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Question Paper Code: 99707

B.E./B.Tech. DEGREE EXAMINATION, APRIL 2024

Elective

Mechanical Engineering

19UME907– RENEWABLE SOURCES OF ENERGY

(Regulation 2019)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Solar radiation which reaches the surface without scattering or absorbed is called CO1- U
(a) Beam Radiation (b) Infrared radiation
(c) Ultraviolet radiation (d) Diffuse radiation
2. The complement of zenith angle is CO1- U
(a) Solar altitude angle (b) Surface azimuth angle
(c) Solar azimuth angle (d) Slope
3. The main source for the formation of wind is CO1- U
(a) Uneven land (b) Sun (c) Vegetation (d) Seasons
4. Wind is defined as CO1- U
(a) air blowing very fast (b) air blowing very slow
(c) air blowing at a point (d) still air
5. Biomass is used in the production of CO1- U
(a) fibres (b) chemicals (c) transportation fuels (d) biochemical
6. A good alternative to biogas is CO1- U
(a) Charcoal (b) Coal (c) Oil and petroleum (d) Fuel wood
7. Which of the following categories does tidal power fall into? CO1- U
(a) Hydrothermal (b) Hydropower (c) Solar (d) Wind

8. What is the byproduct of an ocean thermal energy conversion system? CO1- U
 (a) Electricity (b) Cold water (c) Clean water (d) Water vapour
9. Which of the following use hydrogen as fuel? CO1- U
 (a) Fossil fuels (b) Anaerobic digestion (c) Fuel cells (d) Cooking
10. How is hydrogen gas produced from fossil fuels? CO1- U
 (a) Electrolysis (b) Evaporation
 (c) Partial oxidation of methane (d) Biomass gasification

PART – B (5 x 2= 10 Marks)

11. List out the applications of solar collectors CO1- U
12. Illustrate the environmental impact of wind energy. CO1- U
13. Brief the methods used to produce biodiesel CO1- U
14. List out the applications of geothermal energy. CO1- U
15. List some applications of fuel cells. CO1- U

PART – C (5 x 16= 80 Marks)

16. (a) Determine the angle made by beam radiation with the normal to a flat plate collector pointing the south location in Chennai (13° N, 80.27° E) at 11:00 solar time on 17th April. The collector is tilted at an angle of 32° with the horizontal. CO2-App (16)
 Or
 (b) Calculate the local solar time and declination at a location altitude $22^\circ 15'$ N, longitude $77^\circ 45'$ E at 12:40 IST on 28th March. Take the equation of time correction as $-1^\circ 08'$. Also calculate the day-length on the date given. CO2-App (16)
17. (a) Summarize about the wind data and wind measurement. CO1-U (16)
 Or
 (b) Explain the wind electric generation power plant with neat sketch. CO1-U (16)
18. (a) Explain anaerobic digestion and how biogas is produced by anaerobic digestion. CO1-U (16)
 Or
 (b) Explain the process of Bio diesel production from biomass. CO1-U (16)

- 19 (a) Explain the working principle and components of Tidal power plant. CO1-U (16)
- Or
- (b) Explain how prime movers for geo thermal energy conversion are classified. CO1-U (16)
- 20 (a) Explain the various methods of hydrogen production. CO1-U (16)
- Or
- (b) Describe the working of polymer electrolyte membrane fuel cell with a neat sketch. CO1-U (16)

