KERALA AGRICULTURAL UNIVERSITY

B.Tech.Food Engg. 2016 Admission

II Semester Final Examination – July - 2017

Cat. No: Meen 1203 **Marks: 50**

Title: Engineering Thermodynamics (2+1) **Time : 2 hours**

I. Fill up the blanks: **(10 x 1=10)**

1. A thermodynamic system remains practically in equilibrium at all times in a ---------- process.
2. For steam at 1 MPa, the saturation temperature is ---------- ° C and latent heat is ---------- J/kg.
3. The ratio of mass of vapor to the mass of liquid in a liquid vapour mixture is called ----------
4. Stirling cycle consists of two reversible ---------- and two reversible ---------- processes.

State True or False:

5. Enthalpy of an ideal gas depends only on temperature.
6. The cyclic integral of a thermodynamic property is always greater than zero.
7. A process always occurs in such a direction as to cause a decrease in the entropy of the universe.

Define:

8. PMM2.
9. Compression ratio.
10. Triple point of water.

II. Write short notes on ANY FIVE: **(5x 2=10)**

1. What is meant by thermodynamic system? How it is classified?
2. Differentiate between intensive and extensive properties.
3. State Zeroth law of Thermodynamics. What is it application?
4. What is meant by a reversible process?
5. Sketch the PV and TS diagrams of a Carnot cycle and identify the various processes.
6. A gas has C_p =1.9 and C_v =1.5 kJ/kg-K. Compute the molecular weight and characteristic gas constant of this gas.
7. 1 kg of water at 0 °C is heated and completely converted to superheated steam at 150 °C at 1 atmospheric pressure. Show the phase change process on a TS diagram.

III Write answers on ANY FIVE: **(5 x 4=20)**

1. Derive the expression for pdV work, when an ideal gas of mass m undergoes a reversible isothermal process from state 1 to state 2.
2. Write the Van der Waals equation of state and explain the terms. How does it is different from Ideal gas equation of state?
3. Write down Clausius-Clapeyron equation and explain its significance.

4. Air is compressed reversibly according to the law $pv^{1.25}$ =const. from an initial
   1 bar and volume of 0.9 m^3 to a final volume of 0.6 m^3. Determine the final pressure
   the change in entropy per kg or air.
5. Explain the P-V- T surface of a pure substance with a neat sketch.
6. What are the important assumptions used in the analysis of air-standard cycles?
7. Steam at 30 bar and 400 ° C is expanded isentropically in a steam turbine to 0.06 bar. Find
   the enthalpy and dryness fraction of steam at the end of expansion.

IV. Write essay on any ONE **(1 x 10=10**

1. State the Kelvin-Plank and Clausius statement of second law of thermodynamics. Establis
   the equivalence of both statements.
2. Explain Ericsson cycle. Using an ideal gas as the working fluid, show that the therm
   efficiency of an Ericsson cycle is identical to the efficiency of a Carnot cycle operati
   between the same temperature limits.

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