

[illegible]

B.Tech. DEGREE EXAMINATION, MAY 2024

Fifth to Seventh Semester

18MEO102T – ALTERNATIVE SOURCES OF ENERGY

(For the candidates admitted from the academic year 2018-2019 to 2021-2022)

Note:

- (i) **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.
- (ii) **Part - B & Part - C** should be answered in answer booklet.

Time: 3 hours

Max. Marks: 100

PART – A (20 × 1 = 20 Marks)

Marks	BL	CO	PO
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Answer **ALL** Questions

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|---|---|---|---|-----|
| 1. Which meter is used to measure the global radiations _____ | 1 | 1 | 1 | 1,7 |
| (A) Pyr heliometer | | | | |
| (B) Sunshine recorder | | | | |
| (C) Anemometer | | | | |
| (D) Pyranometer | | | | |
| 2. In a solar pond, the organic working fluid produces mechanical power in a _____ cycle. | 1 | 1 | 1 | 1,7 |
| (A) Brayton cycle | | | | |
| (B) Strolling angle | | | | |
| (C) Ranking cycle | | | | |
| (D) Ericsson cycle | | | | |
| 3. Where does the lowest temperature occur in a vapour compression cycle? | 1 | 1 | 1 | 1,7 |
| (A) Condenser | | | | |
| (B) Evaporator | | | | |
| (C) Compressor | | | | |
| (D) Expansion valve | | | | |
| 4. The single solar cell voltage is about _____ | 1 | 1 | 1 | 1,7 |
| (A) 0.2 V | | | | |
| (B) 0.5 V | | | | |
| (C) 1.0 V | | | | |
| (D) 2.0 V | | | | |
| 5. The wind power directly proportional to _____ of air. | 1 | 1 | 2 | 1,7 |
| (A) V | | | | |
| (B) V ² | | | | |
| (C) V ³ | | | | |
| (D) V ⁴ | | | | |
| 6. Which of the following types of wind turbines is commonly used for large-scale electricity generation? | 1 | 1 | 2 | 1,7 |
| (A) Vertical axis wind turbine | | | | |
| (B) Horizontal axis wind turbine | | | | |
| (C) Hybrid wind turbine | | | | |
| (D) Crosswind turbine | | | | |
| 7. A controller in commercial type wind turbines is provided with data from _____ | 1 | 1 | 2 | 1,7 |
| (A) Anemometer | | | | |
| (B) Yaw drive | | | | |
| (C) Rotor | | | | |
| (D) Wind vane | | | | |
| 8. Which component in a wind power plant senses the direction of wind? | 1 | 1 | 2 | 1,7 |
| (A) Yaw drive | | | | |
| (B) Pitch drive | | | | |
| (C) Nacelle | | | | |
| (D) Wind vane | | | | |

9. The energy produced due to the gravitational force of attraction between earth and moon or sun and earth is _____
 (A) Micro-hydel energy (B) Fusion energy
 (C) Tidal energy (D) Geothermal energy
10. The amount of electrical energy that a hydroelectric power plant can generate depends upon _____
 (A) Density of water (B) Quantity of water
 (C) Specific weight of water (D) Efficiency of alternator
11. What is the function of the turbine in a hydropower plant?
 (A) Produce electrical power (B) Produce hydropower
 (C) Produce heat power (D) Produce mechanical power
12. In geothermal power plants, the steam from the ground is used to _____
 (A) Turn the turbine (B) Heat water
 (C) Heat turbines (D) Turn the generator
13. The term biomass most commonly refers to _____
 (A) Inorganic matter (B) Chemicals
 (C) Ammonium compounds (D) Organic matter
14. Which of the following best describes the process of pyrolysis?
 (A) Conversion of solid biomass into liquid and gaseous fuels
 (B) Conversion of solid biomass into electricity
 (C) Conversion of liquid biomass into solid fuel
 (D) Conversion of gaseous biomass into liquid fuel
15. Which product is not formed during fermentation?
 (A) Lactate (B) Carbon dioxide
 (C) Ethanol (D) Oxygen
16. The residue left after methane production from cattle dung is
 (A) Burnt (B) Buried in land fills
 (C) Used as manure (D) Used in civil construction
17. In an open cycle Magnetohydrodynamic (MHD) steam power plant, the temperature at the entrance of the MHD duct is _____
 (A) 1500-2500 K (B) 2500-3000 K
 (C) 3000-4500 K (D) 4500-5500 K
18. In a closed cycle Magnetohydrodynamic (MHD) steam power plant, which of the following gas is seeded in the MHD duct?
 (A) Helium (B) Xenon
 (C) Sodium vapour (D) Chlorine
19. What is the primary function of the electrolyte in a fuel cell?
 (A) To generate electricity (B) To store energy
 (C) To facilitate chemical reactions (D) To regulate temperature

