Roll No. .....

(011/17-I)

5169

B. Sc. EXAMINATION

(First Semester)

CHEMISTRY

Second Paper (CH-102)

Physical Chemistry

Time : Three Hours *Maximum Marks :* 26

Note : Attempt *Five* questions in all. Q. No. **1** is compulsory. Attempt at least *two* questions from each Section.

1. (a) What are collision number and collision frequency ?

   (b) How does increase of temperature affect the Maxwell's distribution of velocity ?

   (c) At 293K temperature density of benzene is 0.878 g/cm and its viscosity is 6.47 milli poise. Predict whether it is associated or non-associated liquid.

(d) What is Boyle's temperature ?

(e) Give uses of liquid crystals.

(f) Calculate distance between adjacent planes (hkl) in simple cubic system if side of cube is 5Å for (111) plane.

$1 \times 6 = 6$

Section A

2. (a) What are critical constants Pc, Vc and Tc. Derive a relationship between them from van der Walls' equation.

(b) Give limitations of van der Waals' equation.

(c) Give significance of van der Waals' constant a and b.

3. (a) Define Most Probable Velocity, Average Velocity and Root Mean Square Velocity. Give ratio between them and show their value on Maxwell distribution curve of velocity.

(b) Calculate R.M.S. and average velocity of O_2 molecule at 300K temp. 3+2=5

4. (a) Define mean free path. How does it depend upon temperature and pressure of a gas ?

(b) Discuss Linde's method for liquefaction of a gas. 3+2=5

Section B

5. (a) Derive Bragg's equation $n\lambda = 2d \sin\theta$ for X-ray diffraction by crystals.

(b) Explain why NaCl and KCl have different X-ray powder diffraction patterns. 3+2=5

6. (a) What are liquid crystals. Give examples of different types of liquid crystals. Give their uses in thermography.

(b) Define specific refection and molar refraction. Calculate molar refraction of

acetic acid at 293K temp. If its density is 1.046 g/cm^3 and Rm value for C = 2.42, H = 1.1, O in CO = 2.21 and O in O-H = 15 cm^3/mol.

7. Write notes on the following :

(i) Weiss indices and Miller indices

(ii) Rheochor and Chemical constitution

(iii) Determination of surface tension by using Stalagmometer. 2+1½+1½=5