JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST -2 EXAMINATIONS-2022
B.Tech-VIII Semester (CS/Civil/BT)

COURSE CODE: 21B1WEC732   MAX. MARKS: 25

COURSE NAME: Renewable Energy Systems

COURSE CREDITS: 3   MAX. TIME: 1 Hour 30 Min

Note: All questions are compulsory. Marks are indicated against each question in square brackets.

Q1. Explain Thermal Energy Storage systems. Also discuss sensible heat storage and latent heat storage with examples. [3]

Q2. What are Thermochemical storage systems, explain with examples including the reactions. [3]

Q3. Prove that the maximum efficiency of HAWT is less than 60%. [4]

Q4. What are Wind Mills and its types, also discuss the components of general Wind Mills. [3]

Q5. Can we use Solar Energy for Industrial Purpose? If yes, how will you characterize it according to application temperature? [3]

Q6. Consider a spherical body of 50 cm in diameter at 300°C suspended in the air.

   a) Assuming it a blackbody determine the rate at which it emits the radiation energy.

   b) The spectral emissive blackbody power at wavelength of 2 μm.

   c) Also determine the maximum wavelength when it peaks the radiation. [2 + 1 +1]

Q7. A tall grass location is chosen for wind farm project with a wind speed of 3.5 m/s at a height of 20 m. The hub height of VAWT is 120 m. The blade diameter if taken as 50 m. Density of air is taken 1250 gm/m³. If the overall efficiency is 31%, determine the electric power output and energy generated in 1 week in kWh. [3]

Two manufacturer A and B bids for the installation of the project. A produces turbine of 2 kW turbines at 50,000 Rs and assumes wind speed 8m/s. B produces turbines of 2.5 kW turbines at 40,000 Rs and assumes wind speed 10 m/s. Which company will get the bid, Justify your answer with suitable data? [2]

--Important Constants--

$\sigma = 5.67 \times 10^{-8}\ W/m^2,\ h = 6.6 \times 10^{-34} J.s,\ k = 1.38 \times 10^{-38} J/K$

Friction coefficients: $\alpha_{smooth\ surface} = 0.1, \alpha_{tall\ grass} = 0.15$