# T.Y.B.SC. SEM – VI (2014 Course) : WINTER - 2018

## SUBJECT: PHYSICS: THERMODYNAMICS & STATISTICAL PHYSICS

Day : Wednesday
Date : 17/10/2018

**W-2018-0875**

Time : 03.00 PM To 05.00 PM
Max. Marks: 40.

**N.B.:**

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

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**Q. 1** Attempt any **Two** of the following. **(10)**

**(a)** Obtain mean square derivation $(\Delta n_1)^2$ , in case of random walk problem.
**(b)** Differentiate between M.B. statistics and F.D. statistics.
**(c)** We throw a die 3 times and obtain three numbers. What is the probability that these numbers are 0, 4 and 2 precisely in that order.

**Q. 2** Attempt any **Two** of the following. **(10)**

**(a)** Explain the porousplug experiment.
**(b)** Explain the fundamental assumptions for kinetic theory of gases.
**(c)** Determine the mean free path of a gas molecule which has a diameter of 3.2 $^{o}$A. Given: Number of molecules per unit volume = $2.5 \times 10^{25}$ /$m^3$.

**Q. 3** Attempt any **Two** of the following. **(10)**

**(a)** Explain joule-Thomson effect. Obtain joule-Thomson coefficient $\mu = (1/C_P)\,[T\,(\partial V/\partial T)_p - V]$
**(b)** Prove the relations (i) $F = U + T\,[\partial F/\partial T]_V$ and (ii) $G = H + T\,[\partial G/\partial T]_P$
**(c)** If p = q = 1/2 and the total number of possibilities are M=200. Find the root mean square deviation.

**Q. 4** Attempt any **Two** of the following. **(10)**

**(a)** Derive an expression for coefficient of viscosity ($\eta$).
**(b)** Explain the Gaussian probability distribution.
**(c)** Explain the behavior of density of states.
**(d)** Explain Canonical and Microcanonical ensembles.

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