Code: R7210305 **R07**

B.Tech II Year I Semester (R07) Supplementary Examinations December 2015

THERMODYNAMICS

(Mechanical Engineering)

(For 2008 regular admitted batch only)

Time: 3 hours Max. Marks: 80

Answer any FIVE questions

All questions carry equal marks

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1 (a) How are systems classified? What is the importance of each type?
(b) Why does free expansion have zero work transfer?

2 (a) Explain clearly the difference between a non-flow and a steady flow process.
(b) Explain the working principle of a gas thermometer with a neat sketch.

3 (a) What are the limitations of the first law of thermodynamics?
(b) A heat engine receives heat at the rate of 1500 kJ/min and gives an output of 8.2 kW. Determine: (i) The thermal efficiency. (ii) The rate of hear rejection.

4 (a) Explain the difference between internal energy and enthalpy of wet and dry steam.
(b) Derive the Clausius – Clapeyron equation.

5 (a) Distinguish between a perfect gas and a real gas. Enumerate the laws formed by perfect gases.
(b) Explain:
(i) Throttling process
(ii) Free expansion process.

6 A gas mixture consists of 0.5 kg of carbon monoxide, 1 kg of carbon dioxide and 1.5 kg of nitrogen. Determine:
(a) Mass fraction of each component.
(b) Mole fraction of each component.
(c) Average molar mass of the mixture.
(d) Gas constant of the mixture.

7 Derive the expression for thermal efficiency and mean effective pressure of an Otto cycle by drawing PV and TS diagrams.

8 Draw the line diagram of the Bell-Coleman refrigeration cycle. Explain with the help of a P-V diagram, different processes in the cycle. Explain its advantages and disadvantages.

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