

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM**  
**IV B. Tech I Semester Advanced Supplementary Examinations - March 2025**  
**CONCEPTS OF SMART GRID TECHNOLOGIES**

(Open Elective)

Time: 3 hours

Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**

All Questions Carry Equal Marks

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**UNIT-I**

1. a) Discuss the key functions of a Smart Grid and its advantages over a conventional grid. [7M]  
b) Explain how Smart Grids contribute to energy efficiency and sustainability. [7M]  
(OR)
2. a) Discuss on the major technical and economic challenges in implementing Smart Grid technologies [7M]  
b) Explain the role of government policies and international initiatives in the development of Smart Grids. [7M]

**UNIT-II**

3. a) Explain the role of Smart Meters and Automatic Meter Reading (AMR) in Smart Grids. [7M]  
b) Describe the importance of Plug-in Hybrid Electric Vehicles (PHEV) and Vehicle-to-Grid technology. [7M]  
(OR)
4. a) Explain briefly about the outage management system (OMS) [7M]  
b) Describe the significance of Net Metering and its benefits for consumers [7M]

**UNIT-III**

5. a) Discuss the applications of Geographic Information Systems (GIS) in power distribution. [7M]  
b) Explain the role of Intelligent Electronic Devices (IEDs) in monitoring and protection. [7M]  
(OR)
6. a) Illustrate the benefits and potential risks of using Superconducting Magnetic Energy Storage Systems (SMES). [7M]  
b) Compare different smart storage technologies such as BESS, SMES, Pumped Hydro, and CAES. [7M]

**UNIT-IV**

7. a) Discuss its importance of Microgrid in modern power systems from its fundamental definition. [7M]  
b) Explain the issues related to the interconnection, protection, and control of Microgrids. [7M]  
(OR)
8. a) Analyze the impact of Demand Response on power grid stability and efficiency. [7M]  
b) List the major technical challenges in controlling and protecting Microgrids, Explain. [7M]

**UNIT-V**

9. a) Discuss the role of Advanced Metering Infrastructure (AMI) in Smart Grids. [7M]  
b) Explain how ICT-based solutions improve real-time monitoring and decision-making in power grids. [7M]
- (OR)
10. a) Discuss the significance of Neighbourhood Area Networks (NAN) in Smart Grid communication infrastructure. [7M]  
b) Explain the concept of Wide Area Network (WAN) and its significance in Smart Grids. [7M]

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