

# CBCS SCHEME

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18ME651

## Sixth Semester B.E. Degree Examination, Jan./Feb. 2023 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. Elaborate on India's Production and reserves of commercial energy sources. (10 Marks)
- b. Briefly describe energy alternatives (i) Photovoltaic (ii) Tar Sand and oil shale (10 Marks)

OR

- 2 a. Write a note on spectral distribution of extra terrestrial radiation. (10 Marks)
- b. With neat sketch explain (i) Sunshine recorder (ii) Pyrometer. (10 Marks)

### Module-2

- 3 a. Define the following :  
i) Declination angle ii) Hour angle iii) Latitude iv) Zenith angle. (12 Marks)
- b. Determine the local solar time and declination at a location latitude  $23^{\circ} 15' N$ , longitude  $77^{\circ} 33' E$  at 12.30 IST on June 19.  
Equation of time correction is  $= -(1'01'')$  (08 Marks)

OR

- 4 a. With neat sketch explain any two types of concentrating collectors. (12 Marks)
- b. Explain sensible heat and latent heat thermal energy storage. (08 Marks)

### Module-3

- 5 a. Write a short note on collector efficiency factor and collector heat removal factor. (08 Marks)
- b. Explain heat transfer process in LFPC with neat sketch and also write energy balance equation explaining each term in it. (12 Marks)

OR

- 6 a. Explain working principle, characteristics and application photovoltaic conversion. (12 Marks)
- b. Explain any four parameters that affect the performance of the collector. (08 Marks)

### Module-4

- 7 a. What are the constraints in wind energy utilization? (06 Marks)
- b. Write a classification of wind mills. (04 Marks)
- c. With sketch explain horizontal axis wind mill. (10 Marks)

OR

- 8 a. A 10 m/s wind is at 1 standard atmospheric pressure at  $15^{\circ}C$  temperature, calculate:  
(i) Total power density in the wind stream  
(ii) Maximum obtainable power density  
(iii) A reasonable obtainable power density in  $W/m^2$   
(iv) Total power in (kW) if turbine diameter is 120 m  
Assume conversion efficiency = 40%. (12 Marks)
- b. Explain principle of generation of tides. (08 Marks)

**Module-5**

- 9 a. List various sources of geothermal energy. What are the problems associated with geothermal energy conversion? (08 Marks)
- b. Write a note on:
- (i) Energy Plantation (ii) Anaerobic fermentation. (12 Marks)

**OR**

- 10 a. What are the problems involved in production of biogas. (05 Marks)
- b. List any five sources of Hydrogen. (03 Marks)
- c. Explain the process of electrolytic production of hydrogen with a neat sketch. (12 Marks)

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