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

Question Paper Code : 80582

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 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. What is the percentage share of fossil fuels in total energy consumption of the world?
2. What is meant by renewable energy source?
3. What are the relative features of drag and lift type machines?
4. What range of wind speed is considered favorable for wind power generation?
5. Calculate the number of daylight hours (day length) at Bangalore on 21 June in a leap year. The latitude of Bangalore is 12° 58′ N.
6. Define concentration ratio of a solar collector.
7. List out the classifications of geothermal fields.
8. Give the classification of biogas plant.
9. What is the minimum tidal range required for a practical tidal plant?
10. Write the applications of fuel cell.

PART B — (5 × 13 = 65 marks)

11. (a) Explain the importance of non-conventional energy sources in the context of global warming.

Or

(b) Briefly discuss about the primary and commercial energy resources. Also discuss about the energy consumption pattern and growth rate in India. (6+7)

12. (a) Sketch the diagram of a VAWT and explain the functions of its main components.

Or

(b) Using Betz model of a wind turbine, derive the expression for power extracted from wind. What is the maximum theoretical power that can be extracted?

13. (a) Describe the flat plate collector with the help of a suitable diagram.

Or

(b) What is the importance of MPPT in an SPV system? Explain various strategies used for operation of an MPPT. (5+8)

14. (a) Explain the process of commercial production of ethanol from biomass.

Or

(b) Describe the various stages of exploration and development of geothermal resources.

15. (a) For a typical tidal power plant shown in Figure, the basin area is 25×10^6 m^2. The tide has a range of 10 m. However, turbine stops working when the head on it falls below 2 m. Assume that density of seawater is 1,025 kg/m^2, acceleration due to gravity is 9.81 m/s^2, combined efficiency of turbine and generator is 75%, and period of energy generation is 6 h and 12.5 min. Calculate:

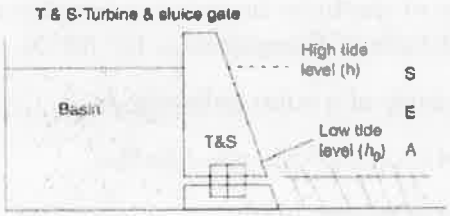

Figure. 15(a)

(i) Work done in filling or emptying the basin. (5)

(ii) Average power (4)

(iii) The energy generated in one filling process (4)

Or

(b) Explain the technologies available for OTEC.

PART C — (1 × 15 = 15 marks)

16. (a) Explain various methods of production of hydrogen for use as energy carrier.

Or

(b) Explain the working principle of various types of concentrating solar collectors with neat sketch.
