VIT

Vellore Institute of Technology

Continuous Assessment Test – I

Programme Name & Branch: BTech (BEM, BCE, BEC, BME, BEE, BMA)

Course Name & Code: MEE1038-SOALR PHOTOVOLTAIC SYSTEM DESIGN

Class Number: 1609 Slot: E2 Exam Duration: 90 mins Maximum Marks: 50

General instruction(s):

- ATTESTED DATA SHEET IS PERMITTED.
- **Coordinates of New Delhi are: (77°13' E, 28°40' N)**

Answer ALL questions (5 x 10 = 50 Marks)

1. a) Why do the seasons occur and explain the relevance of Earth's orbit around the Sun for change in solar radiation on a surface at a location on the Earth [5 Marks] 4

   b) Explain 'declination' of the sun. What is its maximum and minimum value? What is its relevance or impact on PV design? [5 Marks] 3

2. a) Calculate today's angle of incidence on a surface at New Delhi at 10:30 a.m. (LAT), if the surface has a tilt angle of 35° and pointed 10° east of south. [7 Marks] 5

   b) What will be the angle of incidence if the same surface mentioned above is horizontal? Reduce the above equation to a horizontal surface and evaluate [3 Marks] 3

3. Find today's position of the sun at 10:30 a.m. and 2:30 P.M. for New Delhi [10 Marks]

4. Explain the Physics of solar cell operation [10 Marks] 4

5. a) Using an IV curve, explain how temperature of a cell influences the power output of a PV module? [5 Marks] 4

   b) Solar radiation data for New Delhi for a specific day is given below. Find its 'peak-sun hours'. [5 Marks]

Time of the day, hr	9 – 10	10 – 11	11 – 12	12 - 13	13 14
Solar Radiation (W/m^2)	300	500	800	800	400