## Renewable Energy Engineering- CHE 4070

End-semester Examination (Nov-2022)

## Type: DES

Q1. Explain in detail about various kinds of Gasifiers. What is torrefaction (3)

Q2. With the help of a neat diagram explain the working of a floating gas holder-type biogas plant. (3)

Q3. Describe the working of various types of windmills. What are the various factors that affect wind power? (4)

Q4. Justify the statement "Air type flat plate collectors are less efficient than liquid type collectors". Explain the working of a liquid-type flat plate collector. (3)

Q5. Explain the working of the solar pond with the help of a neat diagram. (4)

Q6. Why is the pretreatment process important before the conversion process of biomass? Also, explain different pretreatment processes. (3)

Q7. A biomass gasifier is used to run an ignition engine. The engine operates in dual fuel mode with 85% diesel replacement. The system produces 300kW of power. Calculate the biomass feeding rate to the gasified if the efficiency of the engine is 30% and the calorific value of biomass is 16000kJ/kg. consider the efficiency of the gasifier as 0.7. (4)

Q8. With the help of a neat diagram explain the working of the Closed loop air-conditioning system using an air tunnel. (3)

Q9. What is the process which produces liquid fuel from biomass? Explain in detail the process with the help of a neat diagram. (3)

**Q10.** Evaluate the main dimensions of the wind machine rotor with several blades= 25, blade length= of 1.5m, and solidity=0.6 operating at a speed of 30 kmph. The machine operates a wind pump with a capacity of 7 m3/h and a lift of 10 m. Consider the density of water as 996 kg/m<sup>3</sup>. Pump efficiency and transmission efficiency as 0.5 and 0.8 respectively. Take the density of air as 1.2kg/m<sup>3</sup>, C<sub>pmax</sub>=0.16, and  $\lambda = 0.8$ . (3)

Q11. Explain in detail about types of hydropower plants. A community requires 60 kW of power output to meet its daily electricity needs. If the site survey indicates 100 m of gross

head to be available, what design discharge is required to meet the community's electricity needs? Assume an overall efficiency of 55%. (4)

Q12. Explain the operating principle of a wind turbine. Define the Thrust Coefficient and wind efficiency of a wind turbine. (3)

Q13. Compare the liquid desiccant cooling system and a solid desiccant system. Clearly explain it's working. (3)

Q14. Explain in detail the various stages of anaerobic digestion and mention any two advantages of the anaerobic digestion process. (4)

Q15. Define solar declination, solar altitude, azimuthal, and zenith angles. (3)