

*Module No. 2: Solar PV Technologies*

*No. of weeks / credits 4*

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## **Week 1**

- **Physics of Semiconductors**
  - Types of Solids
  - Band Formation in Solids
  - Extrinsic and Intrinsic Semiconductors
  - Carrier Transport in Semiconductors
  - Drift and Diffusion Currents
  - Generation & Recombination of Charge Carriers in Semiconductors
  - Energy Band Diagram of p-n junction
  - p-n junction under Equilibrium and Non-equilibrium Condition
  - I-V Characteristics of a p-n junction Diode
  - Metal-semiconductor Contacts

## **Week 2**

- **Physics of Solar Cells**
  - Photovoltaic Effect
  - Requirement of a Solar Cell Material and Device
  - I-V Characteristics of a Typical Solar Cell
  - Working of Solar Cells
  - Losses in Solar Cells
  - Conversion Efficiency of the Solar Cells

## **Week 3**

- **Photovoltaic Technologies**
  - C-Si PV Value Chain - poly Silicon to PV Module
  - Thin-film
  - Organic PV and Concentrated Solar Cell Technologies

## **Week 4**

- **Photovoltaic System Engineering**
  - Parameters Influencing Photovoltaic System Operation
  - NOCT, Series and Parallel Connection of Cells/Modules
  - Role of Bypass Diode and Blocking Diode in a Photovoltaic Array
  - Battery Storage
  - Charge-controller
  - Inverter
  - Sizing a Solar Photovoltaic System
  - Ground and Roof Top Systems
  - Stand-alone and Grid Tied Systems