

Analytical Chemistry

QP Code : 77563

(2½ Hours)

[Total Marks : 60

- N. B. : (1) All questions are compulsory.
(2) Figures to the right indicate full marks.
(3) The use of a log table or a non-programmable calculator is permitted.

1. (A) Attempt any two of the following: 8
- (i) Give a detailed account of "Method Validation".
 - (ii) Define sampling. Give the criteria for the acceptance or rejection of any sample.
 - (iii) How is sample register maintained? What are the points to be documented regarding a particular sample in the register?
 - (iv) State the method related factors responsible for the incorrect results.
- (B) Describe the following parameters involved in validation of any analytical method: (i) Recovery Test (ii) Blank. 4
- OR
- (B) What is sampling scheme? How does it vary with the bulk size? 4
2. (A) Attempt any two of the following: 8
- (i) Discuss the following potential sources of uncertainty: Sample preparation effect & Instrumentation/Equipment effect.
 - (ii) How is uncertainty used in interpretation of data?
 - (iii) Write a note on: "significance of GMP" in pharmaceutical manufacturing processes.
 - (iv) Give an account of ensemble averaging to obtain an increase in S/N ratio. What is the liability of this technique?
- (B) The following data were obtained for a current measurement in mA on a noisy system: 15.86, 16.57, 18.09, 11.40, 15.91, 12.21, 15.85, 13.77, 11.85, 16.53; 4
- Assuming that the noise is random, calculate the signal to noise ratio of the system.
- OR
- (B) Three different quantities and their uncertainties are as follows: 4
- $A = 27.19 (0.017)$, $b = 33.72 (0.013)$ and $c = 45.08 (0.018)$.
If the final measurement is of the type $Y = a + b + c$, calculate the combined uncertainty in the measurement of Y.

3. (A) Attempt any two of the following: 8
- (i) What is breakthrough capacity of a resins? How is it determined?
 - (ii) How does the suppressor column function in ion chromatography?
 - (iii) Explain the selectivity of ion exchangers for cations and anions with the help of ion exchange equilibrium.
 - (iv) What are supercritical fluids? Discuss their properties.
- (B) Calculate the amount in 'mg' of sodium and calcium retained by 5.250 g of the cation exchange resin with an exchange capacity of 4.250 m mol/g of the resin. (Na = 23, Ca = 40) 4
- OR
- (B) Give an account of Inorganic Ion Exchangers. 4
4. (A) Attempt any two of the following: 8
- (i) Compare supercritical fluid chromatography with other types of chromatography.
 - (ii) Discuss the principle and applications of inverse gas chromatography.
 - (iii) How is affinity chromatography used in the separation of bio-molecules?
 - (iv) Differentiate between gel filtration and gel permeation.
- (B) With the help of a schematic diagram, explain the setup used in the supercritical fluid chromatography with special reference to function of each component. 4
- OR
- (B) Explain the theory of size exclusion chromatography. 4
5. (A) Attempt any four of the following: 12
- (i) Discuss the criteria for the selection of the method of analysis.
 - (ii) What is meant by random sampling?
 - (iii) Give a brief account of environmental noise.
 - (iv) Explain in brief the abbreviation 'ISO'.
 - (v) State the applications of ion chromatography.
 - (vi) Draw a labelled schematic arrangement of the 'off-line' SFE.
 - (vii) Describe column packing in size exclusion chromatography.
 - (viii) Describe the columns used in super critical fluid chromatography.
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