

Total No. of Questions : 4]

SEAT No. :

PA-10229

[6010]- 105

[Total No. of Pages : 2

B.E. (Mechanical Engineering) (Insem)

RENEWABLE ENERGY TECHNOLOGIES

(2019 Pattern) (Semester - VIII) (Elective - VI) (402051 B)

Time : 1 Hour]

[Max. Marks : 30

Instructions to the candidates:

- 1) *Solve Q.1 or Q.2, Q.3 or Q.4.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of electronic pocket calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

- Q1)** a) Write short note on: JNNSM policies and initiatives. [5]
b) Define solar irradiance, solar constant, extra-terrestrial and terrestrial radiance? What is the standard value of solar constant? [5]
c) Calculate the angle made by beam radiation with the normal to a flat plate collector on 31st March at 10.00 am solar time. The collector is located at Bombay (19° 07' N and 72° 51' E) is tilted at an angle of 30° with the horizontal and pointing due south. [5]

OR

- Q2)** a) Bring out the significance of utilization of renewable energy sources in the context of world energy scenario. [5]
b) With the help of a neat sketch explain the solar pyrheliometer. [5]
c) A propeller type wind turbine has following data [5]
Speed of wind at a height of the 10 m = 12 m/s
Air density = 1.226 kg/m³
Height of tower = 100 m
Diameter of rotor = 80 m
Power coefficient = 0.35
Transmission efficiency = 80%
Generator efficiency = 85%
Find:
i) Total power available in wind
ii) Power extracted by wind turbine
iii) Electrical power generated

P.T.O.

Q3) a) Calculate heat loss from the flat plate collector with two glass covers with following data: [7]

Size of absorber plate = 1.9 m × 0.9 m

Height of collector casing = 16 cm

Mean plate temperature = 70° C

Ambient air temperature = 24° C

Back insulation thickness = 8 cm

Side insulation thickness = 4 cm

Thermal conductivity of insulation = 0.05W/mK

Convective heat transfer coefficient between top cover and the surrounding air = 5.7 W/m² K

Emissivity of glass cover = 0.88

Assume temperature of sky (T_{sky}) is 6° C lower than ambient temperature and temperature of top glass cover as 32° C.

b) Classify concentrating type of collector. Discuss their advantages and disadvantages. Explain construction and working of any one type of concentrating collector. [8]

OR

Q4) a) Draw a neat sketch of solar air heater and explain its principle of working. [5]

b) Solar drying is superior to traditional drying, explain in brief. What are different types of solar driers? Enlist any three applications. [5]

c) Explain with neat sketch procedure for testing liquid flat plate collector. [5]

