

B. Sc. DEGREE END SEMESTER EXAMINATION OCTOBER/NOVEMBER 2018**SEMESTER –5: CHEMISTRY (CORE COURSE)****COURSE: 15U5CRCHE07: PHYSICAL CHEMISTRY - I***(Common for Regular 2016 admission & Supplementary 2015 admission)*

Time: Three Hours

Max. Marks: 60

SECTION A*Answer **all** questions, each question carries **1** mark*

1. What is mean free path?
2. Give the relation between fluidity and viscosity.
3. Define the symmetry element E.
4. Name the point group of H₂O molecule.
5. What is the effect of Schottky defect on the density of a crystal?
6. Define heat of adsorption.
7. Give an example for a non-ideal solution which shows positive deviation.
8. What is critical solution temperature? (1 x 8 = 8)

SECTION B*Answer **any six** questions, each question carries **2** marks*

9. Calculate the temperature at which the RMS velocity of Helium will be same as that of Methane molecule at 27°C.
10. Why ice has density less than that of water?
11. Which are the elements combined in C_{3v} point group? Give one example of a molecule with this point group.
12. Distinguish between n- type and p - type semiconductors.
13. The spacing of one set of crystal planes in NaCl is $d = 0.282$ nm. A monochromatic beam of X-rays produces a Bragg maximum when its glancing angle with these planes is $\theta = 7^\circ$. Assuming that this is a first order maximum, find the wavelength of the X-rays.
14. Distinguish between nematic meso phase and cholestric meso phase.
15. Distinguish between physisorption and chemisorption.
16. Draw the shape of freundlich adsorption isotherm and label its various parts. (2 x 6 = 12)

SECTION C*Answer **any four** questions, each question carries **5** marks*

17. Discuss the three types of molecular velocities.
18. What is hydrogen bonding? Discuss the different types of hydrogen bonding.
19. Explain the terms viscosity and coefficient of viscosity. Discuss the effect of temperature on viscosity of a liquid.

20. Discuss the symmetry of benzene molecule.
21. Discuss how the structure of NaCl is established by Bragg's method.
22. Discuss the various applications of Nernst distribution law. (5 x 4 = 20)

SECTION D

Answer any two questions, each question carries 10 marks

23. Derive the Vander Waals equation of state and discuss its applicability in explaining real gas behaviour at different pressures and temperatures.
24. Write briefly on different types of defects in crystals.
25. a) Derive the Langmuir adsorption isotherm.
b) Define and explain the symmetry elements C_n and S_n with suitable examples.
26. a) What are colligative properties? Explain molal elevation constant. Derive thermodynamically the expression relating the molal elevation constant of the solvent with the molar mass of the solute.
b) The boiling point of benzene is 353.23 K. When 1.80 g of a non-volatile solute was dissolved in 90 g of benzene, the boiling point is raised to 354.11 K. Calculate the molar mass of the solute. K_b for benzene is $2.53 \text{ K kg mol}^{-1}$ (10 x 2 = 20)
