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

Question Paper Code: 99707

B.E./B.Tech. DEGREE EXAMINATION, NOV 2023

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. The solar cell efficiency is about _____ CO1- U

(a) 25% (b) 15% (c) 48% (d) 63%

2. The single solar cell voltage is about _____ CO1- U

(a) 0.2 V (b) 0.5 V (c) 1.0 V (d) 2.0 V

3. Which of the following is the energy used for storing Wind energy? CO1- U

(a) Kinetic (b) Potential (c) Electrical (d) Chemical

4. Which of the following component is used in controller of vertical type wind turbine? CO1- U

(a) Meter (b) Motor (c) Sensor (d) All the above

5. The bio-ethanol obtained in the fermentation process has_____ purity CO1- U

(a) 99% (b) 99.2% (c) 99.4% (d) 99.7%

6. _____ is called as the bio gas. CO1- U

(a) Bioethanol (b) Biomethane (c) Biodiesel (d) Biobutanol

7. What is the primary source of heat for geothermal energy Generation? CO1- U

(a) Solar radiation (b) Fossil fuels

(c) Nuclear fusion (d) Earth's interior heat

8. What type of tide is it if the difference between high and low tide is greatest? CO1- U

(a) Diurnal tide (b) Neap tide (c) Spring tide (d) Ebb tide

9. Which of the following use hydrogen as fuel? CO1- U

(a) Fossil fuels (b) Anerobic digestion (c) Fuel cells (d) Cooking

10. What does hydrogen fuel cell emit? CO1- U

(a) Water (b) Steam (c) Greenhouse gas (d) Methane

PART – B (5 x 2= 10Marks)

11. Explain the various types of Solar Energy. CO1-U
12. Outline the wind energy. CO2- U
13. Summarize the three major designs of fixed bed gasification. CO3- U
14. Distinguish between open-cycle and closed-cycle OTEC systems. CO4- U
15. Discuss the various parts of Fuel cell. CO5- U

PART – C (5 x 16= 80Marks)

16. (a) Explain the working process of Solar Thermal Energy Conversion System with neat sketch advantages and limitations, and exploring applications. CO1-U (16)

Or

(b) Describe the operation of Flat Plate Collectors in a residential heating system, including the key components and processes involved. Discuss the benefits and drawbacks or limitations. CO1- U (16)

17. (a) Identify the various components of a wind mill and explain their respective roles in converting wind energy into electricity with neat diagram. CO2- U (16)

Or

(b) Compare and contrast the working processes, advantages, and disadvantages of upwind turbines and downwind turbines. CO2- U (16)

18. (a) Describe the entire working process of biodiesel production, applications, benefits and drawbacks CO3- U (16)

Or

	(b)	Explain the complete working process of biomass energy generation, from feedstock collection to electricity production, and discuss the key components involved. Discuss the social benefits and drawbacks biomass energy generation.	CO3- U	(16)
19.	(a)	Explain in detail the working principles of a closed Cycle OTEC system. Discuss the main components and their functions.	CO4- U	(16)
		Or		
	(b)	Describe the working process of a double Basin One-Way Cycle tidal power plant, Double Basin Two-Way Cycle with Pump Storage tidal power plant. Discuss its advantages, applications, and disadvantages.	CO4- U	(16)
20.	(a)	Discuss various hydrogen storage technologies, including compressed gas, liquid hydrogen, and solid-state storage. Explain their suitability for different applications.	CO5- U	(16)
		Or		
	(b)	Explore the design and operation of molten carbonate fuel cells. Discuss their suitability for high-temperature applications and their potential in power generation.	CO5- U	(16)