

Duration: 2 ^{1/2} Hours

Total Marks: 60

- N. B.:** 1. All questions are compulsory.
 2. Figures to the right indicate full marks.
 3. The use of non-programmable calculator is permitted.

- Q.1. A.** Attempt **ANY TWO** of the following: (8)
- i What is a sampling plan? Explain the quality of the sample.
 - ii Explain subsampling and storage of samples.
 - iii Explain the “method validation” of analytical processes.
 - iv Elaborate the factors to be considered while selecting a method.
- B.** Attempt **ANY ONE** of the following: (4)
- i Enlist the method related factors responsible for the incorrect analytical results.
 - ii Write a detailed note on ‘Pre-treatment of soil and cosmetic sample’.
- Q.2. A.** Attempt **ANY TWO** of the following: (8)
- i Explain the concept of signal to noise ratio (S/N) in the chemical analysis and list the sources of noise in instrumental analysis.
 - ii Explain the term: Drug rules (Schedules) and drug acts.
 - iii Explain the uncertainty evaluation process with reference to specification and identification.
 - iv Write a short note on “Good Laboratory Practices”.
- B.** Attempt **ANY ONE** of the following: (4)
- i The following data were obtained for a voltage measurement in mv, on a noisy system: 1.37, 1.84, 1.35, 1.47, 1.10, 1.73, 1.54, 1.08
Assuming that the noise is random, what is the S/N ratio?
 - ii Three measurements and their uncertainties are as follows:
 Measurement: a= 17.71, b=22.35, c=37.10
 Uncertainties: a= 0.02, b=0.03 c=0.11
 If the final measurement is of type $Y=a +b +c$, calculate the combined uncertainty in the measurement of Y.
- Q.3. A.** Attempt **ANY TWO** of the following: (8)
- i. Elaborate the principle of Ion Chromatography with the help of instrumentation diagrams.
 - ii. What are the applications of gel permeation chromatography?
 - iii. Write a note on Exclusion Chromatography.
 - iv. Give an account of use of chelating resins for separation of inorganic and organic compounds.

- B.** Attempt **ANY ONE** of the following: (4)
- i.** Explain inorganic and synthetic ion exchangers with suitable examples.
 - ii.** Calculate the amount in “mg” of sodium and calcium retained by 3.250 g of cation exchange resin with exchange capacity of 2.250 m mol/g of resin (At wt. of Na= 23 and Ca =40).
- Q.4. A.** Attempt **ANY TWO** of the following: (8)
- i.** Explain the supercritical fluid chromatography with respect to instrumentation.
 - ii.** What is affinity chromatography? Explain the mechanism for separation of biomolecules by Affinity chromatography.
 - iii.** Write the principle and working of OPLC.
 - iv.** Discuss in brief the critical state and supercritical state of the matter.
- B.** Attempt **ANY ONE** of the following: (4)
- i.** Explain the principle for supercritical fluid chromatography and discuss its applications with special reference to environmental samples.
 - ii.** Discuss the Instrumentation of Affinity chromatography.
- Q5.** Attempt **ANY FOUR** of the following: (12)
- a.** What is random sampling?
 - b.** Write a note on source of methods used for analysis
 - c.** List and explain the hardware devices for noise reduction.
 - d.** State the responsibilities of testing Facility Management and quality assurance units.
 - e.** Explain gel permeation chromatography in detail.
 - f.** Describe the instrumental method of determination of molecular weight of polymer.
 - g.** Give the applications of supercritical fluid chromatography with respect to food and pharmaceuticals analysis.
 - h.** Enlist the applications of OPLC.
