KERALA AGRICULTURAL UNIVERSITY

B.Tech (Food.Engg) 2012 Admission

II[nd] Semester One time Special Re-Examination-June -2016

Cat. No: Meen. 1203 **Marks: 80.00**

Title: Engineering Thermodynamics (2+1) **Time: 3 hours**

I. Fill up the blanks and state true or false **(10x1 = 10)**

1. Thermo couple is working based on the principle of _________ effect.
2. The air standard efficiency of Otto cycle is given by the expression __________.
3. The _________ is a point in P–V–T space defined by the highest possible temperature and the highest possible pressure for which distinct liquid and gas phases can be observed.
4. Entropy may be measured as a function of _________ and __________.
5. For atmospheric air 'Cp/Cv' is equal to _______.
6. A closed system goes from state 1 to state 2 in a process for which Q= 0 and W= 100 kJ. Then the ststem is returned to state 1 in a second process for which W= - 80 kJ. The heat transfer for the second process will be _________.
7. The characteristic equation of a gas is ___________.
8. The value of universal gas constant is ________ J/kg/K.
9. An ideal gas undergoes a process in which PV^n = constant. When n = 1 it may also be called ___________.
10. A device that transfers heat from a body at a lower temperature to a body at higher temperature is _____________.

II. Write short notes on ANY TEN **(10x3 = 30)**

1. Differentiate intensive and extensive properties.
2. Draw the P-T diagram of a pure substance.
3. What is Quasi – static process?
4. Give the Kelvin-Planck statement and Clausius statement of the second law.
5. Differentiate positive and negative heat transfer.
6. Define super heated steam.
7. Define mechanical equilibrium.
8. Explain briefly Classes of system with fig.
9. Define latent heat of vapourization.

10. Define Isentropic process.
11. What is two-stage compressor?
12. Draw the P-T diagram of a pure substance.

III. Write short essays on ANY SIX **(6x5 = 30)**

1. Write on constant volume process with P-V-T relationship.
2. What is meant by volumetric efficiency of a compressor? Explain how the clearance affects it.
3. Establish the inequality of Clausius.
4. Explain the work done of an adiabatic process with a P-V diagram.
5. Explain free expansion process.
6. Determine the volume coupled by a given mass of air occupies 2 cubic meter at 15°C. The pressure remains unchanged.
7. 5 kg of nitrogen is heated in a reversible, non-flow, constant volume process, till the pressure becomes three times the initial. The initial temperature was 100°C. Determine (i) the final temperature (ii) the change in internal energy (iii) the change in enthalpy (iv) the heat transfer.
   Assume c_p = 1.04 kJ/kgKc_v = 0.743 kJ/kgK.
8. Write short notes on second law of thermodynamics.

IV. Write essay on ANY ONE **(1x10 = 10)**

1. Derive the expression for efficiency of Duel combustion cycle with neat sketch.
2. A system contains 0.15m^3 of a gas at a pressure of 3.8 bar and 150^{0}C. It is expanded adiabatically till the pressure falls to 1 bar. The gas is then heated at a constant pressure till its enthalpy increases by 70 kJ. Determine the total work done. Take C_p = 1 kJ/kg K and C_v = 0.714 kJ/kg K.