

**ELECTIVE COURSE 7**

Course Code	Course Name	L-T-P	Credits
CKV735	Integrated energy system	2-2-0	4

**Module 1:**

Distributed Generation Systems: Decentralized versus central station generation, Traditional power systems, Load curves and load curve analysis. Coincidence behavior and load curves, measuring load curve data accurately.

Planning and Planning Process: Planning finding the best alternative, short- and long-range planning, different decision-making philosophies.

**Module 2:**

Basic gas turbine generator concepts; Utility system turbine generators; Mini and micro gas turbine generators.

Solar thermal power generations, Utility Scale Photovoltaic (USPV) generation; Wind-powered generation; Biomass based generation.

DG Evaluation: Cost from past, present, and future, basic DG cost analysis, cost evaluation and schedule of demand.

**Module 3:**

Grid Interconnection Issues and Need for Integration of Renewable Energy: The power grid, pro & cons of DG-interconnection, type of DG grid interconnection, DG-Grid interconnection issues.

Case Study; Planning, constraints and economics. Standard engineering economics evaluation, business and financial factors, recommendation for effective DG evaluation.

Effects on the grid by RE systems integration; Interfacing techniques; Innovations required in technology and policy.

**Module 4:**

Economics: Grid-connected energy storage schemes: response requirement, capacity assessment, cost considerations.

Hybrid Energy Systems: Principles and applications; Comparison of schemes; System design concepts; Techno-economic performance; Energy storage schemes and estimation.

**References**

1. Willis H Lee, Distributed power generation: planning and evaluation, Marcel Dekker, Inc.
2. Willis H. Lee, Power Distribution planning reference book, Marcel Dekker, Inc.
3. Johansson Thomas BEd, Renewable energy: sources for fuels and electricity, Earthscan.
4. Johnson G L, Wind Energy Systems, Prentice Hall Inc, New Jersey, USA.
5. Kandpal T C, Garg H P, Financial Evaluation of Renewable Energy Technology, Macmillan India Ltd. New Delhi.
6. Kaushika N D, Kaushik Kshitij, Energy Ecology and Environment: A Technological Approach. New Delhi, Capital Publishing Company.
7. Ali Keyhani, Mohammad N Marwali, Min Dai, Integration of Green and Renewable Energy in Electric Power Systems, Wiley.