

# Renewable Energy Systems

## Module I

Energy scenario and renewable energy sources: global and Indian situation. Potential of non-conventional energy sources, economics. Solar Radiation: Solar thermal process, heat transfer devices, solar radiation measurement, estimation of average solar radiation. Solar energy storage: stratified storage, well mixed storage, comparison.

## Module II

Hot water system, practical consideration, solar ponds, Non-convective solar pond, extraction of thermal energy and application of solar ponds. Wind energy: The nature of wind. Wind energy resources and modeling. Geothermal energy: Origin and types of geothermal energy and utilization.

## Module III

OTEC: Ocean temperature differences. OTEC systems. Recent OTEC developments. Wave energy: Fundamentals. Availability Wave-energy conversion systems. Tidal energy: Fundamentals. Availability Tidal-energy conversion systems; Energy from biomass: Photosynthesis; Biomass resource; Utilization of biomass.

## Books

S.P.Sukhatme, Solar Energy Principle of Thermal Collection and Storage', Tata McGraw Hill, 1990.

G.L. Johnson, Wind energy systems, Prentice Hall Inc. New Jersey.

J.M.Kriender, Principles of Solar Engineering', McGraw Hill, 1987.

## Reference

V.S. Mangal, Solar Engineering', Tata McGraw Hill, 1992.

N.K.Bansal, Renewable Energy Source and Conversion Technology', Tata McGraw Hill, 1989.

P.J. Lunde, Solar Thermal Engineering', John Willey & Sons, New York, 1988.

J. A. Duffie and W.A. Beckman, Solar Engineering of Thermal Processes', Wiley & Sons, 1990.