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10ME754

Seventh Semester B.E. Degree Examination, June/July 2015

Non Conventional Energy Sources

Time: 3 hrs.

Max. Marks:100

Note: Answer FIVE full questions, selecting at least TWO questions from each part.

PART – A

- 1 a. Briefly discuss the need of non-conventional energy sources for future power needs of the country. (10 Marks)
- b. Briefly discuss the solar energy options for supplying energy needs. (10 Marks)
- 2 a. Define following terms.
 - i) Solar constant I_{sc}
 - ii) Declination Angle δ
 - iii) Local solar time (LST)
 - iv) Zenith angle θ_z
 - v) Hour Angle w (10 Marks)
- b. Calculate the angle made by Beam Radiation with the normal to the flat plate collector pointing due south location in New Delhi ($28^\circ 38' N$, $77^\circ 17' E$) at 9.00 hr. Solar time on December 1st. The collector is filter at an angle of 36° with the Horizontal. Also find day length. (10 Marks)
- 3 a. Explain with a neat sketch working of a flat plate liquid collector, and any two standard panel radiators used for collectors. (10 Marks)
- b. With a neat sketch explain solar pond? List operational problems. (10 Marks)
- 4 a. Explain briefly the factors which affects the performance of flat plate liquid collectors. (10 Marks)
- b. The following data Refers to flat plate collector

$(\tau\alpha)_b = 0.727$ (Transmissivity - Absorptivity product for Beam Radiation)
 $(\tau\alpha)_d = 0.642$ (Transmissivity - Absorptivity product for Diffused Radiation)
 Length of plate = 1.5 m
 Width of the plate = 1m
 Intensity of beam Radiation = 665 W/m^2
 Intensity of Diffused Radiation = 230 W/m^2
 Tilt factor for Beam Radiation = 0.9384
 Tilt factor for Diffused Radiation = 0.9742
 Absorptivity of the plate = 0.95
 Absorptivity of the Glass = 0.88
 Collector Heat Removal factor = 0.866
 Overall loss coefficient = $4.5 \text{ W/m}^2\text{-k}$
 Water inlet Temperature = 60°
 Ambient Temperature = 25°C

Tilt factor for reflected radiation = 0.0052

Angle of incidence = 29.30°

Find :-

- i) Total solar flux incident on the collector
- ii) Incident flux absorbed by the absorber plate
- iii) Instantaneous efficiency

(10 Marks)

PART – B

- 5 a. Explain briefly any two types of Horizontal axis wind mills. (10 Marks)
- b. Discuss briefly the major problems in Harnessing wind energy. (10 Marks)

- 6 a. With a neat sketch explain the working of double basin tidal power plant. What are advantages? (10 Marks)
- b. Explain with a diagram vapour dominated Geo thermal power plant. List the operational problems. (10 Marks)

- 7 a. Discuss the factors which affect the Bio-gas production in a bio gas plant. (10 Marks)
- b. What are the applications of Bio gas? Explain the modifications needed for CI engine using Bio-gas (10 Marks)

- 8 a. With a neat sketch explain the working principle of tank type Electrolyzer for Hydrogen production. (10 Marks)
- b. Briefly discuss the methods of Hydrogen storage. (10 Marks)

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