

### EEE-421 Renewable Energy Sources

Category: OE

Credits: 4

LTP: 3 1 0

(Not for EED students)

**Unit I Energy Science and Technology:** Classification of energy sources and reserves, energy growth and its planning, environmental aspects of energy, green house effect and global warming, energy conservation and energy audit, cogeneration and energy storage.

**Unit II Solar Energy Conversion:** Historical background of solar energy, solar energy radiations and its propagation through atmosphere, beam diffuse and global radiation, definitions and calculations, solar thermal energy conversion and solar collectors, thermal energy applications, solar photovoltaic energy conversion and solar cells, solar PV applications.

**Unit III Fuel Cells and Biomass Energy conversion:** Fuel Cell operation and classifications, fuel cell power packs and power plants, space and other applications, Biomass energy processes, applications, biogas plants

**Unit IV MHD and energy:** MHD conversion principles, classifications, environmental aspects and pollution control, coal saving and efficiency enhancement, Power in the wind and wind power generation, wind energy system integration, wind turbines and control systems, wind energy programmers in India.

**Unit V New and Alternate Energy Sources/Technologies:** Hydrogen energy conversion, Ocean wave, ocean thermal and tidal Energy conversion, Piezoelectric conversion, Geothermal, small hydro resources

**Books:**

1. \*B. H. Khan,
2. G.D. Rai
3. Godfrey Boyle

Non Conventional Energy Resources, TMH, 2009 edition.  
 Non Conventional Energy Sources, Khanna Publishers, New Delhi,  
 Renewable Energy, Oxford, 2<sup>nd</sup> edition 2010.