

## **P.G Diploma in Solar Renewable Energy**

PGDRE-102: Basics of Solar Energy

( 52 Hours)

Sub Code: PGDRE-102	No. of Lecture Hours Per week : 04
Total Ccredit:04	Internal Marks : 30 and Exam Marks: 70=100

Objectives of the paper :

- To know basics of Solar radiation
- To understand solar conversion
- To understand the Thermal Energy conversion

### **Module- I**

**10 Hours**

#### **Solar Radiation:**

Solar radiation; introduction, Solar origin, solar system, sun, earth, and earth, sun, angels, absorption, radiation and conversion of thermal energy, the sun as the source of energy, effects of atmosphere on solar radiation, extra-terrestrial and terrestrial, radiation measuring instruments, Radiation measurements and predictions.

### **Module- II**

**10 Hours**

#### **Challenges and solutions:**

Introduction- Role of Government, Industrial and financial institutions; status, problem, solutions. Need for additional infrastructure development in india , National objectives and vision beyond 2002-22; issues and challenges.

### **Module- III**

**10 Hours**

#### **Solar Thermal Systems and Application:**

Advanced collectors; ETC, Solar Pond, Concentrators; optical design of Concentrators, Solar water heaters, Solar dryers, Solar Stills, Economics of Solar thermal conversion systems

**Module- IV****12 Hours****Renewable Energy, Its Sources and future prospects:**

Definition of energy, kinds of energy, deferent sources of energy, their merits and reserves, remunerable energy sources, energy service and efficiency, improvement, energy in sustainable future, indirect and direct solar energy: Indirect sources- wind, water at high places, ocean, biomass, nuclear power, geothermal energy, Direct sources – Heat and light from the sun.

**Module- V****10 Hours****Solar Thermal Energy conversion**

Solar thermal conversion; Flat plate collectors-liquid and air type, Theory of flat plate collectors selective coatings. Solar cooling and refrigeration, Thermal storage, conversion of heat into mechanical energy, Active and passive heating of buildings, solar thermal power generation.

**References.**

- Dr. H. Naganagouda (2014), Solar Power Hand Book, Director, NTC for solar technology , Banagluru.
- Duffie JA, Beekman WA (2006) Solar Engineering of Thermal Processes, John Wiley,
- Goswami DY Kreith F. Kreider JF (1999), Principles of Solar Engineering Taylor & Franis
- Kishore VVN (2009) Renewable Energy Engineering and Technologies, TERI.
- Tiwari GN. Solar Energy, Fundamentals design, modeling and Application