Total number of printed pages: 1

PG/1st/PGET103

2023

Fundamentals of Energy Technology

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1. a) Write the common forms of energy? 5

   b) 100 watt motor operates for three hours per day. What will be the per day expenditure if one unit cost is Rs. Six. 5

   c) Write the classification of solar absorber plate. 5

   d) Draw the sketch of liquid flat plate collector showing its different components. 5

2. a) Write about diffused radiation. 5

   b) Write about the energy scenario in India. 5

   c) Calculate the total wind power in an area where the average wind speed is 6 m/s, using a wind power power plant with a 60 m rotor diameter. Assume air temperature is 25 degree centigrade with a density of 1.225 kg/m^3. 10

3. a) Write about the spectrum of electromagnetic radiation. 5

   b) Write about the Sun. 5

   c) Calculate the solar intensity or solar flux on June 22 and December 21 10

4. a) What is aerodynamic efficiency? 5

   b) Write the basics of heat transfer. 5

   c) Derive the transmissivity based on reflection-refraction. 10

5. a) Write the advantages and disadvantages of solar photovoltaic conversion. 5

   b) Write the construction PV cell. 5

   c) Calculate the hour angle at 1400 hrs. 5

   d) What is the wavelength range of radiation absorbed by Ozone. 2.5

   e) When Air Mass is minimum? 2.5

6. a) Write the production process of monocrystalline silicon solar cell. 5

   b) Write the different types of PV cell materials and its conversion efficiency. 5

   c) For Mumbai (longitude: 72^{o}49′ E and latitude: 18^{o}54′ N), incidence of direct irradiance/solar radiation is observed on an inclined surface at 45^o from the horizontal with orientation of 30^o west of south at 1.30 (solar Time) on December 15, 2022. The standard longitude for India is 81^{o}44′ E. Calculate the value of Equation of time (E). Also calculate the angle of incidence of direct irradiance/solar radiation. 10