



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

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Enumerate the principle causes of Energy Scarcity in India. (04 Marks)
- b. What are Renewable Energy Sources? Briefly discuss about the status of installed capacity of Renewable Energy Sources in India. (06 Marks)
- c. Define the following terminologies based on Earth – Sun angles and their relationship with suitable diagram. i) Hour angle ii) Declination angle iii) Equation of Time. (06 Marks)

OR

- 2 a. Mention the five factors that affect the Energy Resource development in India. (05 Marks)
- b. Calculate the hour angle at sunrise and sunset on June 21 for a surface inclined at an angle of 10° and facing due south ($\gamma = 0^{\circ}$). The surface is located in Mumbai ($19^{\circ} 07' N, 72^{\circ} 51' E$). (05 Marks)
- c. Explain briefly about the Solar Thermo – Electric Conversion system. (06 Marks)

Module-2

- 3 a. What are Concentrating Collectors? Enumerate the various types of Concentrating Collectors. (04 Marks)
- b. With the help of a neat sketch, explain the Solar Water Heating System using Solar Collectors. (08 Marks)
- c. A specific solar cell has an output capability of 0.5A at 0.4V. Assume that an array of such cells with 100 parallel strings and each string with 300 cells in series is to be building up. What will be the array output voltage (V_a), array current (I_a) and array output power (P_a) (04 Marks)

OR

- 4 a. What are the main components of Flat Plate Collector? Mention the functions of each component. (06 Marks)
- b. Explain briefly the use of solar pond in rural areas for generation of electricity. (06 Marks)
- c. Mention the factors limiting the efficiency of a Solar Cell. (04 Marks)

Module-3

- 5 a. Discuss briefly about the different methods of Hydrogen Production technologies. (06 Marks)
- b. Describe the main guidelines for selecting a site for Wind generators. (06 Marks)
- c. Mention the Environmental effects of Geothermal Energy. (04 Marks)

OR

- 6 a. What are the advantages and disadvantages of Hydrogen Energy? (04 Marks)
- b. With a suitable schematic diagram, explain the waste recovery management scheme. (06 Marks)
- c. Explain the Single Flash Geothermal based Electric Power Generation. (06 Marks)

Module-4

- 7 a. Define Biomass Gasification and explain briefly. (06 Marks)
 b. Describe the construction and working of a Fixed Dome Type Biogas plant. (06 Marks)
 c. Mention the advantages and disadvantages of Tidal Power generation. (04 Marks)

OR

- 8 a. List the different types of Gasifiers. Explain briefly about the Fluidized Bed Gasifiers. (08 Marks)
 b. Enumerate the factors considered for the selection of Biogas plant. (04 Marks)
 c. Show that the potential power P , generated by a Tidal power plant is estimated as :
 $P = 0.226 A H^2$ watts, where A is the surface area of the reservoir (m^2) and H is the tidal range (m). (04 Marks)

Module-5

- 9 a. A 2m sea wave has a 6 sec period and occurs at the surface of 100-m deep water. Assume sea water density as $1,025kg/m^3$. Calculate the energy and power densities of the wave. (06 Marks)
 b. What is the principle of OTEC (Ocean Thermal Energy Conversion]? Briefly explain the closed cycle OTEC plant. (06 Marks)
 c. Write a short note on Carnot Cycle. (04 Marks)

OR

- 10 a. Mention the devices used for harnessing wave energy. (04 Marks)
 b. Explain the basic Rankine cycle for OTEC. (06 Marks)
 c. What are the advantages and disadvantages of OTEC? (06 Marks)


