December 2023

B.Sc.- 1 SEMESTER

Instrumentation Skills-1(BCHT-SE-108)

Time: 3 Hours   Max. Marks:75

Instructions:
1. *It is compulsory to answer all the questions (1.5 marks each) of Part -A in short.*
2. *Answer any four questions from Part -B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*
4. *The table for the t-values is given as Appendix-1 at the end of question paper.*

PART -A

Q1 (a) Write the number of significant figures in 1002 and 0.012 ?   (1.5)

(b) Write the two examples of solid solutions?   (1.5)

(c) How accuracy and precision are interrelated ?   (1.5)

(d) What is the visualizing agent used to detect the amino acids in TLC?   (1.5)

(e) What is solvent extraction and write its basic principle?   (1.5)

(f) Define the term Molality and write its formula?   (1.5)

(g) What do you understand by the batch extraction?   (1.5)

(h) What are the stationary and mobile phase in thin layer chromatography?   (1.5)

(i) Explain how the systematic errors affects the accuracy of a result?   (1.5)

(j) Explain the term one candela?   (1.5)

PART -B

Q2 (a) What is thin layer chromatography. Write about its principle, the two phases (10) in the chromatography, plate preparation, retardation factor and the developing solvent. Comment on the R_f value of the following molecules in 5% ethyl acetate pet ether and arrange them from low to high R_f value: chlorobenzene, Propane, phenol, benzene, butanoic acid.

(b) Calculate the ppm of mercury in water in a given sample contain 30 mg of (5) mercury in 500 ml of solution?

Q3 (a) What is distribution law and how the K_D and D are interrelated?   (5)

(b) What is confidence limit and write its importance. The five measurements (10) were done for a sample and the values are 21.56, 27.25, 25.53, 24.99 and 24.43. calculate the mean, standard deviation, standard error and the 95% confidence limit. Please refer to the table for the t-values as appendix 1.

Q4 (a) Convert the following units: (15)
(i) 25 inch into cm
(ii) 3 eV into Joules
(iii) 2 horsepower into Watt
(iv) 5 slug into Kg

(b) Differentiate between fundamental and derived units and write the full form of CGS, FPS and MKS system.

Q5 (a) What are student's t test and Q test and write their formula and significance? (5)

(b) What is standard unit and write its characteristics. Write the dimensional (10) formula and SI of the following quantities Density, power, work, volume and force. Also write the advantages of the SI system.

Q6 (a) Explain in detail the procedure of separation of the mixture the following (10)
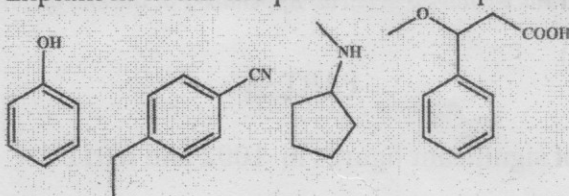
(b) Write the method for the determination of Pb^{2+} in water or any real samples?

Q7   Write about the classification of chromatography based on the force of (15) separation. Also comment on the visualizing agents and the compounds used as visualizing agents for aromatic compounds , carbohydrates, carboxylic acids and the aldehydes and ketones.
What is column chromatography and write about the factors affecting the solutes separation in column chromatography

Appendix-1

Table 22.1: Confidence Limit t-values as a function of (N-1)			
N-1	90%	95%	99%	99.5%
2	2.920	4.303	9.925	14.089
3	2.353	3.182	5.841	7.453
4	2.132	2.776	4.604	5.598
5	2.015	2.571	4.032	4.773
6	1.943	2.447	3.707	4.317
7	1.895	2.365	3.500	4.029
8	1.860	2.306	3.355	3.832
9	1.833	2.262	3.205	3.690
10	1.812	2.228	3.169	3.581