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**ET-201(B)**

# B. TECH. CIVIL (CONSTRUCTION MANAGEMENT)/B. TECH. CIVIL (WATER RESOURCE ENGINEERING)/ B. TECH. (AEROSPACE ENGINEERING)

## (BTCM/BTWRE/BTAE)

## Term-End Examination

## June, 2019

### ET-201(B) : ENGINEERING THERMODYNAMICS

*Time : 3 Hours* *Maximum Marks : 70*

***Note** : Answer any **seven** questions. All questions carry equal marks. Use of steam tables and scientific calculator is allowed.*

1. (a) What is the difference between a Closed System and an Open System ? 5

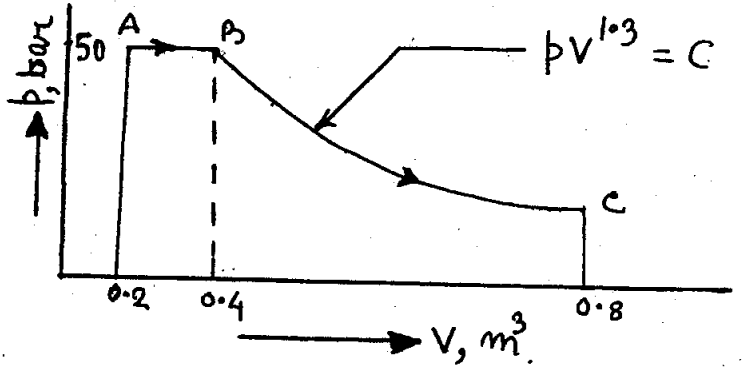
   (b) What are intensive and extensive properties ? Explain with the help of suitable examples. 5

2. (a) What is the zeroth law of thermodynamics ? Explain PMM-1 with neat sketch. 5

(b) A mass of 1.5 kg of air is compressed in a quasic-static process from 0.1 MPa to 0.7 MPa for which $pv$ = constant. The initial density of air is 1.16 kg/m$^3$. Find the work done by the piston to compress the air. 5

3. (a) Explain the Kelvin-Planck statement of the second law. 5

(b) Determine the total work done by a gas system the following an expansion process as shown in the figure. 5




4. (a) Explain the vapour compression refrigeration cycle with the help of T-s *or* p-h diagram. 5

(b) A domestic food freezer maintains a temperature of −15°C. The ambient air

temperature is 30°C. If heat leaks into the freezer at the continuous rate of 1.75 kJ/sec, what is the least power necessary to pump this heat out continuously ? 5

5. (a) Show that the COP of a heat pump is greater than the COP of a refrigerator by unity. 5

(b) Using an engine of 30% thermal efficiency to drive a refrigerator having a COP of 5, what is the heat input into the engine for each MJ removed from the cold body by the refrigerator ? 5

6. (a) Define Entropy. What are the causes of entropy increases ? 5

(b) Explain any ***two*** of the following : 5

(i) Viscosity

(ii) Specific heat

(iii) Triple point of water

(iv) Flash point

7. (a) What is a tonne of refrigeration ? Explain the effect of super heat and sub-cooling on the vapour compression cycle. 5

   (b) Determine the ideal COP of vapour absorption refrigerating system in which the heating, cooling and refrigeration take place at 197°C, 17°C and – 3°C respectively. 5

8. (a) Describe the significance of energy for national economic development. 5

   (b) Explain the nature and scope of energy audit. 5