Govt. City College (Autonomous), Hyderabad.
B.Sc. (Physics) – III Year
Semester - V
GE - I
RENEWABLE ENERGY & ENERGY HARVESTING

(W.E.F the academic year 2021 - 2022)

Credits : 4 **Number of hours: 48**

Course Objectives:

COB 1 :To Introduce the solar energy as non conventional energy source and principles of power generation.
COB 2 :To introduce the solar energy storage and applications
COB 3 :To introduce wind and Bio- mass energy
COB 4 : To introduce Geothermal and Ocean energy generation

Unit I: Principles of Solar Radiation and Collection (Qualitative Only): (12 hrs.)
Non -renewable energy resources - Principles of power generation and transmission. A model of Conventional thermal power plant. Advantages and disadvantages of conventional power plants. Role and potential of new and renewable sources, the solar energy option, environmental impact of solar power, physics of the sun, the solar constant, solar radiation on tilted surface, instruments for measuring solar radiation and shine, solar radiation data.

Unit II: Solar Energy Storage and Applications: (12 hrs.)
Solar energy collectors - Flat plate and concentration collectors, classification of concentration collectors and orientation, advanced collectors. Different sensible, latent heat and stratified storage, solar ponds. Solar Applications - solar heating/ cooling technique, solar distillation and drying, photovoltaic energy conversion.

Unit III: Wind and Bio-Mass Energy: (12 hrs.)
Resources and potentials, horizontal and vertical axis windmills, performance characteristics. Principles of Bio-Conversion, Energy from waste, types of bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, LPG and CNG.

Unit IV: Geothermal anal Ocean Energy: (12 hrs.)
Resources, types of wells, methods of harnessing the energy, potential in India. OTEC, principles of utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy, Potential and conversion techniques, mini-hydel power plants, land and their economics.

Course Outcomes:
After completing the course the student gains knowledge in

CO1: Exploring the non conventional energy sources
CO2 :Application of Non conventional energy to reduce the use of fossil energy.

TEXT BOOKS:

1. Non-Conventional Energy Sources - G.D Rai, Khanna Publishers
2. Renewable Energy Resources- Twidell&Wier, CRC Press (Taylor & Francis)

REFERENCE BOOKS:

1. Renewable energy resources - Tiwari and Ghosal, Narosa.
2. Renewable Energy Technologies - Ramesh & Kumar, Narosa
3. Non-Conventional Energy Systems - K Mittal, Wheeler
4. Renewable energy sources and emerging technologies by D.P. Kothari, K.C. Singhal.

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