



Eighth Semester B.E. Degree Examination, Jan./Feb. 2021
Renewable Energy Sources

Max. Marks:100

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

PART - A

- 1 a. What are primary and Secondary energy sources? (05 Marks)
 b. Explain the significance of Energy Consumption as a measure of prosperity. (05 Marks)
 c. What are the Conventional and non-Conventional Energy Sources? Describe briefly mention the advantages of Renewable energy. (10 Marks)
- 2 a. Define the following terms:
 i) Solar Azimuth angle ii) Surface Azimuth angle iii) Solar Altitude (05 Marks)
 iv) Zenith angle (θ_z) v) Declination angle
 b. Determine the Local Solar time and declination at a location latitude $23^{\circ}15'N$. Longitude $77^{\circ}30'E$ at 12-30 IST on June 19. Equation of time Correction is given from standard chart = $-(1'01'')$. (05 Marks)
 c. What is the difference between a Pyrheliometer and a Pyronometer. Describe the Principle of Angstrom type Pyrheliometer. (10 Marks)
- 3 a. What are the main Components of a flat-plate Solar Collector. Explain with a neat big working principle and function of each components. (10 Marks)
 b. With a neat Sketch Explain the following:
 i) Solar Cooker ii) Solar Green Houses (10 Marks)
- 4 a. Explain with a neat diagram Solar Pond electric power plant with cooling tower. (10 Marks)
 b. Write Short Notes on:
 i) Solar water pumping system
 ii) Methods of energy storage (Block diagram representation) (10 Marks)

PART - B

- 5 a. Prove that in case of horizontal axis wind turbine maximum power can be obtained when:

$$\text{Exit Velocity} = \frac{1}{3} \text{ Wind Velocity and } P_{\max} = \frac{8}{27} \rho A V_1^3$$
 (10 Marks)
 b. Describe with a neat sketch the working of a Wind Energy Conversion System (WECS) with main Components. (10 Marks)
- 6 a. What is Pyrolysis? Explain with a neat figure Small Scale Pyrolysis Unit. (10 Marks)
 b. Explain the Constructional detail and working of KVIC digester. (10 Marks)
- 7 a. Explain with a block diagram Anderson cycle Ocean Thermal Electric Conversion (OTEC) (08 Marks)
 b. Explain briefly, Tidal power plant Double Basin operation. (06 Marks)

- c. The observed difference between the high and low water tide is 8.5m, for a proposed tidal site. The basin area is about 0.5sq km which can generate power for 3 hours in each cycle. The average available head is assumed to be 8m, and the overall efficiency of the generation to be 70%. Calculate the power in h.p at any instant and the yearly output. Average Specific Weight of sea water is assumed to be 1025kg/m³. (06 Marks)

- 8 a. Explain with the help of Block diagram the main components of Fuel Cell System. (10 Marks)
- b. What are the advantages and limitations of Small Scale Hydro electric power generation? (10 Marks)

