

R16

Code No: 138EN

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech IV Year II Semester Examinations, July - 2021

RENEWABLE ENERGY SOURCES

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 75

**Answer any Five Questions
All Questions Carry Equal Marks**

1. A Hyderabad based MNC wants to setup a Power Plant in a rural area around 100 km north to Hyderabad, What kind of power plant would be good? Using SWAT or similar analysis recommend them what kind of power plant they should prefer. [15]
2. Differentiate between: a) Primary and Secondary Sources, b) Renewable and Non-Renewable Sources, c) Conventional and Non-Conventional. [15]
3. Calculate the angle made by the beam of radiation with the normal to the flat collector on June 1 at 11.00AM solar time for the location latitude $16^{\circ}98'N$. The collector is tilted at angle of latitude plus 15° with horizontal and it is pointing due south. [15]
4. Consider a Propeller type wind turbine of 120 m with an operating speed of 40 r.p.m. at its maximum efficiency. Calculate a) The total power density of the wind stream, b) The maximum obtainable power density, c) The reasonably attainable power density, d) The total power, e) The torque and Axial Thrust. [15]
5. The following data are given for a family biogas digester suitable for the output of 8 cows, the retention time is 15 days, temperature is $35^{\circ}C$, the dry matter consumed per day is 2.5 Kg and the biogas yield is 0.28 m^3 per Kg. The efficiency of the burner is 65% and methane proportion is 0.7, and the heat combustion of methane is 28 MJ/m^3 . Calculate the volume of the biogas digester and the power availability from the digester. [15]
6. Discuss about the anaerobic digestion and the factors helping the anaerobic digestion with the factors affecting the anaerobic digestion. Name the various models of biogas plant. [15]
7. A hot water geothermal power plant received waters at $250^{\circ}C$, the pressure at turbine inlet is 11.5 kg/cm^2 . The plant uses a direct contact condenser that operates at 0.35 kg/cm^2 . The turbine has a polytropic efficiency of 0.7. For a cycle output of 15 MW calculate the a) the cycle efficiency and b) plant heat rate. [7+8]
8. Describe the Closed cycle OTEC system with its advantages over Open cycle OTEC system. [15]

---ooOoo---