

MANMOHAN TECHNICAL UNIVERSITY
OFFICE OF THE CONTROLLER OF EXAMINATIONS
Model Question, 2080 Asar

Level: Bachelor
Faculty: School of Engineering
Program: Electrical & Electronics
Subject: Engineering Thermodynamics (EG452ME)

Year/Part: I/II
F.M.: 25
P.M.: 10
Time: 1.5 Hours

Group A [5 × 1 = 5]

Instructions:

- Choose one answer out of four options.
 - Use black ball pen for shading only one circle for correct option of a question in Answer Sheet which you have provided.
 - No mark will be awarded for cutting, erasing, over writing and multiple circles shading
1. A system in which only energy transfer can take place is called a
 - a. Closed system
 - b. Open system
 - c. Isolated system
 - d. Universe
 2. Which of the following is an extensive thermodynamic property
 - a. Pressure
 - b. Temperature
 - c. Entropy
 - d. Specific Volume
 3. First law of thermodynamics is based on
 - a. Conservation of linear momentum
 - b. Conservation of energy
 - c. Conservation of work
 - d. Conservation of angular momentum
 4. Change in entropy during a cyclic process is
 - a. equal to zero
 - b. always negative
 - c. always positive
 - d. equal to heat transfer
 5. The working of the petrol engine is based on
 - a. Brayton cycle
 - b. Rankine cycle
 - c. Otto cycle
 - d. Diesel cycle

Group B

Attempt any FOUR questions [4 × 2 = 8]

- 6 Differentiate between microscopic and macroscopic view point.
7. Briefly describe the conditions for a common substance to be pure.
8. Write down the steady flow energy equation for a single inlet and single outlet thermal device and hence apply it to a adiabatic turbine.
9. Write down the limitations of first law of thermodynamics and explain how second law of thermodynamics overcome the drawbacks of first law of thermodynamics.
10. Derive the expansion for air standard efficiency of an Otto cycle.

Group C

Attempt any THREE questions [3 × 4 = 12]

11. The pressure gauges are connected to a container consisting of two compartments as shown in the below figure P₁. If the local barometer reads 750 mm of Hg and pressure gauges A and B read 300 kPa and 200 kPa respectively. Determine the absolute pressure in each compartment and reading of pressure gauge C. [Take $\rho_{HG} = 13600 \text{ KG/m}^3$ and $g = 9.81 \text{ m/s}^2$]

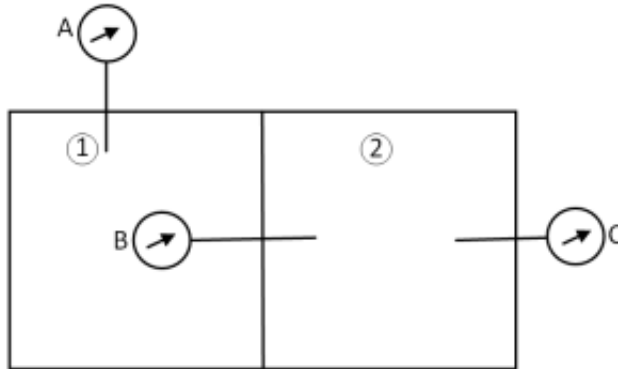


Figure P₁

12. A 0.3 m³ rigid vessel contains 5 kg of water at 150 kPa. Determine:

- a. the temperature
- b. the mass of each phase and
- c. the specific enthalpy.

Please refer steam tables, for different values of water at different conditions.

13. A car engine consumes fuel at a rate of 30 L/h and delivers 80 kW of power output. If the calorific value of the fuel is 42000 kJ/kg and a density of 0.8 g/cm³, determine the efficiency of the engine.

14. An electric current is passed through a wire 2 mm in diameter and 8 cm long. The wire is submerged in the liquid water. During the boiling of water temperature of water is 100°C and convection heat transfer coefficient is 4500 W/m²K. Determine the power supplied to the wire to maintain the wire surface temperature at 120°C.
