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Question Paper Code : 30587

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2024.

Seventh Semester

Electrical and Electronics Engineering

EE 8703 — RENEWABLE ENERGY SYSTEMS

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. How do you define a renewable energy source?

2. What are the main fossil fuels?

3. Consider two locations both at the same altitude with the same wind speed but the air temperature at one location is higher than the other. Which location has more wind power potential? Why?

4. Define Cut-in speed.

5. Differentiate between beam and diffuse radiation.

6. What is the principle of solar photovoltaic?

7. What are the main constituents of biogas?

8. Classify geothermal resources based on temperature.

9. What factors cause variations in tidal motion?

10. What are primary and secondary fuel cells?

PART B — (5 × 13 = 65 marks)

11. (a) Which renewable sources are growing at the fastest rate? Which renewable source is used to produce most electricity?

Or

(b) Examine the impact of environmental consequences of fossil fuel usage.

12. (a) With a neat diagram, explain how wind energy can be converted into electrical energy.

Or

(b) Elaborate the Grid integration issues of WPPs.

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

Or

(b) With the help of a schematic diagram, explain the working of the solar pond.

14. (a) Classify the water turbine and explain the operation of any two water turbines.

Or

(b) Explain the operation of a flashed steam geothermal power plant with a neat sketch.

15. (a) A modulated single-pool tidal system has a tidal range of 10 m, an area of 1 km^2, the parameter α is 0.08 h^{-1}, and work is produced between $t_1 = 1\ h$ and $t_2 = 4\ h$. Using an overall efficiency of 30%, determine the actual work and power outputs. Also, determine the actual work output for the case of a simple single-pool system. Take the density of water to be 1025 kg/m^3.

Or

(b) Explain the operation of the hydrogen energy system with a schematic diagram.

PART C — (1 × 15 = 15 marks)

16. (a) Describe the different methods of energy storage systems.

Or

(b) Explain the impacts of biomass construction, production and operation.