

# GBCS 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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