Semester 1st Multidisciplinary

Subject: Physics

Course title: Energy Sources Course Code: **PHY022I**
Credits: 2+1

Unit I

Physics as a fundamental science, physics and society, relation of physics with other sciences, Energy crisis as a major challenge of the century; Energy concept and sources in general, its significance & necessity, Classification of energy sources: Primary and Secondary energy sources. Commercial and Non-commercial energy sources, Renewable and Non-renewable energy, Conventional and Non-conventional energy. Importance of Non-commercial energy resources Conventional energy sources: Fossil fuels & Nuclear energy- production & extraction, usage rate and limitations, Impact on environment and their issues & challenges. Overview of Indian & world energy scenario with latest statistics–consumption & necessity. Need of eco-friendly & green energy & their related technology, Environmental issues and Renewable sources of energy, Sustainability.

Unit II

Solar energy: Solar Energy-Key features, its importance, Merits & demerits of solar energy, Applications of solar energy. Solar water heater, flat plate collector, solar cooker, solar green houses, solar cell. Need and characteristics of photovoltaic (PV) systems, PV modules, and sun tracking systems.

Wind and Tidal Energy harvesting: Fundamentals of Wind energy, Wind Turbines and different types of wind turbines, An overview of developments in Offshore Wind Energy,
Tidal Energy, Tide Energy Technologies, Wave energy systems, Ocean Thermal Energy Conversion.
B**iomass**, biochemical conversion, biogas generation, geothermal energy, Small Hydroelectricity.

Practicals:

1. Demonstration of training modules on solar energy, wind energy etc
2. Conversion of thermal energy into voltage using thermoelectric modules
3. VI characteristics of solar cell/modules
4. Field trip to nearby hydroelectric stations/ solar power installation
5. Project report on solar, hydro energy scenario in India.
6. Visit to site of Geothermal energy
7. Visit to wind farm
8. Project report on energy crisis in the world
9. Project report on potential of solar energy in the world and in India
10. Study of rural electrification plants of Govt. of India.

Reference Books:

1. Non-conventional energy sources – G.D Rai – Khanna Publishers, New Selhi
2. Solar Energy – M.P Agarwal – S.Chand and Co. Ltd.
3. Solar Energy – Suhas P Sukhative Tata McGraw Hill Publishing Compant Ltd.
4. Dr. P Jayakumar, Solar Energy: Resource Assesment Handbook, 2009
5. J.Balfour, M.Shaw and S. Jarosek, Photovoltaics, Lawrence J Goodrich (USA)
6. Solar Energy: Fundamentals, Design, Modelling and Applications by G. N. Tiwari, Narosa Publications
7. Non-Conventional Energy Resources by B H Khan, McGraw Hill
8. Solar Photovoltaic Technology and Systems by C S Solanki, PHI Learning Publications