BACHELOR OF SCIENCE (CBCS-2018 COURSE)
T. Y. B. Sc. Sem-VI :SUMMER- 2022
SUBJECT : PHYSICS : THERMODYNAMICS & STATISTICAL PHYSICS

Day : Tuesday
Date : 12/7/2022

S-18466-2022

Time : 11:00 AM-02:00 PM
Max. Marks : 60

N.B.:

1) All questions are **COMPULSORY.**
2) Figures to the **RIGHT** indicate full marks.
3) Draw neat labeled diagrams **WHEREVER** necessary.

Q. 1 Attempt any **Two** of the following. **(12)**

(a) Explain the fundamental assumptions of Kinetic theory of gas.
(b) Derive an expression for the coefficient of viscosity of gas (η) in terms of mean free path.
(c) Determine the mean free path of the molecule of hydrogen at NTP, given that density of hydrogen is 8.96×10^{-5} g cm^{-3}, coefficient of viscosity 8.6×10^{-5} C.G.S. units and $k = 1.38 \times 10^{-16}$ ergs $^{o}K^{-1}$.

Q. 2 Attempt any **Two** of the following. **(12)**

(a) Derive and explain the Maxwell's Relation.
(b) With neat suitable diagram explain the porous plug experiment.
(c) Show that for an ideal gas $Cp - Cv = R$ and for a real gas obeying Vander Waals equation $Cp - Cv = R\{1+2a/RTV\}$ approximately.

Q. 3 Attempt any **Two** of the following. **(12)**

(a) Derive binomial expression for random walk problem.
(b) Explain the thermal interaction mechanism.
(c) Describe Gibbs and Helmholtz function.

Q. 4 Attempt any **Three** of the following. **(12)**

(a) Calculate the change in entropy when 10 grams of ice at 0 ^{o}C is converted into water at the same temperature. (Given: Latent heat of ice = 80 cal/gram).
(b) Explain air liquefier with suitable diagram.
(c) Explain the behavior of density of states of system
(d) Write a short note on ensemble.

Q. 5 Attempt any **Four** of the following. **(12)**

(a) Describe the probability distribution function.
(b) The diameter of molecule of a gas is 2.3×10^{-10} m. The mean free path is 2.05×10^{-7} m. Calculate the number of molecules of the gas per c.c.
(c) Explain the terms: i) Entropy ii) Enthalpy
(d) Explain the variation of Cv with pressure.
(e) Write a short note on transport phenomena.
(f) Describe the terms canonical and micro canonical ensemble.

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