

**7B-Solar Energy and Applications**  
**Question bank-Long Answers**

**Unit1**

**Unit - I: BASIC CONCEPTS OF SOLAR ENERGY**

1. Describe the principle and working of pyrometer and pyrhelimeter for direct radiation measurement?.Mention the difference between these two meters.
2. Define Solar constant, Zenith angle and air mass. Explain the Spectral distribution of radiation.

**UNIT-II SOLAR THERMAL COLLECTORS**

3. Mention types of thermal collectors. Describe flat plate collector (FPC)-Liquid heating type. Write down energy balance equations and efficiency.
4. Classify the concentrated collectors based on their design (tracking systemsParabolic trough concentrators; Concentrators with point focus) Write a brief note on Solar cookers, Solar dryers, Solar desalinators.

**Unit-III FUNDAMENTALS OF SOLAR CELLS**

5. Describe homo junction, hetero junction and Schottky barrier. Mention its advantages and drawbacks.
6. Write about Photovoltaic cells and their I-V characteristics? How the the I-V Measured Write down the equivalent circuit, output parameters, and conversion efficiency.

**UNIT-IV TYPES OF SOLAR CELLS AND MODULES**

7. Write about I-V characteristics of Crystalline silicon solar cells. Write about poly-Si cells, Amorphous silicon cells, Thin film solar cells-CdTe/CdS and CuInGaSe<sub>2</sub>/CdS cell,
8. Write down the Steps involved in the fabrication of the solar module. Write about Modules in series and parallel, Bypass and blocking diode.s

**UNIT-V SOLAR PHOTOVOLTAIC SYSTEMS**

9. What are the types of Energy storage modes in PV systems? Write about electrochemical storage. Write about Solid-state battery, Molten solvent battery, lead acid battery and dry batteries
10. Write about Mechanical energy storage in Flywheel.

## **7B-Solar Energy and Applications**

### **Short Answer**

#### **UNIT-I - Basics of Solar Radiation**

- 1.Explain standard time, local apparent time, equation of time.
2. Describe direct, diffuse and total radiations.

#### **Unit II SOLAR THERMAL COLLECTORS**

3. Define of collector efficiency factor, collector heat-removal factor and collector flow factor
4. Write about Evacuated tube collector, collector overall heat loss coefficient
5. Write about testing of flat-plate collectors, solar water heating system, natural and forced circulation types.

#### **Unit-III FUNDAMENTALS OF SOLAR CELLS**

6. What are the advantages and drawbacks of Semiconductor interface solar cells for homo junction, hetero junction and Schottky barrier.
7. What is series and shunt resistance in a PV Cell and their effect on efficiency
8. Write down equivalent circuit of a Photovoltaic cell,,
9. What are PV cell output parameters, conversion efficiency, quantum efficiency

#### **UNIT-IV TYPES OF SOLAR CELLS AND MODULES**

10. Multi junction cells – Double and triple junction cells. Describe advantages and limitations.
11. Write down the I-V characteristics of a Solar cell.
12. Describe the procedure of Modules in series and parallel
13. What are the uses of Bypass and Blocking diodes?

#### **UNIT-V SOLAR PHOTOVOLTAIC SYSTEMS**

14. Explain Electrical storage in Supercapacitor

## **6B - LOW TEMPERATURE PHYSICS & REFRIGERATION**

### **Long Answer Questions**

#### UNIT-I PRODUCTION OF LOW TEMPERATURE

1. What are the Different methods of liquefaction of gases and air. Explain Freezing mixtures, Joule-Thomson effect, Regenerative cooling.
2. Describe Adiabatic demagnetization. Explain the Production of liquid hydrogen and nitrogen.

#### UNIT-II MEASUREMENT OF LOW TEMPERATURE

3. Explain resistance thermometers, thermocouples, Vapour pressure thermometers.
4. Explain Magnetic thermometers, Advantages and drawbacks of different types of thermometer.

#### UNIT-III PRINCIPLES OF REFRIGERATION

5. Explain the different Types of refrigeration systems (Vapor compression and vapor absorption refrigeration systems)
6. Explain the Refrigeration cycle with a block diagram, Introductory ideas on air conditioning.

#### UNIT-IV COMPONENTS OF REFRIGERATOR

7. Explain Refrigerator and its working with the help of a Block diagram.  
Explain Coefficient of Performance (COP), Tons of refrigeration (TR) and Energy Efficiency Ratio (EER),
8. Write about the Types of compressors, evaporators and condensers and their functional aspects

#### UNIT-V APPLICATIONS OF LOW TEMPERATURE & REFRIGERATION

9. Explain the methods of Preservation of biological material, Food freezing.
10. Explain the role of liquid nitrogen and liquid hydrogen in medical field

## **6B - LOW TEMPERATURE PHYSICS & REFRIGERATION**

### **Short Answer Questions**

#### UNIT-I PRODUCTION OF LOW TEMPERATURE

1. Mention the Properties of materials at low temperatures and explain Superconductivity

#### UNIT-II MEASUREMENT OF LOW TEMPERATURE

2. Explain Gas thermometer and its correction and calibration
3. What are Secondary thermometers

#### UNIT-III PRINCIPLES OF REFRIGERATION

4. What is Natural and artificial refrigeration and Stages of refrigeration
5. Write a note on Introductory ideas on air conditioning.
6. What is an Ideal refrigerant. Mention the Properties of refrigerant.
7. Write the Classification of refrigerants. Mention commonly used refrigerants, Eco-friendly refrigerants.

#### UNIT-IV COMPONENTS OF REFRIGERATOR

8. What are the Refrigerator components?
9. What is defrosting in a refrigerator
10. Explain Refrigerant leakage and detection

#### UNIT-V APPLICATIONS OF LOW TEMPERATURE & REFRIGERATION

11. Explain the role of Superconducting magnets in MRI
12. Explain Tissue ablation (cryosurgery) -
13. What is a Cryogenic rocket propulsion system?
12. Domestic refrigerators, Water coolers,
13. Cold storages, Ice plants,
14. Explain the role of refrigeration in Food preservation methods, Chemical and Process industries
15. Describe Cold treatment of metals, Construction field, Desalination of water, Data centers.