Code: 9A03302 **R09**

B.Tech II Year I Semester (R09) Supplementary Examinations December 2015

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) Show that work is a path function and not a property.
(b) A mass of gas is compressed in quasi-static process from 80 KPa, 0.1 m^3 to 0.4 MPa, 0.03 m^3. Assuming that the pressure and volumes are related by PV^n = constant, find the work done by the gas system.

2 (a) Explain the limitations of first law and state the essence of second law.
(b) Prove that the formula $T^bV^{a-b}e^{kt}$ = constant for the adiabatic expansion of the gas if $C_p = a + KT$ and $C_v = b + KT$, where a, b, and k are constants and T in K.

3 Derive the Maxwell relations and explain their importance in thermodynamics.

4 Calculate the state of steam i.e. whether it is wet, dry or superheated for the following cases:
(a) Steam has a pressure of 15 bar and specific volume of m^3/kg.
(b) Steam has a pressure of 10 bar and temperature 200^0C.
(c) Steam has pressure of 30 bar and if 2700 kj/kg of hat is required to generate steam.

5 (a) What is joule Thompson coefficient? Explain its significance.
(b) Explain the difference between Throttling and free expansion process by considering suitable illustration.

6 (a) Explain Amagat's law of reducing volumes.
(b) An exhaust gas is analyzed and is found to contain by volume 78% N_2 and 12% CO and 10% O_2. What is the corresponding gravimetric analysis calculate the mass of the mixture per mole, and the density, if the temperature is 550^0C and total pressure is 1 bar.

7 (a) Explain sensible cooling and dehumidification with the help of psychrometric chart.
(b) Define ADP and By-pass factor with the help of necessary sketches.

8 (a) Explain the working of a constant pressure combustion cycle.
(b) Derive an expression for the efficiency of Diesel cycle.

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