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10ME754

Seventh Semester B.E. Degree Examination, Dec.2013 / Jan. 2014
Non – Conventional Energy Sources

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

PART - A

1 a. Discuss with the help of recent statistics commercial and non – commercial energy reserves and production in India. **(10 Marks)**

b. Explain the advantages and limitations of the use of non – conventional sources of energy. **(10 Marks)**

2 a. Explain the following : i) Solar constant ii) Solar radiation data of India. **(06 Marks)**

b. Sketch and explain the working of shading ring pyrheliometer. **(08 Marks)**

c. Calculate the day length of location (latitude 22^0 00' W, 73^0 10' E) during the month of March. **(06 Marks)**

3 a. Name the different types of solar thermal power cycles and explain any one type, with a neat sketch. **(10 Marks)**

b. With the help of usual expression, explain the beam, diffuse and reflected solar radiation on the tilted surfaces. **(10 Marks)**

4 a. Explain transmissivity based on reflection refraction in relation to flat plate solar collector covers. **(06 Marks)**

b. Two glass covers each 3mm thick have refractive index of 1.526 and an extinction coefficient 'K' of 0.0161mm^{-1}. Calculate the transmittance taking into account the absorption and reflection both for normal incidence and an angle of incidence of 75^0 and also find the absorbtance transmittance product, if absorbtance of the absorber plate is 0.94. **(08 Marks)**

c. Write short notes on i) Solar collector heat loss coefficient ii) Solar collector performance. **(06 Marks)**

PART - B

5 a. List the four important applications of solar photovoltaic system. **(04 Marks)**

b. With a neat sketch, explain the horizontal axis wind machine. **(08 Marks)**

c. Wing at 1 standard atmospheric pressure and 20^0C has velocity of 10m/second. Calculate i) The total power density in the wind stream ii) Maximum power density iii) Actual power density, assuming $\eta = 30\%$ iv) Total power produced, if the turbine diameter is 120 m. **(08 Marks)**

6 a. Explain the mechanism of wave motion. **(06 Marks)**

b. With the neat sketch, explain the working principle of OTEC (closed) plant. **(08 Marks)**

c. State the environmental problem associated with geothermal energy conversion. **(06 Marks)**

7 a. List the factors affecting bio gas generation. Explain any four, in brief. **(10 Marks)**

b. What are the main applications of bio gas? Explain briefly the sources of production of biomass. **(10 Marks)**

8 a. What are the different methods for hydrogen production? Explain in brief. **(10 Marks)**

b. Write short notes on : i) Safe utilization of hydrogen energy ii) Hydrogen transportation. **(10 Marks)**

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