A **Reg. No. :** | | | | | | | | | | |

Question Paper Code: 99707

B.E./B.Tech. DEGREE EXAMINATION, NOV 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) Anerobic 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° 15’ N, longitude 77° 45’ E at 12:40 IST on 28th March. Take the equation of time correction as -1° 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)