

**M.TECH SECOND SEMESTER  
SMART GRID TECHNOLOGIES AND APPLICATIONS**

**17EEPC2T6A**

**Lecture: 4 periods/week**

**Credits: 4**

**Internal Assessment: 40 marks**

**End Semester Assessment: 60 marks**

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**Course Objective:**

Students in this course will learn the fundamentals of the smart grid: its purpose and objectives, its technologies, its architectures, and its management.

**Course Learning Outcomes:** At the end of the course the student will be able to

1. Demonstrate qualitative and quantitative understanding of how modern power systems operate from a physical and economic perspective.
2. Understand how a smart grid can be designed to meet the needs of an utility.
3. Analyze various aspects of the smart grid in distribution sector.
4. Understand operational aspects of transmission network and the issues and challenges that to be solved.

**UNIT – I: SMART GRID & POWER SUPPLY**

Basics of AC power- The beauty and simplicity of the Electro-mechanical grid- Market and policy changes- Power System economics- Renewable, intermittent power sources- Storage- The need for demand response—the emissions and economics costs of peak power- Microgrids (part 1)

**UNIT – II: SMART GRID & THE RETAIL CUSTOMER**

Advanced Metering Infrastructure & the smart meter- Home area networks- Business cases for AMI-Commercial & Industrial energy management- Distributed renewables- Demand response programs & technology- Energy Efficiency programs & technology

**UNIT – III : SMART GRID & DISTRIBUTION**

Advances in storm response-Distributed renewables & storage- Microgrids (part 2) Distribution network reconfiguration and other intelligent distribution control methods- Plug-in electric vehicles and the distribution system

**UNIT – IV: SMART GRID & TRANSMISSION**

Synchronized Phasor Measurement Units- Flexible AC Transmission Systems- High Voltage DC- VAR control; Synchronized Condensers - Estimating and mitigating blackout, particularly cascading failure blackout, risk management

**TEXT BOOKS:**

1. James Mamoh, “Smart Grid: Fundamentals of Design and Analysis” John Wiley & sons Inc -IEEE Press, 2012.
2. Janaka Ekanakye, Kithsiri Liyanage, Jianzhang Wu, Akiihiko Yokoyama and Nick Jeenkins, “Smart Grid Technology and Application”, John Wiley & sons inc, 2012.

**REFERENCE BOOKS:**

1. Fereidoon P. Sioshansi, “Smart Grid: Integrating Renewable, Distributed & Efficient Energy”, Academic Press, 2011.
2. Clark W.Gellings, “The smart grid: Enabling energy efficiency and demand response”, CRC Press, 2009.