Progressive Education Society's
Modern College of Arts, Science & Commerce Ganeshkhind, Pune – 16
End Semester Examination: Jan.2022
Faculty: Science and Technology

Program: B.Sc. Code (BScGen03) Semester: I **SET: B**
Program (Specific): B.Sc. General Course Type: CC -Theory
Class: F.Y.B.Sc. Max.Marks: 35
Name of the Course: Physical & Analytical Chemistry **Time: 2 Hrs.**
Course Code: 22-CH-101 Paper: I

Instructions to the candidate:

1) ***There are 4 sections in the question paper. Write each section on separate page.***
2) ***All Sections are compulsory.***
3) ***Figures to the right indicate full marks.***
4) ***Draw a well labelled diagram wherever necessary.***

SECTION: A

Q1) Define the following. 5 M

1. Solubility product
2. Common Ion effect
3. Dissociation constant of acids
4. Normality
5. Vapour Pressure

Q2) Answer Any **FOUR** of the following: 4 M

1. Solve: $y = x^3 - 5x + 3$, $\frac{dy}{dx} = ?$
2. Explain concentration in parts per billion.
3. Explain the concept of evaporation and condensation.
4. What is ionic product of water?
5. Explain boiling point of liquid.
6. State and explain van der Waals equation.

SECTION: B

Q3) Answer Any **FOUR** of the following: 8 M

1. Calculate the pH of a solution whose hydrogen ion concentration is 0.006 gmL^{-1}
2. The densities of liquid A and water at 20^{o}C are 866 and 998 gm dm^{-3} respectively. The time of flow of liquid A and water through Ostwald viscometer are 70 and 100 seconds respectively. Calculate the viscosity of liquid A. [Given viscosity of water = 0.01 poise]
3. Distinguish between liquids and solids.
4. Deduce expression for dissociation constant of water.
5. Calculate number of moles of benzoic acid contained in 5 gm of pure benzoic acid. [Given molar mass of benzoic acid = 122.1 gm mol^{-1}]
6. Report results for the following calculations to the correct number of significant figures:
   a) 4.591+ 0.2309 + 67.1 = b) 518.256 - 473.15 =

SECTION: C

Q4) Answer Any **FOUR** of the following. 8 M

1. State any four properties of gases.
2. What are liquid crystals? Write any 2 applications.
3. Discuss the Ostwald's dilution law.
4. Deduce the expression of the linear function that passes through the points (3, -1) and (1, -3).
5. Calculate the molar concentration of K^+ ion in a solution containing 100 ppm of $K_3[Fe(CN)_6]$. [Given: molar mass of $K_3[Fe(CN)_6]$ = 329.3 gm mol^{-1}]
6. How will you express the concentration of a solution in weight to volume percent?

SECTION: D

Q5) Attempt any **TWO** of the following 10 M

1. Describe the experimental method for measurement of viscosity.
2. A major textile dye manufacturer developed a new yellow dye. The dye has a percent composition of 75.95% C, 17.72% N and 6.33% H by mass with a molar mass of about 240 g/mol. Determine the molecular formula of the dye.
3. A 250 ml aqueous solution contains 45.1 mg of a pesticide. Express the pesticide's concentration in weight to volume percent, parts per million and parts per billion.
4. Calculate the solubility of silver chromate Ag_2CrO_4 in a 0.1M solution of $AgNO_3$. (K_{sp} for Ag_2CrO_4 = 9.0 x 10^{-12})