



MANGALORE UNIVERSITY

Department of Physics

MSc Physics

PHE 455: **ENERGY STUDIES** (Open elective)

(39 Hrs.)

Course outcome

CO1 The student will know to determine: Half-life of material like K-40, Thermoelectric constant of materials. Gamma ray Spectrum of Cs-137.

CO2 Will able to determine Ferroelectric Curie temperature, study the effect of white light (sun tracking) on energy generation by solar PV module and I-V characteristic of solar cell, measure the variation of dielectric constant with temperature.

CO3 Will able to study the: transition temperature of ferrites, Hall effect and temperature dependence of Hall coefficient.

Unit I

Renewable energy resources: Energy and Thermodynamics, Forms of Energy, Conservation of Energy, Entropy, Heat capacity, Thermodynamic cycles: Brayton, Carnot Diesel, Otto and Rankin cycle; Fossil fuels, time scale of fossil fuels and solar energy as an option. Solar Energy for Clean Environment Sun as the source of energy and its energy transport to the earth, Extraterrestrial and terrestrial solar radiations, solar spectral irradiance, Measurement techniques of solar radiations, Estimation of average solar radiation [13 hrs]

Unit II

Basics of the Wind energy: Wind Energy Origin and classification of winds, Aerodynamics of windmill: Maximum power, and Forces on the Blades and thrust on turbines; Wind data collection and field estimation of wind energy, Site selection, Basic components of wind mill, Types of wind mill, Wind energy farm, Hybrid wind energy systems: The present Indian Scenario. [13 hrs]

Unit III

Biomass energy and biogas technology: Nature of Biomass as a fuel, Biomass energy conversion processes, Direct combustion: heat of combustion, combustion with improved Chulha and cyclone furnace; Dry chemical conversion processes: pyrolysis, gasification, types of gasification Importance of biogas technology, anaerobic decomposition of biodegradable materials, Factors affecting Bio-digestion, Types of biogas plants, Applications of biogas. [13 hrs]

References

1. Peter A., 'Advances in energy systems and technology', (Academic Press, USA, 1986).
2. Neville C.R., 'Solar energy conversion: The solar cell', (Elsevier North-Holland, 1978).
3. Dixon A.E. and Leslie J.D., 'Solar energy conversion', (Pergamon Press, New York, 1979) .
4. Ravindranath N.H., 'Biomass, energy and environment', (Oxford University Press, 1995).
5. Cushion E., Whiteman A. and Dieterle G., (World Bank Report, 2009).

