

## **SOLAR ENERGY MATERIALS**

### **Module I (6 hrs)**

Solar Energy: definitions, its intensity distribution, variation and spectrum Thermal Conversion, Photovoltaic Conversion, Limitations of Solar Energy.

### **Module II (10 hrs)**

Solar Thermal Conversion: Solar Radiation collection and concentration, Conversion to heat, Storage of energy, Generation of electricity. Design and materials for solar collectors, selective surface, composite semiconductors, solar reflectors and concentrators, photothermal conversion materials and their preparation and characterization.

### **Module III (20 hrs)**

Semiconductors: p–n Junction, PV Effect; Analysis of PV Cells: Efficiency of Solar Cells, Maximum Power Point Tracking, Multi-junction Solar Cells, Thin-Film Solar Cells, Dye-Sensitized Solar Cells, Polymer Solar Cells, Perovskite solar cell

Design of a PV System: Manufacture of Solar Cells and Panels, Single-Crystal and Polycrystalline Cells, Amorphous Silicon and Thin-Film Fabrication

### **Text and Reference Books:**

1. Principle of Solar Engineering, D. Yogi Goswami, 3<sup>rd</sup> Edition, Taylor & Francis Group
2. Solar Energy Fundamentals, Technology, and Systems, Klaus Jäger, Olindo Isabella, Arno H.M. Smets, René A.C.M.M. van Swaaij, Miro Zeman
3. Nanostructured Materials for Solar Energy Conversion, Tetsuo Soga, Elsevier
4. Solar Photovoltaics: Fundamentals, Technologies And Applications, Chetan Singh Solanki, PHI Learning Pvt. Ltd.