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EIGHTH SEMESTER   B.TECH. [EP]

MID SEMESTER EXAMINATION   (March - 2019)

EP-40₺   *ALTERNATIVE ENERGY STORAGE AND CONVERSION DEVICES*

Time: 1 Hour 30 Minutes   Max. Marks: 30

Note: Answer *All FIVE* questions
           Assume suitable missing data, if any.

1.(a). What is albedo? Explain the distribution of solar radiation in different regions.   [3]

   (b). Consider the rate of the solar radiation per m^2 in extraterrestrial region (I_{sc}) is 1367 W/m^2 and diameter of earth is 12.75×10^6 m. Calculate the average earth's temperature in absence of atmosphere ($\sigma = 5.672 \times 10^{-11}$ kW/m^2K^4).   [3]

2.(a). Explain the 'declination' and 'latitude' angles with proper ray diagram.   [3]

   (b). Determine the declination angle on 23 September, 1995.   [3]

3.(a). Explain 'anemometer', 'eolergometer' and 'savonious rotor'.   [3]

   (b). Discuss the characteristics of wind turbine for a GE-3.6 model and find out the generated power output by this model.   [3]

4.   Define insolation. Discuss about collection of solar thermal energy using solar architecture. Consider a house with inside temperature of 30 °C and the attic temperature of 0 °C. The ceiling has an area of 100 m^2 and is insulated with R-10 material. How much heat is lost through attic? (R10 = 1.78 m^2KW^{-1}).   [6]

5.   What are cascade type photo cells? Discuss the working of these cells. How these cells can improve the efficiency of a photo cell? An ideal photodiode is made of a material with a bandgap energy 2.35 eV. It operates at 300 K and is illuminated by monochromatic light with wavelength of 400 nm. What is its maximum efficiency?   [6]