

KAMARAJ COLLEGE (Autonomous)

Accredited with A+ Grade by NAAC

(Affiliated to Manonmaniam Sundaranar University, Tirunelveli)

(4 Pages)

Reg. No:.....

Question Code: 26E03312

Course Code: 24PSPH41

PG Degree - End Semester Examinations, April 2026

Fourth Semester

M.Sc., PHYSICS

Solar Energy Utilization

(For those who joined in July 2024 onwards)

Time : 3Hours

Maximum: 75 Marks

PART - A (10 × 1 = 10 Marks)

Answer ALL Questions

Choose the correct answer:

CO:1 1. What is the cause of sea breeze?

- K:1
- (a) Conduction (b) Convection
(c) Radiation (d) Reflection

CO:1 2. What is called the time measured by the apparent movement of
K:1 the sun across the sky?

- (a) Standard time (b) Atomic time
(c) Solar time (d) Local time

CO:2 3. What is the function of solar collector?

- K:1
- (a) Store solar energy (b) Convert solar energy radiation
into heat energy
(c) Convert heat into (d) Reflect sunlight
electricity

CO:2 4. Which of the material is mainly used for absorber plate in solar
K:1 collector?

- (a) Plastic (b) Copper and Aluminium
(c) Wood (d) Rubber

CO:3 5. Which system is used for thermal energy storage in large scale
K:1 solar heater?

- (a) Solar Pond (b) Solar still
(c) Solar cell (d) Solar chimney

- CO:3 6. Which refrigeration system is commonly used in solar cooling?
K:1 (a) Vapor compression (b) Vapor absorption refrigeration
refrigeration
(c) Air refrigeration (d) Magnetic refrigeration
- CO:4 7. Choose the commonly used material for solar cell is
K:1 (a) Copper (b) Silicon
(c) Iron (d) Aluminium
- CO:4 8. How the solar energy is converted into electricity?
K:1 (a) Photovoltaic system (b) Diesel generator
(c) Wind turbine (d) Gas turbine
- CO:5 9. What is the main advantage of catalyst in fuel cell?
K:1 (a) Lower surface area (b) Higher catalytic activity
(c) Heavy weight (d) Poor conductivity
- CO:5 10. How hydrogen can be produced by nanomaterials?
K:1 (a) Electrolysis of (b) Nuclear reaction
water
(c) Combustion (d) Fermentation

PART - B (5 X 5 = 25 Marks)

Answer ALL Questions choosing either (a) or (b).

Answer should not exceed 250 words.

- CO:1 11. (a) Distinguish between conduction, Convection and
K:4 Radiation of heat with example.

(OR)

(b) Analyze the working of solar insolation and its measurement using a pyronometer.

- CO:2 12. (a) Apply the working principle of point focusing collector to
K:3 explain how energy is concentrated at the receiver with neat diagram.

(OR)

(b) Outline the general characteristics of Flat plate solar collector.

- CO:3 13. (a) Classify the types of solar water heaters with neat diagram.

K:4

(OR)

(b) Explain the working of solar pond and mention its advantages.

CO:4 14. (a) Explain the principle of Seebeck effect by Thermo electric conversion.

K:4

(OR)

(b) Analyze the advantages and limitations of Quantum dot solar cells over traditional solar cells.

CO:5 15. (a) Distinguish between the high and low temperature fuel cells.

K:4

(OR)

(b) Examine the performance of catalyst in fuel cells.

PART - C (5 X 8 = 40 Marks)

Answer ALL Questions choosing either (a) or (b).

Answer should not exceed 600 words.

CO:1 16. (a) Apply the basic principles of solar radiation and estimate the different parameters of solar radiation at Earth's surface. (Assume standard solar constant)

K:2

(OR)

(b) Explain how a pyranometer measures solar radiation and the sunshine recorder indicates the duration of bright sunshine during a day.

CO:2 17. (a) Discuss the heat transfer process in a flat plate solar collector with neat diagram.

K:4

(OR)

(b) Analyze the thermal performance evaluation of optical loss in focusing collector system.

CO:3 18. (a) Examine the design and cost estimation of solar thermal system with reference to Load Analysis, System design and Economic evaluation.

K:4

(OR)

(b) Analyze the solar cooling system using Absorption refrigeration cycle.

CO:4 19. (a) Elaborate the effectiveness of each step in the silicon solar cell fabrication process in improving efficiency.
K:5

(OR)

(b) Compare how different type of solar cell responds to different temperatures.

CO:5 20. (a) Evaluate the use of nanotechnology in Hydrogen production and storage.
K:5

(OR)

(b) Explain the role of nanomaterials in enhancing proton exchange membranes in fuel cells.