

10 ME 42B NON-CONVENTIONAL ENERGY SOURCES

IV B.Tech II Semester

(with effect from the academic year 2013-2014)

Lectures/week: 4 Hrs.
University Exam: 3 Hrs

Credits: 4
Sessional Marks: 40
End Examination Marks: 60

UNIT – I

Introduction: Role and potential of new and renewable sources – The solar energy option – Environmental impact of solar power

Principles of Solar Radiation: Physics of the sun – The solar constant – Extraterrestrial and Terrestrial solar radiation – Solar radiation on tilted surface – Instruments for measuring solar radiation and sun shine – Solar radiation data.

UNIT – II

Solar Energy Collection: Flat plate and concentrating collectors – Classification of concentrating collectors – Orientation and Thermal analysis – Advanced collectors.

Solar Energy Storage: Different methods – Sensible, Latent heat and Stratified storage – Solar Ponds

Solar Applications: Solar heating/cooling techniques – Solar distillation and drying - Photovoltaic energy conversion.

UNIT – III

Wind Energy: Sources and potentials – Horizontal and Vertical axis windmills – Performance characteristics.

Geothermal Energy: Resources – Types of wells – Methods of harnessing the energy – Potential in India.

UNIT – IV

Bio-Mass: Principles of Bio-conversion – Anaerobic/Aerobic digestion – Types of Bio-gas digesters – Gas yield – Combustion characteristics of bio-gas – Utilization for cooking, I.C. engine operation – Economic aspects.

OTEC: Principles – Utilization – Setting of OTEC plants - Thermodynamic cycles.

Tidal and Wave Energy: Potential and Conversion techniques – Mini-hydel power plants – Their economics.

UNIT – V

Direct Energy Conversion:

Need for DEC – Carnot cycle – Limitations – Principles of DEC – Thermo-electric generators – Seebeck, Peltier and Joule Thompson effects – Figure of merit – Materials – Applications – MHD generators – Principles – Dissociation and Ionization – Hall effect – Magnetic flux – MHD accelerator – MHD engine – Power generation systems – Electron gas dynamic conversion – Economic aspects

Fuel Cells:

Principle – Faraday's laws – Thermodynamic aspects – Selection of fuels and Operating conditions.

TEXT BOOKS:

1. Non-conventional Energy Sources : Rai G.D.
2. Non-conventional Energy : Ashok V Desai

REFERENCES:

1. Renewable Energy Sources : Twidell and Weir
2. Solar Energy : Sukhame
3. Solar Power Engineering : Magal Frank Kreith B.S. & Kreith J.F.