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 "CO_2" 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?

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