

# 20PE017 - SMART POWER GRIDS

## UNIT-I

**Introduction to Smart Grid:** Evolution of Electric Grid, Concept of Smart Grid, Definitions, Need of Smart Grid, Functions of Smart Grid, Opportunities & Barriers of Smart Grid, Difference between conventional & smart grid, Concept of Resilient & Self-Healing Grid, Present development & International policies in Smart Grid. Case study of Smart Grid . CDM opportunities in Smart Grid.

## UNIT-II

**Smart Grid Technologies:** Introduction to Smart Meters, Real Time Pricing, Smart Appliances, Automatic Meter Reading(AMR), Outage Management System(OMS), Plug in Hybrid Electric Vehicles(PHEV), Vehicle to Grid, Smart Sensors, Home & Building Automation, Phase Shifting Transformers. Smart Substations, Substation Automation, Feeder Automation, Wide Area Measurement System (WAMS), Phase Measurement Unit (PMU).

## UNIT-III

**Micro grids and Distributed Energy Resources:** Concept of micro grid, need & applications of micro grid, formation of micro grid, Issues of interconnection, protection & control of micro grid. Plastic & Organic solar cells, Thin film solar cells, Variable speed wind generators, fuel cells, micro turbines, Captive power plants, Integration of renewable energy sources.

## UNIT-IV

**Power Quality Management in Smart Grid:** Power Quality & EMC in Smart Grid, Power Quality issues of Grid connected Renewable Energy Sources, Power Quality Conditioners for Smart Grid, Web based Power Quality monitoring, Power Quality Audit.

## UNIT-V

Information and Communication Technology for Smart Grid: Advanced Metering Infrastructure (AMI), Home Area Network (HAN), Neighbourhood Area Network (NAN), Wide Area Network (WAN). Cyber Security for Smart Grid.

## References:

1. Smart Grid: Fundamentals of design and analysis, James Momoh John Wiley & sons Inc,IEEE press 2012.
2. Clark W. Gellings, "The Smart Grid: Enabling Energy Efficiency and Demand Response", CRC Press
3. Smart Grid: Technology and Applications,Janaka Ekanayake, Nick Jenkins, Kithsiri Liyanage, Jianzhong Wu, Akihiko Yokoyama, John Wiley & sons inc, 2012.
4. Smart Grid: Integrating Renewable, Distributed & Efficient Energy,Fereidoon P. Sioshansi, Academic Press, 2012.
5. The smart grid: Enabling energy efficiency and demand response,Clark W.Gellings, Fairmont Press Inc, 2009.