Code :9A03302

R9

II B.Tech I Semester(R09) Supplementary Examinations, May 2011
THERMODYNAMICS
(Aeronautical Engineering, Mechanical Engineering)

Time: 3 hours **Max Marks: 70**

Answer any FIVE questions
All questions carry equal marks
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1. (a) Define a thermodynamic system. Differentiate between open system, closed system and an isolated system.
   (b) Determine the work done by the air which enters into an evacuated vessel from atmosphere when the valve is opened. The atmospheric pressure is 1.013 bar and 1.5 m^3 of air at atmospheric condition enters into the vessel.
2. A system receives 200 Kj of work at constant volume process and rejects 220 Kj of heat at constant pressure and 40 Kj of work is done on the system. The system is brought to its original state by an adiabatic process. Calculate the adiabatic work. If the initial internal energy is 240 Kj, then calculate the value of internal energy at all points.
3. (a) Define Clausius inequality and prove it.
   (b) An engine operating on a Carnot cycle works with in temperature limits of 600 K and 300 K. If the engine receives 2000 Kj of heat, evaluate the work done and thermal efficiency of the engine.
4. (a) Explain with a neat diagram p-v-t surface.
   (b) Find the enthalpy and entropy of steam when the pressure is 2 MPa and the specific volume is 0.09 m^3/kg
5. Derive the work transfer equations for various Quasi-static processes.
6. A perfect gas mixture consists of 4 kg of hydrogen and 6 kg of carbondioxide at a pressure of 4 bar and a temperature of 25^0C. Calculate C_p and C_v of the mixture. If the mixture is heated at constant volume to 50^0C,find the change in the internal energy, enthalpy and entropy of the mixture.
7. (a) Explain Adiabatic saturation.
   (b) Prove for air- water vapour mixture, Specific humidity, w = 0.622 (P_v/P_t-P_v)
8. (a) Derive an expression for an air standard efficiency of otto cycle.
   (b) Compute the changes in effiencies of an otto cycle when the compression ratio changes from 4 to 5. Take $\gamma = 1.4$

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