

Annexure - I

SMART GRID TECHNOLOGIES

Unit-1: Introduction

Smart grids-Traditional power grids-Regulated and deregulated power system - Challenges of the future- Electric Energy Efficiency in Power Generation & Delivery-Electric End-use Energy Efficiency

Unit-2: Smart Grid Technologies

Core Smart Grid Technologies: Active Network Management (ANM) - Automatic Voltage Control-Dynamic Voltage Restorer (DVR)-Intelligent Electronic Device (IED) - Phasor Measurement Unit (PMU) -Reactive Power Compensation; Peripheral Smart Grid Technologies; Distributed Generation (DG): Dynamic Demand (DD) - energy storage - Micro generation-Smart appliances -Smart homes-Smart meters -Virtual power plants (VPPs).

Unit-3: Smart Measurements

Phasor Measurement Units: Introduction- Phasor Representation- Phasor Estimation of Nominal Frequency and Frequency Estimation- PMUs Applications to Smart Grid- State Estimation- Protection System with Phasor Measurement Units- Optimal Location of PMUs for observability and controllability.

Unit-4: Smart Power Generation

Renewable power generation: Wind/Solar/Hydro- Hybrid power system; Key performance indicators of power plants- Statistical approach for obtaining a reliable power plant- Balancing unpredictable variations in renewable electricity production and demand- Reliability and availability- Benefits of cogeneration.

Unit-5: Micro Grids

Introduction- System Configuration-Connecting Renewable Power Generators to Main Grid- Control Design- Connected and Islanding Modes- Case Studies.

References

1. Clark W. Gellings, "The Smart Grid: Enabling Energy Efficiency and Demand Response", CRC Press, Taylor & Francis group, 2009.
2. Jacob Klimstra, Markus Hotakainen, "Smart Power Generation", Avain Publishers, Helsinki, 2011.
3. Peter Fox-Penner, "Smart power", Oisland Press, Washington, 2011.
4. A.G. Phadke, J.S. Thorp, "Synchronized Phasor Measurements and Their Applications", Springer, 2008.
5. IEEE Transactions on Smart Grids, Power Delivery and Power Systems.

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