Roll No. | | | | | | | | | | | | | **Total No. of Pages : 02**

Total No. of Questions : 09

B.Sc. Honours (Physics) (Sem.–3)

PHYSICAL CHEMISTRY

Subject Code : BHCL-204-21

M.Code : 92459

Date of Examination : 19-12-22

Time : 3 Hrs. **Max. Marks : 60**

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION - B & C. have FOUR questions each.**
3. **Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.**
4. **Select atleast TWO questions from SECTION - B & C.**

SECTION-A

l. Write short notes on :

a) Define Compressibility factor Z.

b) Differentiate between Space lattice and Unit cell.

c) Explain with example how Ionization of weak acid can be done.

d) Vapour pressure of water at 20°C is 17.51mm. Lowering of vapour pressure of sugar solution is 0.0614mm. Calculate Relative lowering of vapour Pressure.

e) What is pH scale? Calculate the pH of 0.0001M HCI solution.

f) What is solubility product? Give example.

g) Derive PV = nRT for Ideal Gas Equation.

h) What are Lewis acids and bases? Explain with examples.

i) What are buffer solutions? Also explain acidic and basic buffers.

j) Explain the Law of Rational Indices.

SECTION-B

2. a) Derive Kinetic Gas Equation $PV= 1/3\ mnu^2$.

   b) One mole of water vapour is confined to a 20-litre flask at 27° C. Calculate its pressure using

      (i) Ideal gas equation

      (ii) Vander Waal's equation. Given van der Waals constants: a = 5.464 atm litre^2 mol^{-2}, b = 0.0305 litre mol^{-1}, R = 0.082 litre atm deg^{-1} mol^{-1}

3. a) Explain the Bragg Equation. Give its derivation.

   b) What is coefficient of viscosity? Describe the method for the measurement of coefficient of viscosity.

4. Why do real gases show deviations from ideal behaviour? Derive expression for the equation of state for real gases i.e. Van der Waal equation.

5. a) What are seven crystal systems? Explain.

   b) Describe the Symmetry elements and Symmetry operations.

SECTION-C

6. What is Relative Lowering of vapour pressure? Explain the thermodynamic derivation for relative lowering of vapour pressure.

7. a) What is Degree of Ionization? What are the various factors affecting degree of Ionization?

   b) Calculate the osmotic pressure of 0.01 M solution of canesugar is 27°C (R=0.0821litre atm /degree/mol)

8. What is van't Hoff factor? How is it used in the determination of degree of association and degree of dissociation of a solute?

9. Illustrate the application of the concept of solubility product in the following operations :

   a) Determination of solubility of sparingly soluble salts.

   b) Predicting Precipitation Reactions.

NOTE : Disclosure of Identity by writing Mobile No. or Marking of passing request on any paper of Answer Sheet will lead to UMC against the Student.