UCH715 ALTERNATE ENERGY SOURCES

L	T	P	Cr
3	1	0	3.5

Course Objectives: To learn and appreciate the various alternate energy sources.

Introduction: Energy, Present and future trends of energy consumption, Resources in India and worldwide, Introduction to different non conventional energy sources, Detailed study of following sources with particular reference to India.

Solar energy: Solar radiation and its measurement, Limitation in application of solar energy, Solar collectors- types and constructional details, Solar water heating, Application of solar energy for residential and industrial heating, Drying, Space cooling, Water desalination, Photovoltaic power generation using silicon cells.

Bio-Fuels: Importance, Combustion, Pyrolysis and other thermo chemical processes for biomass utilization- performance analysis, Alcoholic fermentation, Anaerobic digestion for biogas production

Wind Power: Principle of energy from wind, Windmill construction, Operational details, Electricity generation, Mechanical power production.

Tidal Power: Introduction, Causes of tides and their energy potential, Enhancement of tides, Power generation from tides and problems, Principles of ocean thermal energy conversion (OTEC) analysis.

Geothermal Energy: Geo thermal wells and other resources dry rock and hot aquifer analysis, Harnessing geothermal energy resources.

Energy Storage and Distribution: Importance, Biochemical, Chemical, Thermal, Electrical storage, Fuel cells, distribution of energy.

Scope and Economics: Calculation of energy cost from renewable, Comparison with conventional fuel driven systems, Calculation of CO reduction, Incremental costs for renewable options.

Course Learning Outcomes (CLO):

The students will be able to:

1. Calculate energy demand and availability from various resources
2. Calculate the parameters associated with the use of solar energy and its harnessing
3. Identify effective utilization of bio-fuels and geothermal energy resources
4. Identify and analyze the ways of harnessing wind and tidal power
5. Identify energy storage and distribution methods
6. Analyze the economic and environmental aspects of conventional and renewable energy resources.

Text Books:

1. *Rai, G.D., Non-Conventional Energy Sources, Khanna Publishers (2001).*
2. *Twiddle, J. Weir, T., Renewable Energy Resources, Cambridge University Press (1986).*
3. *Duffie, J. A., Beckman, W. A., Solar Engineering of Thermal Processes, John Wiley (1980).*

Reference Books:

1. *Sukhatme, S. P., Solar Energy: Principles of Thermal Collection and Storage, Tata McGraw-Hill, (2001).*
2. *Garg, H.P. and Prakash, J., Solar Energy: Fundamentals and Applications, Tata McGraw-Hill (2001).*

Evaluation Scheme:

S. No.	Evaluation Elements	Weightage (%)
1	MST	30
2	EST	45
3	Sessional (may includes tutorials/ assignments/ quiz's etc)	25