

Course Syllabi: UEE711 Alternate Sources of Energy (L : T : P :: 3 : 0 : 0)

1. **Course number and name:** UEE711; Alternate Sources of Energy

2. **Credits and contact hours:** Credits: 3.0; Hours: 3

3. **Text book, title, author, and year**

- *Rai, G.D., Non Conventional Energy Sources, Khanna Publishers (2005).*
- *Rao, S. and Parulekar, B.B., Energy Technology: Non Conventional, Renewable and Conventional, Khanna Publishers (2005).*
- *Wadhwa, C.L., Generation, Distribution and Utilization of Electric Energy, New Age International (P) Limited, Publishers (2007).*
- *Simon, Christopher A., Alternate Source of Energy, Rowman and LittleField Publishers Inc. (2007).*
- *Venikov, V.A. and Putyain, E.V., Introduction to Energy Technology, Mir Publishers (1990).*

a. Other supplemental materials

- Nil

4. **Specific course information**

a. Brief description of the content of the course (catalog description)

Introduction: Global and national energy scenarios, Concept of energy services, Patterns of energy supply, Energy resource availability, Cultural, Economic and national security aspects of energy consumption. Forms and characteristics of renewable energy sources. Energy classification, Source and utilization, Thermodynamic power cycles and binary cycles.

Solar Energy: Solar radiation, Flat plate collectors, solar concentration, Thermal applications of solar energy, Photovoltaic technology and applications, Energy storage.

Biomass Energy: Energy from Biomass, Thermo chemical, biochemical conversion to fuels. Biogas and its applications.

Wind Energy: Wind characteristics, Resource assessment, Horizontal and vertical axis wind turbines, Electricity generation and water pumping, Micro/Mini hydro power system, Water pumping and conversion to electricity, Hydraulic ram pump.

Other Alternate Sources: Ocean thermal energy conversion, Geothermal, Tidal, Wave energy, MHD, Fuel cells. Environmental Issues of energy services.

Stand alone generating units: Synchronous generator and induction generator, Operation and characteristics, Voltage regulation. Lateral aspects of Renewable Energy technologies and systems.

5. **Specific goals for the course**

After the completion of the course, the students will be able to:

- Realise the national energy scenario and work for managing the different alternating available energy resources.
- Design solar energy based system for various applications.
- Synthesize biomass energy and utilize it in house hold applications.
- Design wind energy based electric power generating system.
- Explore the application areas of Geothermal, Fuel cell, MHD and Ocean energy.

- Analyse the operational characteristics of stand-alone generating unit for renewable energy applications.

6. Brief list of topics to be covered

- Solar Energy
- Biomass Energy
- Wind Energy
- Stand alone generating units