A P J ABDUL KALAM TECHNOLOGICAL UNIVERSITY
M.TECH DEGREE EXAMINATION, DECEMBER 2020
FIRST SEMESTER

Energy Management

Solar Energy Engineering

Time: 3 Hrs   **Maximum Marks:60**

PART A

Answer ALL Questions. Use of approved data book is permitted.

1) Define the following terms:
   (i)   Angle of Incidence
   (ii)   Declination
   (iii)   Surface Azimuth angle
   (iv)   Solar Azimuth angle

2) What is a sun shine recorder? Explain its working with a suitable sketch

3) Explain the working principle of an evacuated-tube collector with a schematic diagram. Mention their indicative temperature ranges and concentration ratios also

4) Explain the working of a solar powered solid desiccant dehumidifier with a suitable sketch

                                                                            4 x 5 marks = 20 marks

PART B

5) Determine the number of sunshine hours for New Delhi on December 22 and June 22, 2013

OR

6) A surface tilted 45° from horizontal and pointed 10° west of due south is located at 35°N latitude. Calculate the incident angle at 2h after local noon on June 16

7) Determine the extra-terrestrial normal radiation and the extra-terrestrial radiation on a horizontal surface on March 10 at 2:00 pm solar time for 35°N latitude

OR

8) Explain the construction and working principle of a pyranometer used in the measurement of solar radiation. How a Pyranometers may be modified to measure only the diffuse component of the global horizontal radiation?

9) Discuss the classification of solar collectors mentioning the salient features of each

OR

10) For a FPC with a top-loss coefficient of 6.6 W/m² °C, determine the overall loss coefficient by using following data:

Back insulation thickness = 0:045 m
insulation conductivity = 0.04 W/m² °C
Collector bank length = 8m
Collector bank width = 2:5m
Collector thickness = 0:08 m
Edge insulation thickness = 0:02m

11) Describe the operational steps involved in the working of a solar powered ammonia vapour absorption refrigeration system with a block schematic diagram

OR

12) Discuss on
(i) the advantages of monocrystalline silicon cell over multicrystalline silicon cell
(ii)the I-V characteristics of a solar cell and explain how the irradiation and cell temperature influences it.

4 x 10 marks = 40 marks