CBCS SCHEME

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18AU654

Sixth Semester B.E. Degree Examination, Dec.2023/Jan.2024
Renewable Energy Sources

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Discuss on the need for Renewable Energy Resources. **(08 Marks)**

b. List out different types of Renewable Energy Sources and briefly explain them. **(12 Marks)**

OR

2 a. What is a Solar Collector? List out different types and explain a typical liquid type flat plate collector. **(10 Marks)**

b. Outline the concept of Solar radiation measurement using a pyrheliometer, with a neat sketch. **(10 Marks)**

Module-2

3 a. List out the advantages and disadvantages of Wind Energy Conversion System (any six). **(10 Marks)**

b. How do you classify Wind Energy Conversion System (WECS) based on shaft orientation? Sketch and explain the working of a horizontal axis wind mill. **(10 Marks)**

OR

4 a. Derive an expression for power developed due to wind, using the fundamentals. If the wind velocity is halved, with other parameter being constant, what is the percent change in theoretical power? **(10 Marks)**

b. A four bladed horizontal axis wind turbine of 4m diameter rotor, rotates at 120 rpm when wind velocity is 10m/s. Assuming a power coefficient of 0.35, density of air as $1.24 kg/m^3$, determine i) the theoretical and actual power ii) tip speed ratio and solidity ratio. Take a mean chord length of 0.20m. **(10 Marks)**

Module-3

5 a. Define Geothermal Energy and discuss its advantages and disadvantages. **(10 Marks)**

b. Classify Hydrothermal systems. Using a schematic and T – S diagram, explain the working of a vapour dominated (dry steam) system. **(10 Marks)**

OR

6 a. What are the Operational and Environmental problems of Geothermal Energy? Discuss any five such problems. **(10 Marks)**

b. Describe with a schematic sketch, a binary cycle liquid dominated system. Represent all the processes on a T – S diagram. **(10 Marks)**

Module-4

7 a. Sketch and explain the working of a hybrid cycle based to harness Ocean Thermal Energy. **(10 Marks)**

b. Mention the advantages and disadvantages of Ocean Thermal Energy. Discuss on the difficulties associated with OTEC **(10 Marks)**

OR

8 a. Sketch and explain the working of a Tidal power generation system. **(10 Marks)**

b. List out the components of a typical tidal power plant. Discuss the advantages and limitations of tidal power. **(10 Marks)**

Module-5

9 a. Discuss briefly, different methods of storing hydrogen. **(10 Marks)**

b. List out and briefly explain the civil work design considerations for mini and micro hydel projects. **(10 Marks)**

OR

10 a. Sketch and explain the working of a bulb type turbine used in a small hydro plant. **(10 Marks)**

b. Determine i) Hydraulic efficiency ii) Overall efficiency iii) Volume flow rate of water iv) Plant power generating capacity in kW for a small hydel plant working under a net head of 20m. The water is supplied at 60kg/s accounting a head loss of 2m. Assume the mechanical and generator efficiencies as 94% and 98% respectively. **(10 Marks)**

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