Total No. of Questions : 8]   [Total No. of Printed Pages : 2

Roll No ....

AU/ME-3005 (CBGS)

B.E., III Semester

Examination, May 2018

Choice Based Grading System (CBGS)

Thermodynamics

Time : Three Hours

Maximum Marks : 70

Note: i)   Attempt any five questions out of eight.
      ii) All questions carry equal marks.
      iii) Use of steam tables and Mollier chart is permitted in the examination.

1. a) What is thermodynamic equilibrium? Discuss its aspects. Explain the significance of quasi static process.

   b) 3 kg of air at 2.5 bar and 77°C is compressed polytropically to 7.5 bar, n = 1.2. It is then cooled isothermally to its original state. Find out the net work and heat transferred.

2. a) Establish the equivalence of Kelvin-Planck and Clausius statements.

   b) A refrigerator plant for a food store operates as a reversed carnot heat engine cycle. The store is to be maintained at a temperature of –5 °C and heat transfer from the store to the cycle is at the rate of 5 kW. If heat is transferred from the cycle to the atmosphere at a temperature of 25 °C. Calculate the power required to drive the plant.

3. a) Why does entropy remain constant in a reversible adiabatic process. Explain.

   b) What is a pure substance and it's saturation states. Explain the meaning of tripple point also.

4. Steam flows in a pipeline at 1.5 MPa. After expanding to 0.1 MPa in a throttling calorimeter the temperature is found to be 120 °C. Find the quality of steam in the pipe line. What is the maximum moisture at 1.5 MPa that can be determined with this setup if at least 5 °C of superheat is required after throttling for accurate reading.

5. a) What is the importance of air standard cycle? Sketch otto cycle on T-S diagram and give the formula for efficiency of the cycle.

   b) In an otto cycle the minimum temperature and pressure are 310 K and 1 bar respectively. The compression ratio and maximum cycle temperature are 8 and 1500 K. Calculate the thermal efficiency network and mean effective pressure.

6. Show that the efficiency of the Brayton cycle depends only on the pressure ratio. Discuss the effect of change in pressure ratio on the net output and efficiency of the cycle.

7. a) Differentiate between actual and theoretical combustion process.

   b) What do you understand by Adiabatic flame temperature? Explain its importance.

8. Write short notes on any two:
   a) Concept of available and unavailable energy
   b) Dryness fraction and its measurement
   c) Dalton's law of partial pressure

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