

EES-810: SCADA & Smart Grid

Credit	L	T	P
4	3	1	-

UNIT-I

Evolution of Smart Grid, Components of Smart Grid, Distributed Energy Resources- Challenges & Opportunity, Smart Grid benefits, Status of Indian Electricity Systems Markets and Regulations, Grid Modernization Initiatives-Case Studies.

UNIT-II

Smart meters, Smart Appliances, Multiagent System Technology; multiagentspecifications- Control agent, DER agent, User agent, Database agent. Challenges to load flow in Smart grid and weaknesses of the present Load Flow Methods, Load flow for smart grid design, Dynamic Stochastic Optimal Power Flow (DSOPF) application to the Smart Grid.

UNIT-III

Distribution System Automation Requirement of the Power Grid-Voltage/VAr Control, Power Quality, Network Reconfiguration, Demand side management, Distribution Generation Control. Interoperability, Benefits and Challenges of Interoperability, Smart Grid Network Interoperability, Review of standards for Smart Grid.

UNIT-IV

ISO's OSI 7 layers Reference Model, TCP/IP Model, SCADA communication requirements, SCADA communication systems topologies, data communication techniques-Master-Slave, peer-to-peer, broadcast and multicast, Introduction to SCADA and Smart Grid communication protocols- Modbus, IEC61850-5-101/103/194, DNP.

UNIT-V

Intelligent Electronic Devices (IEDs), Substation Automation, Deregulation of Power Systems and Substation Automation, Substation LAN, Substation Communication Architecture, Ethernet in Substation, Wide area monitoring systems (WAMS), Phasor Measurement Unit (PMU),

TEXT/REFERENCE BOOKS

1. Mini S. Thomas and John Douglas McDonald, "Power System SCADA and Smart Grids" CRC Press-2015.
2. James Momoh, "SMART GRID Fundamentals of Design and Analysis", IEEE Press, John Wiley & Sons, 2012.
3. JanakaEkanayake, Nick Jenkins, KithsiriLiyanage, Jianzhong Wu, Akihiko Yokoyama, "Smart Grid: Technology and Applications", John Wiley & Sons, 2012.
4. Clark W. Gellings, "The Smart Grid: Enabling Energy Efficiency and Demand Response", CRC Press-2009.