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18ME651

Sixth Semester B.E. Degree Examination, Feb./Mar. 2022

Non-Conventional 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. What are conventional and non-conventional energy sources? (04 Marks)
- b. Explain the energy sources from Tarsand's and oil shale. (08 Marks)
- c. With neat sketch, explain the working principle of Pyreliometer. (08 Marks)

OR

- 2 a. Write notes on: (i) Solar constant (ii) Beam radiation (iii) Diffuse radiation (06 Marks)
- b. Discuss the India's production and reserves of commercial energy sources. (10 Marks)
- c. With a neat sketch, explain Sunshine recorder. (04 Marks)

Module-2

- 3 a. With reference to the solar radiation geometry, define the following:
(i) Latitude angle (ii) Declination angle (iii) Solar altitude angle
(iv) Hour angle (v) Solar Azimuth angle (10 Marks)
- b. Calculate the angle made by beam radiation with the normal to a flat collector on December 1st at 9.00 am, solar time for a location at 28°35' N. The collector is tilted at an angle of latitude plus 10°, with the horizontal and is pointing due south. (10 Marks)

OR

- 4 a. Explain the solar energy thermal storage system. (08 Marks)
- b. What are the advantages and disadvantages of concentrating collectors over flat plate collectors? (06 Marks)
- c. With neat sketch, explain the principle and working of solar pond. (06 Marks)

Module-3

- 5 a. With neat sketch, explain the main components of solar flat plate collector. (08 Marks)
- b. Explain transmissivity based on reflection-refraction. (08 Marks)
- c. Explain energy balance equation for liquid flat plate collector. (04 Marks)

OR

- 6 a. Discuss overall loss coefficient with respect to flat plate collectors. (08 Marks)
- b. Explain the parameters affect the performance of the flat plate collectors. (06 Marks)
- c. Explain the working principle of photovoltaic energy conversion. (06 Marks)

Module-4

- 7 a. Discuss the factors for wind turbine site selection. (04 Marks)
- b. Wind at 1 standard atmospheric pressure and 15°C has velocity of 15 m/s, turbine diameter = 120 m, calculate:
(i) The total power density in the wind stream
(ii) The maximum obtainable power density
(iii) A reasonably obtainable power density
(iv) The total power (08 Marks)
- c. With neat sketch, explain the double basin Tidal Power plant operation. (08 Marks)

OR

- 8 a. With neat sketch, describe the closed cycle OTEC system, with its advantages over open cycle system. (10 Marks)
- b. What are the advantages and limitations of Tidal Power generation? (06 Marks)
- c. What are the advantages of vertical axis wind machines over horizontal axis wind machines? (04 Marks)

Module-5

- 9 a. With neat sketch, explain binary cycle geothermal power system. (06 Marks)
- b. List the disadvantages of geothermal power plants. (04 Marks)
- c. Explain with neat sketch constructional details of floating drum type (KVIC) biogas plant. (10 Marks)

OR

- 10 a. Discuss the application of biogas in engines. (06 Marks)
- b. With neat sketch, describe the production of hydrogen by electrolysis of water. (08 Marks)
- c. Brief the main applications of hydrogen gas. (06 Marks)
