LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **PHYSICS**

FIFTH SEMESTER – **NOVEMBER 2022**

UPH 5502 – THERMAL PHYSICS

Date: 25-11-2022 Dept. No. Max. : 100 Marks

Time: 09:00 AM - 12:00 NOON

PART – A

Answer ALL the questions **(10 x 2 = 20 marks)**

1. What do you mean by relaxation time?
2. Calculate the RMS velocity of O_2 molecule at the temperature of 10^o C.
3. Define zeroth law of thermodynamics.
4. What are the types of thermodynamic systems?
5. Give the physical significance of first law of thermodynamics.
6. Calculate the efficiency of the Carnot engine working between steam point and ice point.
7. Define entropy.
8. What you mean by heat death?
9. Give the expression for the work done in an adiabatic process.
10. Mention the distinguishing features of a first order phase transition?

PART - B

Answer any FOUR questions **(4 x 7.5 = 30 marks)**

11. Discuss in detail the kinetic interpretation of temperature.
12. From Maxwell's distribution law of molecular speeds obtain the expressions for the average speed and RMS speed of gas molecules.
13. Describe how state of a system is defined by thermodynamic variables.
14. Explain the specific heat capacities of gas using first law of thermodynamics and show that $C_p - C_v$ is always positive.
15. Obtain the change in entropy during an irreversible process and explain the increase in entropy.
16. Derive Clausius Clapeyron equation and explain it's significances.

PART - C

Answer any FOUR questions **(4 x 12.5 = 50 marks)**

17. State equipartition theorem. Using this, find the ratio of molar heat capacities of a system if the constituent particles are: i) monoatomic ii) diatomic iii) triatomic.
18. Derive the Van der waal's equation of state for a real gas and obtain the constants.
19. State and explain Carnot's theorem. Also derive the efficiency of a Carnot heat engine.
20. Derive all the Maxwell's thermodynamic relations.
21. Describe the thermodynamic mnemonic diagrams and using it obtain the thermodynamic equilibrium condition.
22. Explain i) Reversible heat transfer ii) Clausius inequality and iii) Joule Thomson expansion.

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