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|--|---|---|---|-----|
| 20. How is hydrogen stored physically? | 1 | 1 | 5 | 1,7 |
| (A) As atoms | | | | |
| (B) By compressing hydrogen gas | | | | |
| (C) In the form of hydrides | | | | |
| (D) In the form of water | | | | |

PART – B (5 × 4 = 20 Marks)

Answer ANY FIVE Questions

Marks BL CO PO

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|--|---|---|---|-----|
| 21. Explain the operation of solar still, with a neat diagram. | 4 | 2 | 1 | 1,7 |
| 22. Define sensible and latent heat storage systems and highlight their significance. | 4 | 1 | 1 | 1,7 |
| 23. Define wind data, describe its measurement methods, and emphasize its importance. | 4 | 1 | 2 | 1,7 |
| 24. Describe the functioning of hydropower plants, accompanied by an illustrative diagram. | 4 | 2 | 3 | 1,7 |
| 25. Discuss the generation of tidal waves and enumerate the types of tidal power plants. | 4 | 2 | 3 | 1,7 |
| 26. Explain the pyrolysis process. | 4 | 2 | 4 | 1,7 |
| 27. Explain the operation of thermionic power generation systems, with a neat sketch. | 4 | 2 | 5 | 1,7 |

PART – C (5 × 12 = 60 Marks)

Answer ALL Questions

Marks BL CO PO

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|---|----|---|---|-----|
| 28. a. Explain the construction and operational principles of a solar vapor compression refrigeration system, accompanied by a clear diagram. | 12 | 2 | 1 | 1,7 |
| (OR) | | | | |
| b. Elucidate the working principle of a solar photovoltaic (PV) system, starting from the fundamentals of P and N type semiconductors. | 12 | 2 | 1 | 1,7 |
| 29. a. Outline the procedure for selection of suitable sites for wind turbine installation. | 12 | 2 | 2 | 1,7 |
| (OR) | | | | |
| b. Detail the components and their roles in a horizontal axis wind turbine, and illustrate the operational mechanism with a labeled diagram. | 12 | 3 | 2 | 1,7 |
| 30. a. Define the OTEC system and illustrate the operational mechanism of a open-cycle OTEC system using a detailed sketch. | 12 | 2 | 3 | 1,7 |

(OR)

- b. Define geothermal energy and differentiate between dry steam and flash steam systems. Elaborate on the operational principles of both systems. 12 2 3 1,7
31. a. Explore the operational principles of updraft and downdraft gasifiers, accompanied by essential illustrations. 12 2 4 1,7
- (OR)**
- b. Elaborate on the construction and functionality of a floating digester biogas plant, supported by a detailed sketch. 12 3 4 1,7
32. a. Describe the operational principles of both phosphoric acid and polymer electrolyte membrane fuel cells. 12 2 5 1,7
- (OR)**
- b. Elucidate the working mechanism of a closed-cycle magnetohydrodynamic (MHD) power generation system. 12 2 5 1,7

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