CBCS SCHEME

USN | | | | | | | | | | |

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)

* * * * *