B.Tech DEGREE EXAMINATION, DECEMBER 2023

Fifth and Seventh Semester

18MEO102T - ALTERNATIVE SOURCES OF ENERGY

(For the candidates admitted during the academic year 2020 - 2021 & 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** and **Part - C** should be answered in answer booklet.

Time: 3 Hours   **Max. Marks: 100**

PART - A (20 × 1 = 20 Marks)
Answer all Questions

		Marks	BL	CO

1. A pyranometer is used for the measurement of — Marks 1, BL 1, CO 1
   (A) Direct radiation only
   (B) Diffuse radiation only
   (C) Direct as well as diffuse radiation
   (D) scatter radiation only

2. In a solar pond, the organic working fluid produces mechanical power based on _____ cycle — Marks 1, BL 1, CO 1
   (A) Brayton cycle
   (B) Strilling angle
   (C) Ranking cycle
   (D) Ericssion cycle

3. A photovoltaic cell or solar cell converts _____ — Marks 1, BL 1, CO 1
   (A) Thermal energy into electricity
   (B) Electromagnetic radiation directly into electricity
   (C) Solar radiation into thermal energy
   (D) Solar radiation into kinetic energy

4. The efficiency of various types of collectors _____ with _____ temperature. — Marks 1, BL 1, CO 1
   (A) increases, decreasing.
   (B) decreases, increasing.
   (C) remains same, increasing.
   (D) depends upon type of collector.

5. The energy required to extract an electron from the metal is known as — Marks 1, BL 1, CO 2
   (A) Work function
   (B) Pulling energy
   (C) Electrical Energy
   (D) Path function

6. The speed at which the turbine stops producing power is known as — Marks 1, BL 1, CO 2
   (A) The cut-in speed
   (B) The cutoff speed
   (C) Rated speed
   (D) Betz limit

7. The wind speed is measured using an instrument called — Marks 1, BL 1, CO 2
   (A) Hydrometer
   (B) Manometer
   (C) Anemometer
   (D) Wind vane

8. The amount of energy available in the wind at any instant is proportional to _____ of the wind speed — Marks 1, BL 1, CO 2
   (A) Square root power of two
   (B) Square root power of three
   (C) Square power
   (D) Cube power

9. On which of the following factor power output in the wind energy not depend upon? — Marks 1, BL 1, CO 3
   (A) Blade radius
   (B) Sunlight
   (C) Air density
   (D) Wind speed

10. The process of splitting water into hydrogen and oxygen by means of direct current is known as — Marks 1, BL 1, CO 3
    (A) Electrolysis
    (B) Osmosis
    (C) Reverse osmosis
    (D) Fission

11. The vertical distance between the crest and trough is defined as the   1   1   3
   (A) Wave height   (B) Wave length
   (C) Wave period   (D) Wave frequency

12. A tide whose difference between high and low tides is least is called as   1   1   3
   (A) Diurnal tide   (B) Neap tide
   (C) Spring tide   (D) Ebb tide

13. Identify the working fluid which is used in the closed OTEC system   1   1   4
   (A) Syngas   (B) Propane
   (C) Carbon monoxide   (D) Hydrogen

14. Magma in its upward movement cools and turns into a solid form known as -------- .   1   1   4
   (A) Impermeable rock   (B) Magma rock
   (C) Igneous rock   (D) Sedimentary rock

15. A thermoelectric convertor is a form of   1   1   5
   (A) Heat pump   (B) Solar pump
   (C) Electric pump   (D) Heat engine

16. _____ in large proportion is generated by anaerobic fermentation of   1   1   4
   organic wastes.
   (A) Nitrogen   (B) Hydrogen
   (C) Methane   (D) Carbon dioxide

17. Pyrolysis is _____ process   1   1   5
   (A) Thermal decomposition   (B) Thermo-chemical decomposition
   (C) Fermentation   (D) Bio-chemical decomposition

18. In floating gas bio-digester plants, gas tank is made up of   1   1   5
   (A) Concrete   (B) Stainless steel
   (C) Brick   (D) Plaster

19. _____ is the principle product from fermentation process.   1   1   5
   (A) Ethanol   (B) Methanol
   (C) Vegetable oil   (D) Higher alcohol

20. Fuel cell is basically   1   1   5
   (A) An electro-mechanical energy   (B) An electro- static energy
        conversion device   conversion device
   (C) An electro- chemical energy   (D) An electro- electric energy
        conversion device   conversion device

PART - B (5 × 4 = 20 Marks)   Marks BL   CO
Answer **any 5** Questions

21. Explain the working of a solar furnace with a diagram.   4   2   1

22. A solar water heating plant with a Flat plate collector has to be designed based on the   4   4   1
   following data:
   Daily solar radiation = 6 kWh/m^2 per day, Hot water consumption = 1500 kg per
   day, Hot water temperature = 50 °C, Cold water temperature = 18 °C,
   Plant mean efficiency = 58 %., Isobaric specific heat of water = 1.163 W h/kg-K
   Determine the total collector surface area and the number of solar collector modules
   required if a single module has an area of 2.5 m^2.

23. a) Why gearbox is used in HAWT?   4   2   2
   b) State betz law?

24. a) What are the components of tidal power plants   4   2   3
   b) Define fissures in geothermal fields

25. List the various bio-mass resources available in India.

26. What is a fuel cell? What are the characteristics of a fuel cell?

27. Discuss about the thermoelectric power generator

4	2	4
4	2	5
4	2	5

PART - C (5 × 12 = 60 Marks)
Answer all Questions

	Marks	BL	CO

28. (a) i) Describe the solar pond power plant with neat diagram. (8 Marks)
    ii) Explain the working of solar dryer with neat diagram. (4 Marks)

12	3	1

(OR)

(b) Explain the working of solar vapour absorption refrigeration system with a neat diagram.

29. (a) i) Differentiate horizontal-axis and vertical-axis wind turbines. (4 Marks)

12	3	2

ii) The wind velocity at a wind site is available at 12 m/s. The windmill selected is 10 m in diameter and 5 rps with maximum efficiency of 35%. Find the power output and axial thrust on the turbine. (8 Marks)

(OR)

(b) i) What are the factors involved in site selection for wind mills? (4 Marks)
    ii) Draw the sectional view of HAWT and explain its parts. (8 Marks)

30. (a) i) Explain the working of Anderson cycle OTEC system with a neat sketch. . (8 Marks)
    ii) Differentiate Waves and Tides? .(4 Marks)

12	2	3

(OR)

(b) Explain the operation of Binary cycle Geothermal energy system with a neat schematic diagram.

31. (a) Explain the working of a Fixed Dome digester plant with a neat diagram. Mention its advantages over the Floating Dome digester plant.

12	2	4

(OR)

(b) What is the working principle of a gasifier? Draw and explain updraft and downdraft gasifiers.

32. (a) i) Explain Hydrogen production and storage methods.(6 Marks)
    ii) Explain the working of a solid acid fuel cell with a neat sketch.(6 Marks)

12	3	5

(OR)

(b) Explain with a neat diagram the working of a closed cycle MHD systems. List the scope for MHD generator systems in India.

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