

Register No.:

**1467**

**October 2024**

*Time - Three hours*  
*(Maximum Marks: 100)*

- [N.B.]**
1. Answer all questions under Part-A. Each question carries 3 marks.
  2. Answer all the questions either (A) or (B) in Part-B. Each question carries 14 marks.]

**PART - A**

1. List any three properties of thermodynamic system.
2. Define throttling process.
3. List the modes of heat transfer.
4. A Carnot heat engine works between 650K and 310K and produces 150 kJ of work. Find its thermal efficiency.
5. List the types of piston rings.
6. What is governing of I.C engine?
7. What is combustion?
8. Define brake thermal efficiency.
9. Mention any three applications of refrigeration.
10. Define COP.

**PART - B**

11. (a) (i) Explain the types of thermodynamic systems. (7)  
(ii) State First and Second laws of thermodynamics. (7)  
(Or)  
(b) A gas has a density of  $1.875\text{kg/m}^3$  at 1 bar and  $15^\circ\text{C}$ . When 0.9kg of the gas is heated from  $15^\circ\text{C}$  to  $250^\circ\text{C}$  at constant pressure, the heat required is 175kJ. Calculate the characteristic gas constant, the specific heat capacity of the gas at constant pressure and at constant volume. Also calculate the change in internal energy and external work done during the process.

12. (a) The following data refer to a four cylinder petrol engine. Total swept volume – 2000 cc, clearance volume – 60 cc per cylinder, maximum cycle temperature – 1400°C. At beginning of compression, the pressure is  $1 \times 10^5 \text{ N/m}^2$  and the temperature is 24°C. Calculate the air standard efficiency and mean effective pressure.

(Or)

- (b) Describe the operation of parallel and counter flow heat exchanger.

13. (a) Explain the working of MPFI system with neat sketch.

(Or)

- (b) (i) Explain the working principle of gear pump with sketch. (7)  
(ii) Explain any one fuel filter used in diesel engine with sketch. (7)

14. (a) Explain the construction and working of Bomb calorimeter with neat sketch.

(Or)

- (b) The following results were obtained during a test on a single cylinder four stroke petrol engine. Brake power – 73.5 kW when running at 400 rpm, brake mean effective pressure – 8.5 bar, mechanical efficiency – 80%, specific fuel consumption – 0.346 kg/kWhr, calorific value of fuel – 44100 kJ/kg, compression ratio – 6:1. Determine i) Bore and stroke (assuming bore and stroke size is equal), ii) Brake thermal efficiency, iii) Indicated thermal efficiency, iv) Air standard efficiency, v) Relative efficiency.

15. (a) Describe the operation of vapour compression refrigeration system with a neat sketch.

(Or)

- (b) Explain the working of a central air-conditioning system with a neat sketch.

-----