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10EE836

Eighth Semester B.E. Degree Examination, July/August 2021
Renewable Energy Sources

Time: 3 hrs. Max. Marks:100

Note: 1. *Answer any FIVE full questions.*
2. *Missing data assumed suitably.*

1 a. What are the prospects of Renewable energy resources in India? Explain. **(10 Marks)**
b. Explain the Significance of energy consumption as a measure of prosperity. **(05 Marks)**
c. Briefly explain the Indian energy scenario. **(05 Marks)**

2 a. With a neat diagram, explain the working principle of pyranometer used for measuring global radiation. **(08 Marks)**
b. Define the following terms to solar radiation geometry.
i) Declination ii) Hour angle iii) Local solar time iv) Solar constant. **(12 Marks)**

3 a. With a neat diagram, explain the working of solar water heater. **(08 Marks)**
b. With a neat diagram, explain the working principle of solar steel and solar cooker. **(12 Marks)**

4 a. Explain clearly the advantages and disadvantages of concentrating collector over flat plate collectors. **(10 Marks)**
b. Explain how the variation of insulation and temperature affects the I-V characteristic of a solar P.V cell. **(10 Marks)**

5 a. Derive an expression for power in the wind. **(10 Marks)**
b. Wind at a velocity of 20m/s flows through a horizontal axis wind turbine having a diameter of 10m. Assume density of air = 1.293 kg/m^3. Calculate :
i) Power available in wind
ii) Power density
iii) Maximum power which can be extracted
iv) Torque at maximum efficiency, if rotor speed is 30rpm. **(10 Marks)**

6 a. Explain the various factors affecting the generation of biogas. **(10 Marks)**
b. With a neat sketch, explain the KVIC biogas plant. **(10 Marks)**

7 a. With a neat sketch, explain the principles of OTEC system. **(10 Marks)**
b. A single basin type tidal power plant has a basin area of $3km^2$. The tide has an average range of 10m, power is generated during flood cycle only. The turbine stops operating when the head on it falls below 3m. Calculate the average power generated by the plat in a single filling process of the basin if the turbine generator efficiency is 0.65. Estimate the average annual energy generation of the plant. Density of sea water may be assumed as 1025 kg/m^3. **(10 Marks)**

8 a. With neat sketch, explain the working of fuel cell. **(10 Marks)**
b. What are the advantages and limitations of small hydro resources? **(10 Marks)**

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