



## **SEMESTER-III**

### **PHYIDC201T**

## **RENEWABLE ENERGY AND ENERGY HARVESTING**

**Contact Hours: 45**

**Full Marks = 100 [ESE (70) CCA (30)]**

*Course objective: The aim of this course is to impart theoretical knowledge on various energy sources and cause of environmental degradation due to energy production and utilization along with few energy harvesting techniques.*

#### **Unit 1:**

**Energy sources:** Concept of work and energy, definition and units of energy, power, sources of energy in general, its significance & necessity, Classification of energy sources: Primary and Secondary energy, Commercial and Non-commercial energy, Renewable and Non-renewable energy, Importance of renewable energy resources. **(10 Lectures)**

#### **Unit 2:**

**Conventional energy sources:** Energy consumption in various sectors, Fossil fuels (coal, oil, natural gas). 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. **(10 Lectures)**

#### **Unit 3:**

**Renewable energy sources:** Need of renewable energy, non-conventional energy sources. An overview of developments in offshore Wind Energy, Tidal Energy, Wave energy systems, Ocean Thermal Energy Conversion, solar energy, biomass, biochemical conversion, biogas generation, geothermal energy tidal energy, principle of generation of Hydroelectric power. **(9 Lectures)**

#### **Unit 4:**

**Solar energy:** Solar Energy-Key features and its importance, Merits & demerits of solar energy, Applications of solar energy. Solar water heater, solar cooker, solar green houses, solar cell - brief discussion of each. Importance and characteristics of photovoltaic (PV) systems and Suntracking systems. **(9 Lectures)**

#### **Unit 5:**

**Environmental Effects:** Environmental degradation due to energy production and utilization, air and water pollution, depletion of ozone layer, global warming, biological damage due to environmental degradation. Environmental effects of thermal power station, nuclear power generation, hydroelectric power, Geothermal power, Ocean energy harvesting, Wind energy harvesting, Solar energy harvesting. **(7 Lectures)**



*Expected learning outcomes: At the end of this course the students are expected to acquire basic knowledge on various energy sources such as Fossil fuels, Solar energy, Wind energy, Ocean Energy, and cause of environmental degradation due to energy production and utilization along with few energy harvesting techniques.*

**Reference Books:**

- i. Non-conventional energy sources - G.D Rai - Khanna Publishers, New Delhi
- ii. Solar energy - M P Agarwal - S Chand and Co. Ltd.
- iii. Solar energy - Suhas P Sukhative Tata McGraw - Hill Publishing Company Ltd.
- iv. Godfrey Boyle, “Renewable Energy, Power for a sustainable future”, 2004, Oxford University Press, in association with The Open University.
- v. Dr. P Jayakumar, Solar Energy: Resource Assessment Handbook, 2009
- vi. J. Balfour, M.Shaw and S. Jarosek, Photovoltaics, Lawrence J Goodrich (USA).

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