explain about Outage management system.	CO1	K1
b.	Write the importance of PMU.	CO2	K1
c.	What are the benefits of periodic power quality audits for businesses and utilities?	CO3	K1
d.	Explain the basic operating principle of a micro-turbine for power generation.	CO4	K2
e.	Write the role GIS in smart grid.	CO1	K2

PART – B **(15 x 4 = 60 Marks)**

		Marks	CO #	Blooms Level
	Answer ***All*** the questions			
2. a.	Write short notes on the following: i) Home & building automation ii) Geographic Information system	8	CO1	K1
b.	Explain the architecture of smart grid with neat diagram.	7	CO1	K2
	(OR)			
c.	Write short notes on the following: i) Real time pricing ii) Automatic meter reading	8	CO1	K2
d.	Distinguish between conventional grid and smart grid.	7	CO1	K1
3.a.	Explain the operation of WAMS with its benefits.	8	CO2	K1
b.	Explore the technical challenges associated with interconnecting micro-grids with the main power grid, focusing on synchronization, protection, and voltage regulation	7	CO2	K2
	(OR)			
c.	Describe the core components and functionalities of protection and control systems in micro-grids, highlighting their role in fault detection, isolation, and system restoration	8	CO2	K1
d.	Discuss the various control modes that a micro-grid can operate in, including grid-connected, islanded, and transitional modes. What are the key considerations for switching between these modes?	7	CO2	K2
4.a.	Explore the benefits of remote monitoring and data accessibility in web-based power quality systems, particularly for utilities, businesses, and consumers. How can this information be leveraged to improve power quality?	8	CO3	K2
b.	Discuss the various dimensions of power quality, including voltage stability, frequency regulation, and harmonic distortion, in the context of a smart grid. How do these aspects affect both utility operations and end-users?	7	CO3	K2
	(OR)			

c.	Describe the role of energy storage systems in mitigating power quality issues associated with variable renewable energy generation. How do these systems contribute to grid stability and reliability?	8	CO3	K2
d.	Outline the step-by-step process of conducting a comprehensive power quality audit, from initial data collection to the generation of actionable recommendations.	7	CO3	K2
5.a.	Describe the fundamental principles and operation of energy storage systems, including batteries, superconducting magnetic energy storage (SMES), pumped hydro storage, and compressed air energy storage.	8	CO4	K2
b.	Provide a detailed explanation of the electrochemical processes that occur within a fuel cell, highlighting the conversion of fuel into electricity and the associated efficiencies.	7	CO4	K2
	(OR)			
c.	Write short notes on Pumped Hydro and Compressed Air Energy Storage.	8	CO4	K2
d.	Explain the operational principles of variable speed wind generators, including the role of power electronics and variable rotor speeds. How do these features enhance energy capture and efficiency?	7	CO4	K2

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