Code: 9A03302

R09

B.Tech II Year I Semester (R09) Supplementary Examinations June 2017

THERMODYNAMICS

(Common to AE & ME)

Time: 3 hours Max. Marks: 70

Answer any FIVE questions

All questions carry equal marks

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1 (a) Define the term 'heat' in detail. Justify the statement that work and heat are not properties.

(b) A pressure gauge fixed in a boiler reads 1200 kN/m^2. The barometer reads atmospheric pressure as 735.5 mm of Hg. Determine the corresponding absolute pressure.

2 (a) Give the concept of temperature and differentiate between heat, temperature and internal energy.

(b) A gas having the equation of state PV = RT + b(T)p is expanded isothermally and reversibly from an initial specific volume V_1 to a final specific volume V_2. Show that the work done per unit mass of gas is RT lnV_2 – b(T)/V_1- b(T).

3 For the following given differential equations:

du = Tds – pdv and dh = Tds + vdp

Prove that for perfect gas equation

$$\left(\frac{\partial u}{\partial P}\right)_T = 0 \quad \text{and} \quad \left(\frac{\partial h}{\partial P}\right)_T = 0$$

4 (a) What is a triple point? Explain.

(b) What amount of heat would be required to produce 4.4 kg of steam at a pressure of 6 bar and temperature of 250^{0}C from water at 30^{0}C. Take specific heat for super heated steam as 2.2 Kj/kg K.

5 (a) One kg of ideal gas is heated from 18.3^{0}C to 93.4^{0}C. Assuming R = 0.264 kj/kgK and γ = 1.18 for the gas. Find specific heats, change in internal energy and change in enthalpy.

(b) Derive an expression for the work done during adiabatic expansion of an ideal gas.

6 (a) Distinguish between Gravimetric & Volumetric analysis and explain the procedure to convert one from the other.

(b) Explain Dalton law of partial pressures.

7 (a) How does the wet bulb temperature differ from thermodynamic wet bulb temperature?

(b) Explain any four Psychrometric process by marking on skeleton psychrometric chart.

8 (a) Derive an expression for the air standard efficiency of diesel cycle.

(b) An oil engine working on a dual combustion cycle has a compression ratio 14 and the explosion ratio obtained from an indicator card is 1.4. If the cut-off occurs at 6% of stroke. Find the ideal efficiency. Take γ for air is 1.4.

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