SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
Siddharth Nagar, Narayanavanam Road – 517583
QUESTION BANK (DESCRIPTIVE)

Subject with Code : SMART GRID TECHNOLOGIES (25EE2108) **Course & Branch**: PE

Year & Sem: I-M.Tech & I-Sem **Regulation:** R25

UNIT – I

SMART GRIDS

1	Define Smart Grid and explain its need in modern power systems.	**[L2][CO1]**	**[10M]**
2	Discuss the challenges of ageing assets and lack of circuit capacity in power networks.	**[L2][CO1]**	**[10M]**
3	Explain the operational and thermal constraints that affect grid performance.	**[L2][CO1]**	**[10M]**
4	Illustrate the concept of Active Distribution Network with suitable example.	**[L3][CO1]**	**[10M]**
5	Explain the concept and benefits of a Virtual Power Plant.	**[L2][CO1]**	**[10M]**
6	Analyze early Smart Grid initiatives and their contribution to grid modernization.	**[L4][CO1]**	**[10M]**
7	Compare various national Smart Grid initiatives and their objectives.	**[L4][CO1]**	**[10M]**
8	Discuss security of supply and its importance in Smart Grid operation.	**[L2][CO1]**	**[10M]**
9	Describe various technologies required for Smart Grid implementation.	**[L2][CO1]**	**[10M]**
10	Analyze the role of Smart Grid in anyone application	**[L4][CO1]**	**[10M]**

UNIT – II

TRANSMISSION AND DISTRIBUTION MANAGEMENT

1	Explain the architecture and components of Energy Management Systems.	**[L2][CO2]**	**[10M]**
2	Describe the working of SCADA in transmission and distribution management.	**[L2][CO2]**	**[10M]**
3	Illustrate the steps involved in distribution system modeling and topology analysis.	**[L3][CO2]**	**[10M]**
4	Explain the significance of load forecasting in grid operation.	**[L2][CO2]**	**[10M]**
5	Demonstrate power flow and fault analysis in a sample distribution system.	**[L3][CO2]**	**[10M]**
6	Analyze the importance of state estimation for grid monitoring and control.	**[L4][CO2]**	**[10M]**
7	Explain the working and advantages of an Outage Management System.	**[L2][CO2]**	**[10M]**
8	Describe the visualization techniques used in wide-area monitoring systems.	**[L2][CO2]**	**[10M]**
9	Analyze the role of data sources and external systems in T&D management.	**[L4][CO2]**	**[10M]**
10	Explain different energy storage technologies used in Smart Grids.	**[L2][CO2]**	**[10M]**

UNIT – III

SMART METERING AND DEMAND SIDE INTEGRATION

1	Explain the evolution and key features of Smart Meters.	**[L2][CO3]**	**[10M]**
2	Describe the functional blocks of a Smart Metering system.	**[L2][CO3]**	**[10M]**
3	Illustrate the signal acquisition and conditioning process in smart meters.	**[L2][CO3]**	**[10M]**
4	Explain various communication infrastructures used in Smart Metering.	**[L2][CO3]**	**[10M]**
5	Analyze different communication protocols used in Smart Metering.	**[L4][CO3]**	**[10M]**
6	Explain the concept and services of Demand Side Integration (DSI).	**[L2][CO3]**	**[10M]**
7	Analyze the role of DSI in improving energy efficiency and grid reliability.	**[L4][CO3]**	**[10M]**
8	Illustrate the hardware support required for implementing DSI.	**[L2][CO3]**	**[10M]**
9	Discuss the flexibility provided by consumers through Demand Side Integration.	**[L2][CO3]**	**[10M]**
10	Analyze the challenges of DSI implementation in developing countries.	**[L4][CO3]**	**[10M]**

UNIT – IV

COMMUNICATION TECHNOLOGIES FOR THE SMART GRID

1	Define and differentiate between dedicated and shared communication channels.	**[L2][CO4]**	**[10M]**
2	Explain various switching techniques used in Smart Grid data communication.	**[L2][CO4]**	**[10M]**
3	Illustrate the use of TCP/IP protocol in Smart Grid applications.	**[L3][CO4]**	**[10M]**
4	Describe the features of IEEE 802 communication standards.	**[L2][CO4]**	**[10M]**
5	Apply the concept of packet switching in Smart Grid communication systems.	**[L3][CO4]**	**[10M]**
6	Analyze the significance of MPLS in Smart Grid data routing.	**[L4][CO4]**	**[10M]**
7	Compare mobile communication and power line communication techniques.	**[L4][CO4]**	**[10M]**
8	Explain various communication channels used in Smart Grids.	**[L2][CO4]**	**[10M]**
9	Illustrate the role of data communication in improving grid reliability.	**[L3][CO4]**	**[10M]**
10	Analyze the performance and limitations of power line communication.	**[L4][CO4]**	**[10M]**

UNIT – V

INFORMATION SECURITY FOR THE SMART GRID

1	Define encryption and decryption and their roles in Smart Grid communication.	**[L2][CO5]**	**[10M]**
2	Explain symmetric key and public key encryption with examples.	**[L2][CO5]**	**[10M]**
3	Describe the concept of authentication and its importance in Smart Grids.	**[L2][CO5]**	**[10M]**
4	Illustrate the process of authentication using a Key Distribution Center (KDC).	**[L2][CO5]**	**[10M]**
5	Analyze vulnerabilities and security threats in Smart Grid communication.	**[L4][CO5]**	**[10M]**
6	Explain the use of digital signatures in ensuring data integrity.	**[L2][CO5]**	**[10M]**
7	Describe the message digest process in information security.	**[L2][CO5]**	**[10M]**
8	Analyze the effectiveness of encryption methods for grid data protection.	**[L4][CO5]**	**[10M]**
9	Discuss authentication based on shared secret keys with suitable examples.	**[L2][CO5]**	**[10M]**
10	Explain the need for information security standards in Smart Grid design.	**[L2][CO6]**	**[10M]**

Prepared by:

Dr R Lakshmi

Associate Professor/EEE