

5th Semester	RME5D004	Non-Conventional Energy Sources	L-T-P 3-0-0	3 Credits
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MODULE I**(6 CLASSES)**

Energy, Ecology and environment: Introduction, Classification of Energy Resources, Common Forms of Energy, Energy Chain, Advantages and Disadvantages of Conventional Energy Sources, Importance and Salient Features of Non-Conventional Energy Sources, Environmental and ecological Aspects of Energy use, Environment-Economy-Energy and Sustainable Development, World Energy Status, Energy Scenario in India. Energy Conservation and Energy Storage: Salient Features of “Energy Conservation Act,2001”, Various Aspects of Energy Conservation, Principles of Energy Conservation, General Electrical ECO’s (Energy Conservation Opportunities)

MODULE II**(15 CLASSES)**

Solar Energy: Basics, The Sun as a Source of Energy, Sun, Earth Radiation Spectrums, Extraterrestrial and Terrestrial Radiations, Spectral Energy Distribution of Solar Radiation, Depletion of Solar Radiation, Measurements of Solar Radiation, Solar Time (Local Apparent Time), Solar Radiation Geometry, Solar Day Length, Empirical Equations for Estimating Solar Radiation(Hourly Global, Diffuse and Beam Radiations) on Horizontal Surface Under cloudless and Cloudy Skies, Solar Radiation on Inclined Plane Surface only (empirical relations for numerical). Solar Thermal Systems: Solar Collectors: Flat plate and concentric collectors, Solar WaterHeater, Solar Passive Space - Heating and Cooling Systems, Solar Refrigeration and Air-Conditioning Systems, Solar Cookers, Solar Furnaces, Solar Green House, Solar Dryer, Solar Distillation (or Desalination of Water), Solar Photovoltaic Systems: Solar Cell Fundamentals, Solar Cell Characteristics, Solar Cell Classification, Solar Cell, Module, Panel and Array Construction, Solar PV Systems, Solar PV Applications.

MODULE III**(08 CLASSES)**

Wind Energy: Origin of Winds, Nature of Winds, Wind Turbine Siting, Major Applications of Wind Power, Wind Turbine Types and Their Construction, Wind Energy Conversion Systems (WECS), Effects of Wind Speed and Grid Condition (System Integration), Biomass Energy: Photosynthesis Process, Usable Forms of Biomass, their Composition and Fuel Properties, Biomass Resources , Biomass Conversion Technologies, Urban Waste to Energy Conversion, Biomass Gasification ,Biomass Liquefaction, Biomass to Ethanol Production, Biogas Production from Waste Biomass, Energy Farming.

MODULE IV**(08 CLASSES)**

Geothermal Energy: Applications, Origin and Distribution of Geothermal Energy, Types of Geothermal Resource. Ocean Energy: Tidal Energy, Wave Energy, Ocean Thermal Energy Fuel Cell Technology: Types, Principle of operation, Advantages and disadvantages.

Books:

- [1] Solar Energy Technology: Sukhatme and Nayak, TMH
- [2] Renewable Energy Sources and Emerging Technology: D.P.Kothari and etal., PHI
- [3] Renewable Energy Sources & Conversion Technology: N.K.Bansal, Manfred Kleenman&Michael Meliss, TMH Publication.
- [4] Non Conventional Energy Sources: B.M Khan, TMH Publications
- [5] Renewable Energy Sources:Fundamentals & Applications:G.N.Tiwari&M.K.Ghosal, NarosaPub
- [6] Non-Conventional Energy Resources: D.S. Chauhan and S.K.Srivastava, New Age International
- [7] Non-Conventional Energy Sources: H.P.Garg
- [8] Non-Conventional Energy Systems: G.D.Rai, Khanna publications
- [9] Renewable Energy, Godfrey Boyle, Oxford University Press

Digital Learning Resources:

NPTEL MOOCs:

Course Name: Solar Energy Engineering and Technology
Course Link: https://swayam.gov.in/nd1_noc20_ph14/preview
Course Instructor: Prof. P Kalita, IIT, Guwahati.