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BRAINWARE UNIVERSITY

Term End Examination 2024-2025

Programme – Dip.EE-2022/Dip.EE-2023

Course Name – Renewable Energy Power Plants

Course Code - DEEPE401A

(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 photovoltaic cell converts solar energy into-
 - a) Heat energy
 - b) Electric energy
 - c) Mechanical energy
 - d) Chemical energy
- (ii) Identify that concentrated solar power (CSP) systems use _____ to focus a large area of sunlight into a small beam.
 - a) Lenses
 - b) Trackers
 - c) Mirrors
 - d) All of above
- (iii) Tell that most widely used solar material is.....
 - a) Arsenic
 - b) Cadmium
 - c) Silicon
 - d) Steel
- (iv) 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
- (v) Identify the biomass which is used for waste water treatment.
 - a) Agricultural
 - b) Industrial
 - c) Municipal
 - d) Aquatic
- (vi) Identify which of the following is an example of biomass feedstock from starch crops?
 - a) Sugar cane
 - b) Corn Stover
 - c) Orchard pruning
 - d) Wheat straw
- (vii) Identify which of the following does not serve as a source of biomass?
 - a) Hybrid poplar
 - b) Trap grease
 - c) Willow algae
 - d) Iron nails
- (viii) Predict from the following temperature ranges are suitable for biomass gasification.
 - a) Above 1000 degree Celsius
 - b) Between 500 and 600 degree Celsius

- c) Between 700 and 1000 degree Celsius
d) Less than 500 degree Celsius
- (ix) Select which of the following applications is the product gas from downdraft gasifier suitable for?
a) Fuel for combustion engine
b) Fuel for burning wood
c) Fuel for internal combustion engine
d) Fuel for household purpose
- (x) Select from the option which is best describes world energy consumption.
a) Total energy produced and used by humanity
b) Total energy consumed by humanity
c) Total energy consumed by humans in the biological pyramid
d) Total energy produced by humans in the biological pyramid
- (xi) Indicate the time duration of report for World energy consumption.
a) quarterly
b) half-yearly
c) yearly
d) every decade
- (xii) Identify the term 'net metering' in the context of rooftop solar PV systems.
a) A process of measuring the temperature of solar panels
b) A billing mechanism that credits solar energy users for excess electricity fed into the grid
c) A method of cleaning solar panels automatically
d) A technique to enhance solar panel efficiency
- (xiii) Select the role of a charge controller in an off-grid rooftop solar PV system.
a) It controls the speed of electricity flow to the appliances
b) It prevents overcharging and deep discharge of the battery
c) It converts DC to AC power
d) It reduces the temperature of solar panels
- (xiv) Identify the reason of applying SCIG used in wind power applications.
a) It is self-excited and does not need external excitation.
b) It is cost-effective, rugged, and requires minimal maintenance.
c) It operates efficiently over a wide speed range.
d) It provides variable frequency output without a converter.
- (xv) Indicate the main advantage of using an SCIG in wind power plants.
a) High efficiency at varying speeds
b) Simple and rugged construction
c) High power factor operation
d) Self-excitation capability

Group-B

(Short Answer Type Questions)

3 x 5=15

2. Discuss about pros of wind energy. (3)
3. Write down the working principle of pump storage hydroelectric power plant. (3)
4. Discuss the environmental benefits of wind energy compared to fossil fuels. (3)
5. Identify the factors due to height of a wind turbine affect its performance. (3)
6. Explain briefly the selection of a water turbine for hydroelectric power plants depends upon on what factor. (3)

OR

Explain the main operating principle of a Pelton turbine.

(3)

Group-C

(Long Answer Type Questions)

5 x 6=30

7. Explain the disadvantages of Photovoltaic Solar System. (5)
8. Explain Turbine Components of wind power generation. (5)
9. Explain the merits and demerits of wind energy conversion systems. (5)
10. Explain how fuel moisture content impacts the energy output and efficiency of a biomass power plant. (5)
11. Explain I-V characteristics of solar cell. (5)

12. A photovoltaic (PV) cell has the following parameters Short-circuit current (I_{sc}) = 5 A, (5)
Open-circuit voltage (V_{oc}) = 0.6 V, Maximum power output (P_{max}) = 2 W. Calculate the fill
factor (FF) of the PV cell.

OR

Explain the working of a PV power plant. (5)

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