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Reg. No. : | | | | | | | | | | | | |

**Question Paper Code : 81145**

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2024

Fifth Semester

Mechanical Engineering

ORO 551 – RENEWABLE ENERGY SOURCES

(Common to : Aeronautical Engineering/Aerospace Engineering/ Agriculture Engineering/Automobile Engineering/Biomedical Engineering/ Civil Engineering/Electronics and Communication Engineering/ Electronics and Telecommunication Engineering/Environmental Engineering/ Industrial Engineering/Industrial Engineering and Management/Manufacturing Engineering/Marine Engineering/Material Science and Engineering/ Medical Electronics/Petrochemical Engineering/Production Engineering/ Safety and Fire Engineering/Bio Technology/Chemical Engineering/ Chemical and Electrochemical Engineering / Fashion Technology / Food Technology/Handloom and Textile Technology/ Petrochemical Technology/Petroleum Engineering/ Pharmaceutical Technology/Textile Chemistry/Textile Technology)

(Regulations 2017)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Classify the two basic types of instruments employed for solar radiation measurement.
2. Define solar azimuth angle and zenith angle.
3. Write the energy balance equation of the solar collector.
4. Why orientation is needed in concentrating type collectors?
5. What are solar ponds?
6. Define the PV effect.
7. What is the difference between a windmill and a wind turbine?
8. What are the two most common biofuels used in internal combustion engines?
9. What causes wave energy?
10. List any two methods of harvesting geothermal energy.

PART B — (5 × 13 = 65 marks)

11. (a) Explain and derive expressions for beam and diffuse radiation..

Or

(b) Discuss the Environmental impact of solar energy usage with suitable examples.

12. (a) What are the main components of a flat plate solar collector? Explain the function of each.

Or

(b) Discuss the construction and working principle of Central Receiver power plants.

13. (a) With the help of a neat sketch describe solar heating system using water-heating solar collectors. What are the advantages and disadvantages of this method?

Or

(b) Classify the methods of solar energy storage. Describe the thermal energy storage system. (8+5)

14. (a) Explain the environmental impact of wind energy with suitable examples.

Or

(b) What are the three technologies used to convert biomass energy into heat and electricity? Briefly describe any two them.

15. (a) Describe in detail the operation of a double basin–type tidal power plant.

Or

(b) Explain with neat sketches, the operation of a geothermal power plant.

PART C — (1 × 15 = 15 marks)

16. (a) How windmills are classified and explain their construction and working principle with a neat sketch.

Or

(b) Explain about the various types of Ocean Thermal Energy Conversion (OTEC) systems with neat sketches.

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