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10ME754

Seventh Semester B.E. Degree Examination, Dec.2016/Jan.2017
Non-Conventional Energy Sources

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions, selecting atleast TWO questions from each part.*
2. Missing data may be suitably assumed.

PART – A

1 a. Elaborate on India's production and reserves of commercial energy sources. **(10 Marks)**
b. Enlist the merits and demerits of any three non-conventional energy sources. **(10 Marks)**

2 a. With schematic representation, explain the mechanism of absorption, scattering, beam and diffuse radiation received at earth surface. **(06 Marks)**
b. What are the various instruments used for solar radiation measurement? Explain pyranometer with neat sketch. **(08 Marks)**
c. Define : (i) Zenith angle (ii) Solar altitude angle (iii) Surface azimuth angle. **(06 Marks)**

3 a. Explain beam radiation and diffuse radiation. Also write the expression for tilt factor for the above two. **(06 Marks)**
b. List the different types of concentrating collectors. Explain any one of them with a neat sketch. **(07 Marks)**
c. With a neat sketch explain the working principle of solar pond. **(07 Marks)**

4 a. Explain the heat transfer process in LFPC with neat sketch and also write energy balance equation, explaining each term in it. **(08 Marks)**
b. List and discuss the various parameters that affect the performance of the collector. **(12 Marks)**

PART – B

5 a. Explain the working principle and characteristics of photovoltaic conversion. **(08 Marks)**
b. Wind blow with a velocity of 15 m/s at 15°C and 1 std atm. pressure. The turbine diameter is 120 m with operating speed 40 rpm at maximum efficiency. Propeller type wind turbine is considered. Calculate the following :
(i) Total power density in the wind stream (ii) The maximum obtainable power density
(iii) A reasonally obtainable power density (iv) Total power
(v) Torque at maximum efficiency (vi) Maximum axial thrust.
Assume R = 0.287 kJ/kg K, η = 35%. **(12 Marks)**

6 a. Explain briefly the harnessing of Tidal Energy. **(06 Marks)**
b. Explain with a sketch, the closed Rankine cycle OTEC system. **(08 Marks)**
c. Give a brief note on prospects of geothermal energy in context to India. **(06 Marks)**

7 a. Explain the constructional details and working of KVIC digester. **(10 Marks)**
b. Explain the following : (i) Photo synthesis (ii) Energy plantation. **(10 Marks)**

8 a. What are the different methods of hydrogen production? Describe the more popular method of hydrogen production. **(10 Marks)**
b. Explain briefly the methods of hydrogen storage and transportation. **(10 Marks)**

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