

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 a non-programmable calculator is permitted.

- Q1 A.** Attempt **ANY TWO** of the following: **(8)**
- i** Write the details of subsampling and storage of samples.
 - ii** Write a note on 'Pre-treatment of food sample'.
 - iii** Elaborate the factors which contribute to produce incorrect analytical results.
 - iv** What is validation of analytical methods? Give its importance.
- B.** Attempt **ANY ONE** of the following: **(4)**
- i** Define: a) Representative sample b) Systematic sampling
c) Random sampling d) Bulk material for sampling.
 - ii** List the factors to be considered while selecting a method for analysis.
- Q2 A.** Attempt **ANY TWO** of the following: **(8)**
- i** Define uncertainty and explain the rules for combining standard uncertainties.
 - ii** Describe the hardware devices for noise reduction.
 - iii** Write a note on "Drug acts".
 - iv** Elaborate the significance of GMP in pharmaceutical manufacturing processes.
- B.** Attempt **ANY ONE** of the following: **(4)**
- i** Three measurements and their uncertainties are as follows:
Measurement: a= 11.38, b=9.89, c=10.29
Uncertainties: a= 0.012, b=0.011 c=0.008
If the final measurement is of type $Y=a +b +c$, calculate the combined uncertainty in the measurement of Y.
 - ii** A noisy conductometer shows the following values of a solution for 10 measurements: - 5.84, 5.80, 5.89, 5.79, 5.95, 5.87, 5.86, 5.81, 5.93, 5.84
Assuming the noise is random, Calculate the S/N ratio for the conductometer.
- Q.3. A.** Attempt **ANY TWO** of the following: **(8)**
- i.** Explain the chelating resins. Discuss their uses in the separation of inorganic and organic compounds.
 - ii.** What are the applications of gel permeation chromatography
 - iii.** Discuss the principle and applications of Ion Chromatography.
 - iv.** With the help of ion exchange equilibria, explain the selectivity of ion exchangers for cation and anion.

- B.** Attempt **ANY ONE** of the following: (4)
- i.** What are the inorganic molecular sieves? Explain their uses.
 - ii.** Discuss in brief the instrumentation of Size Exclusion Chromatography.
- Q.4. A.** Attempt **ANY TWO** of the following: (8)
- i.** Write a note on instrumentation of supercritical fluid chromatography.
 - ii.** Why “CO₂” is the supercritical fluid of choice?
 - iii.** With the help of a labeled diagram, explain instrumentation of OPLC.
 - iv.** Explain the role of supercritical fluids in food analysis.
- B.** Attempt **ANY ONE** of the following: (4)
- i.** Compare TLC and OPLC.
 - ii.** Explain the instrumentation of Affinity chromatography.
- Q5.** Attempt **ANY FOUR** of the following: (12)
- a.** Elaborate “sampling schemes”.
 - b.** Write the sources of analytical methods .
 - c.** Explain the terms repeatability and reproducibility.
 - d.** Explain the appropriate design and placement of laboratory equipment.
 - e.** Write a short note on inorganic and synthetic ion exchangers with suitable examples.
 - f.** Describe the instrumental method of determination of molecular weight of polymers .
 - g.** Explain the concept of critical state and supercritical state of matter.
 - h.** What are the applications of Affinity chromatography?
