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BRAINWARE UNIVERSITY

Term End Examination 2025-2026

Programme – Dip.EE-2024

Course Name – Renewable Energy Power Plants

Course Code - DEE40201A

(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 unit used to express global solar radiation.

- | | |
|--------|----------------------------|
| a) kW | b) kWh/m ² /day |
| c) Lux | d) °C |

(ii) Identify the CSP system that focuses sunlight at a point.

- | | |
|---------------------|----------------------|
| a) Parabolic trough | b) Fresnel reflector |
| c) Parabolic dish | d) Solar PV |

(iii) Identify the CSP system that uses flat mirrors arranged in rows.

- | | |
|-----------------------------|----------------|
| a) Parabolic dish | b) Power tower |
| c) Linear Fresnel reflector | d) Solar pond |

(iv) Choose the principle on which a solar PV cell operates.

- | | |
|------------------------|---------------------------|
| a) Seebeck effect | b) Thermionic emission |
| c) Photovoltaic effect | d) Electrochemical effect |

(v) Identify the most commonly used axis in small wind turbines.

- | | |
|------------------|--------------------|
| a) Vertical axis | b) Horizontal axis |
| c) Inclined axis | d) Compound axis |

(vi) Identify the suitable location for rooftop small wind turbines.

- | | |
|------------------------------------|--------------------------|
| a) Low wind regions | b) High turbulence zones |
| c) Areas with consistent wind flow | d) Indoor spaces |

(vii) Identify the classification of hydropower plants based on head.

- | | |
|-------------------------------------|------------------------|
| a) Large, medium, small | b) Peak, base, standby |
| c) High head, medium head, low head | d) AC, DC, hybrid |

(viii) Identify the turbine commonly used for medium head hydropower plants.

- | | |
|------------|---------------|
| a) Pelton | b) Kaplan |
| c) Francis | d) Cross-flow |

(ix) Select the type of wind turbine that can accept wind from any direction without yaw mechanism.

a) Horizontal axis turbine

b) Vertical axis turbine

c) Upwind turbine

d) Downwind turbine

(x) Identify the types of turbine blades to extract energy from wind

a) Elliptical

b) Rectangular

c) Aerofoil

d) All

(xi) Identify the main composition of biogas is _____

a) Methane

b) Carbon dioxide

c) Nitrogen

d) Hydrogen

(xii) Select among the following have a large amount of installed grid interactive renewable power capacity in India.

a) Wind power

b) Solar power

c) Biomass power

d) Small Hydro power

(xiii) Identify the biomass which is used for waste water treatment.

a) Agricultural

b) Industrial

c) Municipal

d) Aquatic

(xiv) Employ the appropriate power factor correction method for SCIG-based wind power plants.

a) Series resistance

b) Capacitor banks

c) Inductor banks

d) Flywheels

(xv) Select the solid fuel with the highest moisture content when fresh:

a) Dry wood chips

b) Bagasse

c) Pellets

d) Charcoal

Group-B

(Short Answer Type Questions)

3 x 5=15

2. Explain the energy conversion process of hydroelectric power plant.

(3)

3. Explain in details use of surge tank in hydel power station.

(3)

4. Describe in brief about Vertical Axis Wind Turbine or VAWT.

(3)

5. Explain the advantages and disadvantages of using a Francis turbine compared to a Pelton turbine.

(3)

6. Explain the role of biomass energy in sustainable development.

(3)

OR

Compare Biomass energy to fossil fuels in terms of greenhouse gas emissions.

(3)

Group-C

(Long Answer Type Questions)

5 x 6=30

7. Explain the impact of moisture content on the combustion efficiency of bagasse and wood chips.

(5)

8. Explain the merits and demerits of wind energy conversion systems.

(5)

9. Write a short note on thermochemical conversion related to biomass energy.

(5)

10. Express how the electricity is generated from solar energy.

(5)

11. A PV system requires 40 kWh of energy per day and operates in an area with an average solar irradiance of 6 kWh/m²/day. Evaluate the minimum area of solar panels needed, assuming an efficiency of 15%.

(5)

12. Compare between Parabolic Trough, Parabolic Dish and Linear Fresnel reflectors.

(5)

OR

Explain with necessary diagram the operation principle of solar cell.

(5)

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