

U.G. 3rd Semester Examination - 2022

CHEMISTRY**[HONOURS]****Skill Enhancement Course (SEC)****Course Code : CHEM-H-SEC-T-1A&B**

Full Marks : 40

Time : 2 Hours

*The figures in the right-hand margin indicate marks.**Candidates are required to give their answers in their own words as far as practicable.***Answer all the questions from Selected Option.****OPTION-A****CHEM-H-SEC-T-1A****(IT Skills for Chemists)**

1. Answer any five questions: $2 \times 5 = 10$
- a) What do you mean by source code and object code? How do they differ?
- b) Write the characteristics of the Gaussian distribution curve.
- c) Explain the term relative error with an example.
- d) What is the full form of (i) BASIC & (ii) ASCII?
- e) Sketch the curve $y = x^2 - 9$.

[Turn over]

f) The normality of a solution is determined by four separate titrations, the results being 0.2041, 0.2049, 0.2039 and 0.2043. Calculate the standard deviation.

g) Which of the following are unacceptable as integer variables. and why?

i) NICKEL ii) ALPHA iii) J+2023

h) Convert $(11110)_2$ into a decimal number.

2. Answer any **four** questions: $5 \times 4 = 20$

a) Explain the curve fitting problem.

b) Explain the differences between compiler and interpreter.

c) What are the main logical operators? Explain in brief.

d) Briefly explain the Least Square Method.

e) Explain the differences between RAM and ROM.

f) What are the errors when debugging a program.

3. Answer any **one** question: $10 \times 1 = 10$

a) What are the errors in chemical analysis? How errors are classified? What are significant figures? How statistical treatment of data is done with Mean and standard deviation?

$2+2+2+2+2=10$

- b) i) Calculate pH of 10^{-7} M benzoic acid
(given, K_a , of benzoic acid 6.5×10^{-5})
- ii) Describe Simpson's rule. $5+5=10$
- c) Express the van der Waals equation of state as a cubic equation of V. State and explain the Trapezoidal rule. $5+5=10$

OPTION-B

CHEM-H-SEC-T-1B

(Basic Analytical Chemistry)

1. Answer any **five** questions: $2 \times 5 = 10$
- a) Why the thin layer chromatography is superior to paper chromatography?
 - b) Distinguish between field sample and laboratory sample.
 - c) Why buffer solution is added during the estimation of hardness of water. Give two examples.
 - d) What do you mean by retention factor in chromatographic separation technique?
 - e) What do you mean by complexometric titration?
 - f) What is colour developing reagent? Give two examples.
 - g) Name the composition of talcum powder.
 - h) Write a name of fungus resistant food preservatives.
2. Answer any **two** questions: $5 \times 2 = 10$
- a) Name the metal ion indicator used for the estimation of hardness of water. Draw its structure. Write down the name and structure of a penta dentate ligand. $3+2$

b) What do you mean by cation exchange resin? Give examples. In a water sample, Biological Oxygen Demand (BOD) is 60gm/L. What does it mean? 3+2

c) Name the masking and demasking agents with respect to a complexometric titration. What are the roles of ZnO, TiO₂ and boric acid in talcum powder? 2+3

d) Double beam spectrophotometer is better option in analytical measurement than single beam spectrophotometer. Give reason. What is edible colour? Give example. 3+2

3. Answer any two questions: 10×2=20

a) What do you mean by exchange affinity of an ion exchange resin? Discuss the sequence of separation of hydrated alkali metal ions by using through a cation exchange resin. What do you mean by back titration? Give one example. 3+3+2+2=10

b) How can the individual components of a mixture of Ca(II) and Mg(II) be determined complexometrically? Name two indicators involved in their estimations and draw their chemical structures. 4+2+4=10

c) What do you mean by food-flavouring agent and food-colouring agent? Give examples for each agent. How can you determine the BOD of a water sample? How does BOD differ from COD? $4+3+3=10$

d) The stability of (Zn^{2+} -indicator) complex should be lower than that of (Zn^{2+} - EDTA) complex in the titration of Zn^{2+} and EDTA solution—why? Explain the terms Adsorbents and Eluate in chromatography. Which of the adsorbants, either of high or low activity would you prefer to separate a mixture of highly polar compounds by TLC? What are the organic and inorganic compositions of soil? $4+2+2+2=10$
