

(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:
- (i) What information is to be documented about the sample, while reporting the results of analysis?
  - (ii) Explain the term "Method Validation" of analytical processes.
  - (iii) How will you do charting and reporting of results in any analytical laboratory? What is record management? How is it done?
  - (iv) Give an account of acceptance criteria of sample.
- (B) What are the requirements for "Certified Reference Material"? 4
- OR**
- (B) Report the checklist for Quality Audit with reference to 'Staff and Equipments'. 4

2. (A) Attempt any two of the following: 8
- (i) Account for 'Sample effect' & 'Measurement conditions' as the potential sources of uncertainty.
  - (ii) How is uncertainty used in improving the Quality of Results?
  - (iii) Explain the effect of S/N ratio on the sensitivity and the detection limit.
  - (iv) What are the ISO 9000 requirement? How are they fulfilled?
- (B) Three measurements of a parameter and their respective uncertainties are as follows: 4
- Measurements:  $a = 101.18$ ,  $b = 099.49$ ,  $c = 102.59$   
 Uncertainties:  $a = 0.015$ ,  $b = 0.021$ ,  $c = 0.018$
- If the final measurement is of the type  $Y = a + b + c$ , calculate the combined uncertainty in the measurement of Y.

- OR**
- (B) A noisy conductometer shows the following values of conductance of a solution in a replicate measurement: 4
- 8.06, 6.81, 6.09, 7.98, 8.93, 6.99, 7.84, 6.27, 7.11, 9.45; Assuming that the noise is random, calculate the signal to noise ratio for the conductometer.

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3. (A) Attempt **any two** of the following: 8

- (i) What are chelating resins? Describe their applications with appropriate examples.
- (ii) Explain: Ion Exchange Equilibria.
- (iii) What are supercritical fluids? Explain their use in food analysis.
- (iv) Describe liquid ion exchangers.

(B) If a cation exchanger has an exchange capacity of 2.75 m mol/g of resin, calculate the number of milligram of potassium (39) and magnesium (24) that will be taken up by 5.250 g of resin.

OR

(B) Explain the role of suppressor column in ion chromatography. What are the applications of ion chromatography. 4

4. (A) Attempt **any two** of the following: 8

- (i) State the advantages and limitations of the size exclusion chromatography.
- (ii) Describe the different modes of elution with respect to affinity chromatography.
- (iii) Explain the theory of Size-Exclusion Chromatography.
- (iv) What are the different types of columns and detectors used in supercritical fluid chromatography.

(B) Write a note on column packing in size exclusion chromatography. 4

OR

(B) What is the principle of inverse gas chromatography? Discuss its applications. 4

5. (A) Attempt **any four** of the following: 12

- (i) What is sub sampling?
- (ii) In GLP, what is the role of Study Director?
- (iii) Write a brief note on chemical noise.
- (iv) Explain in brief 'Drug Act'.
- (v) What is breakthrough capacity of ion exchange resins?
- (vi) Discuss the application of SCF in pharmaceutical analysis.
- (vii) Give in short the comparison of SFC with other types of chromatography.
- (viii) What is gel filtration?