

Roll No.

Total No. of Pages : 02

Total No. of Questions : 08

M.Tech.(ME) (Sem.-3)

SOLAR ENERGY

Subject Code : MME-577

M.Code : 38224

Time : 3 Hrs.

Max. Marks : 100

INSTRUCTION TO CANDIDATES :

1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carries TWENTY marks.

1. a) What are the characteristics of the solar spectrum? Which part of the spectrum is known as visible spectrum? 10
b) Why it is advisable to tilt a non-tracking solar system at an angle equals to the latitude angle? Justify your answer. 10
2. Find the solar altitude and azimuth angles at solar noon in Canberra, Australia, on February 1. Also find the sunrise and sunset times in Canberra on that day.
Latitude = 35.3 °S
Longitude = 149.18 °E
Standard Meridian = 150 °E 20
3. a) List instruments used for measurement of solar radiation intensity. Explain any one with neat sketch. 10
b) Explain working of solar cooker with neat sketch. 10
4. a) Define the following terms : 8
(1) Solar Altitude Angle
(2) Declination Angle
(3) Hour Angle
b) Write short note on effect of various parameters on performance of flat plate collectors. 12

5. You have to generate hot water utility for a small food processing industry that needs 20000 litres hot water. Solar radiation available on the location is $10 \text{ kWh/m}^2\text{-day}$. The temperature of the feed water is 25°C and it is to be heated up to 200°C . Which types of collectors can cater to the demand? Why? 20
6. What do you mean by thermal energy storage system? List and explain the various systems. 20
7. Make a preliminary design for a solar driven Rankine refrigeration machine to provide the temperature environment required below the surface of a $20 \times 40 \text{ m}$ ice skating rink that is to operate all year in the vicinity of Denver, Colorado. State all your assumptions. 20
8. Explain how window placement in a building could be defined as :
- (a) Passive solar feature 7
 - (b) Energy conservation technique, and 7
 - (c) Both of the above. 6

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.