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FACULTY OF SCIENCE AND TECHNOLOGY
B.Sc. (CBCGS)(Pattern-2022) F.Y SEM I
Examination November / December 2025
Physics Paper-II Heat and Thermodynamics

[Time: 1:30 Hours]**[Max. Marks: 40]**

Please check whether you have got the right question paper.

N. B

- 1) All questions are compulsory.
- 2) All question carry equal marks.
- 3) Draw neat diagrams & give labels wherever necessary
- 4) Figure to the right indicate full marks.

Q1 Explain in detail the Spherical Shell Method of Radial Flow of Heat.**10****OR**

- a) Explain the reason for modification of the perfect gas equation. **05**
- b) Explain the correction for pressure in Van der Waal's gas equation. **05**
- c)

Q2 Derive an expression for the Viscosity (η) of a Gas in terms of the mean free path of its molecules.**10****OR**

- a) State and explain the zeroth law of thermodynamics. **05**
- b) Explain the concept of reversible and irreversible processes. **05**

Q3 Solve any two questions.**10**

- a) Write a short note on the coefficient of thermal conductivity.
- b) For a gas,
 Vander Waals const for a gas are
 $a = 6.9 \times 10^{-2} \text{ Jm}^6 \text{ mol}^{-2}$ & $b = 2.9 \times 10^{-5} \text{ m}^3 \text{ mol}^{-1}$.
 The universal gas constant $R = 8.31 \text{ J mol}^{-1} \text{ K}^{-1}$.
 Calculate the critical temperature of the gas.
- c) The viscosity of a gas is $25 \times 10^{-4} \text{ g/m sec}$.
 If the mean free path of the gas molecule is $2 \times 10^{-8} \text{ m}$ and its density is 1 kg/m^3 ,
 Then calculate the R.M.S. velocity of the gas molecules.
- d) Derive an expression for the work done during an adiabatic process.

Q4 Multiple Choice Questions

- In Ingen-Hauz experiment, the thermal conductivity ' k ' and ' l ' of the rod upto which metals are related as:
 a) $\frac{k}{l} = \text{const}$ b) $\frac{k}{l^2} = \text{const}$ c) $\frac{k^2}{l} = \text{const}$ d) $kl = \text{const}$
- The SI unit of Thermal Conductivity is:
 a) J/msk b) Js/mk c) Jk/ms d) Jm/sk
- The value of Critical Volume V_c according to Vander Waal's gas equation is:
 a) $V_c = b$ (b) $V_c = 2b$ (c) $V_c = 3b$ (d) none of above
- The critical constant of temperature (T_c) is
 a) $\frac{a}{27Rb}$ b) $\frac{8ab}{27R}$ c) $\frac{27Rb}{8a}$ d) $\frac{8a}{27Rb}$
- The coefficient of Thermal Conductivity of a gas is directly proportional to:
 a) T (b) T^2 c) $\sqrt{T}$ d) none of these
- Viscosity of gas is directly proportional to:
 a) Temperature b) Density of gas c) T^2 d) Pressure
- In Carnot cycle, the second step is:
 a) Isothermal Expansion b) Isothermal Compression
 c) Adiabatic Expansion d) Adiabatic Compression
- A Carnot's engine operating between 100°C and 50°C . Its efficiency will be:
 (a) 15.2% (b) 13.4% (c) 50% (d) 100%
- Correction for Volume in Vander Waal's equation is:
 a) $V + b$ b) $V - b$ c) $V + b^2$ d) $V - b^2$
- Heat transmitted through a substance with actual migration of particles is called:
 a) Convection b) Conduction c) Radiation d) All of these

