



Seventh Semester B.E. Degree Examination, Jan./Feb. 2021
Non Conventional Energy Sources

Time: 3 hrs.

Max. Marks: 100

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

PART – A

- 1 a. With sketches, explain the production of oil from oil shale and tar sands. (10 Marks)
 b. Explain the advantages and limitations of use of Non-conventional Energy resources. (10 Marks)
- 2 a. With a neat sketch, explain the working of pyrheliometer. (08 Marks)
 b. Explain beam, diffuse, reflected and total radiation on a tilted surface. (06 Marks)
 c. Calculate angle made by beam radiation with normal to a flat plate collector on December 1st at 9.00AM, 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. (06 Marks)
- 3 a. Describe solar pond for solar energy collection and storage. (10 Marks)
 b. List out the different concentrating solar collectors and explain the working principle with schematic diagram of any one concentrating collector. (10 Marks)
- 4 a. Explain the effect of following parameters on the collector performance
 i) Collector orientation
 ii) Selective surface coating
 iii) Fluid inlet temperature
 iv) Number of covers (10 Marks)
 b. Data for a flat plate collector used for heating the building are given below:

Factor	Specification
Location and Latitude	- Baroda, 22°N
Day and time	- January 1, 11:30 – 12:30 (IST)
Annual average intensity of solar radiation	- 0.5 Langley/min
Collector tilt	- Latitude + 15°
Number of glass covers	- 2
Heat removal factor for collector	- 0.81
Transmittance Absorptance product ($\tau \cdot \alpha$)	= 0.811
Top loss coefficient for collector	= 7.88 W/m ² °C
Collector fluid temperature	= 60 °C
Ambient temperature	= 15 °C

Calculate :

 - i) Solar altitude angle
 - ii) Incident angle
 - iii) Collector Efficiency. (10 Marks)

PART – B

- 5 a. Explain the problems associated with wind power. (10 Marks)
b. Wind at 1 standard atmospheric pressure and 15°C has velocity of 15m/s, calculate
i) Total power density in the wind stream
ii) Maximum obtainable power density
iii) Total power
iv) Torque at maximum efficiency and maximum axial thrust. (10 Marks)
- 6 a. With a neat sketch, explain the concept of liquid dominated system of generating geothermal energy. (10 Marks)
b. Sketch and explain double basin type tidal power generation. (10 Marks)
- 7 a. Explain with sketch how biogas is produced in an Indian type biogas plant. (10 Marks)
b. Explain the benefit and application of biomass. (10 Marks)
- 8 a. With a neat sketch, explain the working principle of tank type electrolyser for hydrogen production. (10 Marks)
b. Write short notes on :
i) Merits of hydrogen Energy
ii) Transportation of Hydrogen. (10 Marks)
