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BRAINWARE UNIVERSITY

Term End Examination 2025-2026

Programme – Dip.EE-2024

Course Name – Solar Power Technologies

Course Code - DEE40201B

(Semester IV)

Full Marks : 60

Time : 2:30 Hours

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question)

1 x 15=15

1. Choose the correct alternative from the following :

- (i) Identify the series and parallel combination of the solar cell.
 - a) Solar array
 - b) Solar Module
 - c) Solar sight
 - d) Solar eye
- (ii) Identify the single solar cell voltage.
 - a) 0.2V to 0.5
 - b) 5V to 8V
 - c) 10V to 15V
 - d) 0.5V to 0.6V
- (iii) Choose the correct option: In India which state produced highest solar energy.
 - a) Telangana
 - b) Karnatak
 - c) Rajasthan
 - d) Gujarat
- (iv) Identify the name of first solar powered satellite.
 - a) Bell
 - b) Vanguard 1
 - c) Vanguard 2
 - d) Apollo 1
- (v) Identify the safe limit of CO₂ in atmosphere.
 - a) 350 ppm
 - b) 450 ppm
 - c) 380 ppm
 - d) 550 ppm
- (vi) Identify the total amount of solar energy received by the earth and atmosphere per year.
 - a) 3.8×10^{24} J/year
 - b) 9.2×10^{24} J/year
 - c) 5.4×10^{24} J/year
 - d) 2.1×10^{24} J/year
- (vii) Select from the following materials that have the highest conversion efficiency in the case of solar cells.
 - a) Single crystal silicon solar cell
 - b) Multicrystalline silicon solar cell
 - c) Gallium Arsenide cell
 - d) Organic PV cell
- (viii) Choose the correct option. Factors that affect solar irradiance measurement.
 - a) Time of day and atmospheric conditions
 - b) Surface orientation and shading

- c) Latitude, season, and altitude
d) All of the these
- (ix) Select the correct option. PV stands for, in the context of solar energy.
a) Photonic Voltage
b) Photo Voltaic
c) Power Variation
d) Peak Velocity
- (x) Select the correct option. the approximate value of the reference temperature used for standard testing conditions.
a) 25°C
b) 30°C
c) 35°C
d) 40°C
- (xi) Select the effect of shading losses on the overall performance of a PV system.
a) Shading losses have no impact on system performance
b) Shading losses only affect energy production during peak sunlight hours.
c) Shading losses can significantly reduce energy production in affected areas of the solar array
d) Shading losses primarily affect battery efficiency
- (xii) Select from the parameters that are crucial for module selection to ensure compatibility with a PV system.
a) Voltage output
b) Color temperature
c) Cable length
d) Number of junction boxes
- (xiii) Select the black body temperature.
a) 5777k
b) 5000k
c) 4449k
d) 1000k
- (xiv) Select the water absorb wavelength at atmosphere.
a) 0.7 to 2.2 micro meter.
b) 0.5 to 1.2 micro meter.
c) 1.7 to 3.2 micro meter.
d) 0.9 to 2.7 micro meter.
- (xv) Select the correct option. The earth radiates.
a) Longer wave
b) Shorter wave
c) Scatter wave
d) None of these.

Group-B

(Short Answer Type Questions)

$$3 \times 5 = 15$$

2. Explain the importance of voltage measurement of PV instrumentation. (3)
3. Explain the reason for temperature variations in solar cells. (3)
4. Describe the main energy source utilized in a direct steam solar tower power plant. (3)
5. Explain the contribution of hybrid solar thermal plants to energy resilience. (3)
6. Explain the process to reduce temperature in a solar panel. (3)

OR

Differentiate between pyranometer and pyrliometer. (3)

Group-C

(Long Answer Type Questions)

$$5 \times 6 = 30$$

7. A PV system operates with an efficiency of 17% in an area with an average solar irradiance of 5 (5)
kWh/m²/day. Calculate the energy produced daily with a panel area of 20 square meters.
8. Discuss the role of orientation and tilt angle in array sizing and module selection for PV (5)
systems.
9. Suppose a PV array comprises 15 strings of solar modules connected in parallel. Each string (5)
contains 6 modules connected in series. If the voltage output of each module is 45 volts,
estimate the total voltage output of the array.
10. Describe a monocrystalline panel and polycrystalline panel with diagram. (5)

11. Explain See-beck Effect. (5)

12. Explain the impact of the choice of PV module technology on array sizing and module selection. (5)

OR

Explain the impact of module efficiency on array sizing and module selection in PV system design. (5)

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