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Question Paper Code : Q 2301

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2009.

Sixth Semester

Mechanical Engineering

ME 1005 — RENEWABLE SOURCES OF ENERGY

(Regulation 2004)

Time : Three hours

Maximum : 100 marks

(Standard Tables, Charts and Data Book) are permitted)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are greenhouse gases? List down two green house gases.
2. What do you understand by greenpower?
3. Define solar constant.
4. List down the main advantages of a flat plate solar collector.
5. Mention the principle of wind energy conversion.
6. Define a geothermal source.
7. What is the difference between biomass and biogas?
8. List down the factors that affect biodigestion.
9. Mention the difference between MHD open and closed cycle systems.
10. What is the principle of a solar cell?

PART B — (5 × 16 = 80 marks)

11. (a) What is meant by renewable energy source? Explain in brief these energy sources with special reference to Indian context. (16)

Or

- (b) (i) Write a note on CO₂ emissions and global warming. (8)
(ii) What are the potential impacts of harnessing renewable energy sources? Explain. (8)

12. (a) (i) Define the following :

- (1) Altitude angle
(2) Zenith angle
(3) Latitude angle
(4) Solar azimuth angle
(5) Declination angle (10)

- (ii) List down the disadvantages of concentrating collectors. (6)

Or

- (b) (i) Describe the layout and working of a continuous solar cooling system. (8)
(ii) Explain the principle of working of solar furnace. (8)

13. (a) (i) Discuss the advantages and disadvantages of horizontal and vertical axis windmill. What methods are used to overcome the fluctuating power generation of windmill? (8)
(ii) Describe any one major application of wind energy giving a neat sketch. (8)

Or

- (b) (i) Explain the operation of a double basin tidal power plant with a sketch. (8)
(ii) Describe the three geothermal sources. (8)

14. (a) Calculate the volume of a biogas digester suitable for the output of four cows and the power available from the digester with the following data: Retention time is 20 days, temperature is 30°C, dry matter consumed is 2 kg/day, Bio gas yield is 0.24 m³ per kg. Burner efficiency is 60 %; Methane proportion is 0.8. The heat of combustion of methane may be assumed as 28 MJ/m³ at STP. (16)

Or

- (b) (i) Explain the constructional details and working of KVIC digester. (8)
(ii) Discuss the possibility of using municipal and industrial wastes. (8)

15. (a) (i) Describe the MHD closed cycle system with a neat sketch. (8)
(ii) Explain the construction and principle of a basic thermionic generator. (8)

Or

- (b) (i) Describe the principle of working of a fuel cell with reference to H_2-O_2 cell. (8)
(ii) Discuss the methods of storing hydrogen gas. (8)

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