

NON-CONVENTIONAL SOURCES OF ENERGY (ELECTIVE-III)

Objective:

It introduces solar energy its radiation, collection, storage and application. It also introduces the Wind energy, Biomass energy, Geothermal energy and ocean energy as alternative energy sources.

UNIT – I:

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 Utilization.

Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors, solar applications- solar heating/cooling technique, photovoltaic energy conversion.

UNIT-III:

Wind Energy:

Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

UNIT-IV:

Maximum Power Extraction.

Maximum power point tracking for wind and photovoltaic power systems, battery energy storage system.

UNIT-V:

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 and economic aspects.

UNIT-VI:

Geothermal Energy:

Resources, types of wells, methods of harnessing the energy, potential in India.

UNIT-VII:

Ocean Energy:

Ocean thermal energy conversion, Principles utilization, setting of Ocean thermal energy conversion plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT-VIII:

Direct Energy Conversion:

Need for Direct energy conversion, Carnot cycle, limitations, principles of Direct energy conversion. Fuel cells, principles, faraday's law's, thermodynamic aspects, selection of fuels and operating conditions.