B.Sc. 3rd Semester (Honours) Examination, 2021(CBCS)
Subject: Chemistry
Course Code: SEC-1
Basic Analytical Chemistry

Time: 2 Hours   **Full Marks: 40**

Candidates are required to give their answers in their own words as far as practicable

Answer any eight questions from the following: **5x8= 40**

1. (a) Define ion- exchange capacity of an ion exchange resin. Mention its unit.

    (b) 5.0 g of strongly acidic cation exchange resins can adsorb Na^+ ions fully from 500.0 ml of 0.1 (N) NaCl solution. Calculate the exchange capacity of the cation exchanger.

2. (a) How can you separate Zn^{2+} and Mg^{2+} by strongly basic anion exchange resins?

    (b) What are the characteristics of an exchanger?

    (c) Why pH measurement of the soil is important?

3. (a) Why sample preparation is important before chemical analysis?

    (b) Solve the following with significant figures:

    i) Logarithm of 1.5×10^5 ii) 112.7+ 13.8456 + 1.08.

    (c) Give an example of constant error

4. (a) Mention three important differences between thin layer chromatography and paper chromatography.

    (b) A certain cation exchange column is saturated with Fe^{3+}. It is desired to recover Fe^{3+} and convert the resin to the H^+ form. Which acid would you use to wash the column: 12M H_2SO_4 or 6M HCl ? Why?

5. (a) In a particular TLC experiment, solvent front moves to 34 cm where as compounds A, B, C in a mixture moves up to 24, 28 and 30 cm respectively. R_f of the desired compound is 0.82. Identify the compound.

    (b) What are the functions of aluminium compounds in deodorants?

    (c) Zinc oxide is a common compound used in sunscreen cream. What is its role in sunscreen cream?

6. (a) What is the composition of soil?

   (b) Why buffer solution is used in complexometric titration?

   (c) Why EDTA is widely used as chelators?

7. (a) What are the major groups of nutrients found in different types of foods?

   (b) What do you mean by food value?

   (c) How does heat affect the loss of nutrients in food?

8. (a) Distinguish between pasteurization and sterilization.

   (b) How does food processing enhance the nutritional value of food? What is fermentation?

9. Discuss briefly about the different types of drying methods used in food preservation.

10. (a) Define food additives and adulterants with one example of each.

    (b) Cite one chemical that is used to enhance flavour and mention its harmful effects.

The University of Burdwan

B. Sc. (Honours) Sem-III Examination, 2021

Subject: Chemistry

Paper: SEC-I (IT Skill in Chemistry)

Full Marks: 40   Time: 2 hours

Attempt any eight questions $8 \times 5 = 40$

1. Write a BASIC program for computing the sum of two matrices **A** and **B** each being of size 2×2.

2. Define 'mean' and 'standard deviation'. Find the value of mean and standard deviation for the following numbers

      3.75, 3.66, 3.10, 3.27, 3.49

3. What is the full form of (i) COBOL (ii) FORTRAN (iii) RAM (iv) ROM (v) DOS

4. Convert the following binary numbers into decimal numbers

      (i) $(10.1)_2$ (ii) $(11010)_2$

Convert the following decimal numbers into binary numbers

      (i) $(45)_{10}$ (ii) $(1.3)_{10}$ (iii) $(8)_{10}$

5. Define Trapezoidal Rule. Use trapezoidal rule with $n = 6$ to estimate

$$\int_1^5 (1 + x^3)dx$$

6. Write a program to find nC_r and nP_r.

7. Write down the van der Waals equation of state as a cubic equation of volume.

The Maxwell Boltzmann distribution is $N = N_0 e^{-\frac{E}{RT}}$. Write down the expression of E in terms of variables N and T.

8. Write a BASIC program for computing the sum of n given odd integers.

9. Compute by Newton-Raphson method the positive root of the equation $3x^2 + 2x - 9 = 0$ using initial guess $x = 0.9$

10. Use the method of least squares to find a formula of the type $Y = a + bX$ which fits the following data:

X	1.0	2.0	3.0	4.0	5.0	6.0
Y	2.0	3.9	5.9	8.2	10.1	12.0