

B. Sc. 3rd Semester (Honours) Examination, 2020 (CBCS)
Subject: Chemistry
Paper: SEC-1

(Basic Analytical Chemistry)

F.M: 40

Time: 2 Hours

Answer any eight questions. Each question carries 05 marks.

1. Explain “high precision of the data does not warrant high accuracy of the result.”
What is the origin of random error in laboratory measurement of a sample?
Mention different types of water contaminants.
2. Why constant error is called proportional error? Give example. Between 3.01g and 3.010 g, which one is more significant and why?
3. What is the composition of soil? What is soil pH? How can you measure the pH of a soil sample? Which soil show maximum pH value?
4. What are the advantages and disadvantage of EDTA used in Complexometric titration? In complexometric titration, 50 ml hard water is titrated with 0.01(M) EDTA using EBT indicator, 20 ml EDTA is required. Calculate the hardness of water in terms CaCO₃ in ppm level.
5. What is ‘PARABEN’? In which type of cosmetics, it was found? Write role of boric acid in deodorants.
6. What are the stationary and mobile phase in paper chromatography? What are the methods to purify water? Which food preservative is used in tomato sauce?
7. What are the common methods of food preservation? What do you mean by asepsis? Where ‘Metanil Yellow’ has been used as an adulterant?
8. What do you mean by ion exchange capacity? Give its unit. Write four primary conditions to satisfy a good ion exchange resin.
9. How will you measure R_f (retardation factor) in thin layer chromatography and show this by picturization? Between Li⁺ and Cs⁺ which one will show greater exchange capacity in high aqueous medium by a cation exchanger resin?
10. Give the differences between accuracy and precision. What is chelation? Solve the following problem using the correct number of significant figures.
34.683 + 58.930 + 68.35112

B.Sc. 3rd Semester (Honours) Examination, 2020 (CBCS)

Subject: Chemistry

Paper: SEC-I

(IT Skill in Chemistry)

Time: 2 hours

Full Marks: 40

Candidates must give their answer legibly, in their own words as far as practicable.

Answer any eight questions from the following:

8 × 5 = 40

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

23.75, 23.66, 23.10, 23.27, 23.49

2. What is Newton Raphson method? Calculate the volume of one mole N₂ gas (which follows van der Waals equation of state) at 100 atm and 300 K.

[Given: $a = 1.36 \text{ atm. lit}^2 \cdot \text{mol}^{-2}$ and $b = 3.18 \text{ cc. mol}^{-1}$]

3. What is the full form of (i) BASIC (ii) BIOS (iii) RAM (iv) ROM (v) ASCII

4. Convert the following decimal numbers into binary numbers

(i) $(2.5)_{10}$ (ii) $(13)_{10}$ (iii) $(85)_{10}$

Convert the following binary numbers into decimal numbers

(i) $(10.1)_2$ (ii) $(1100100)_2$

5. Define Trapezoidal Rule. Use trapezoidal rule with $n = 8$ to estimate

$$\int_1^5 (1 + x^2) dx$$

6. Calculate the pH of a 0.01 (M) acetic acid solution. The dissociation constant of acetic acid (HA) is given by

$$K_a = \frac{[H_3O^+]_{eq}[A^-]_{eq}}{[HA]_{eq}} = \frac{[H_3O^+]_{eq}[H_3O^+]_{eq}}{[HA]_{in} - [H_3O^+]_{eq}}$$

[Given: $K_a = 1.85 \times 10^{-5}$]

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

The Boltzmann barometric formula is $P = P_0 e^{-\frac{Mgh}{RT}}$. Write down the expression of h in terms of variables P and T .

8. Write a BASIC program for computing the sum of n given numbers, x_1, x_2, \dots, x_n whose values are given up to two places of decimal.

9. Write a BASIC program for computing the sum of two matrices **A** and **B** each being of size 3×3 .

10. Find the expression for slope of the tangent to the plot of reactant concentration (C) against time (t) at time $t_{1/2}$ for a first order reaction.