

Seat No. : _____

MD-221

May-2025

M.Sc., Sem.-II

410 : Chemistry

(Analytical Chemistry)

Time : 2½ Hours]

[Max. Marks : 70

1. (i) What is sampling and sample preparation ? Discuss in brief general steps followed in chemical analysis. 7

(ii) Write a short note on Craig's counter current extraction. 7

OR

1. (i) Explain the process for accelerated and microwave-assisted extraction. 7

(ii) What is cloud point extraction ? Discuss its principle, mechanism and applications in brief. 7

2. (i) Discuss plate theory and rate theory in chromatography. 7

(ii) Explain the principle and working mechanism of ion chromatography. 7

OR

2. (i) Discuss the basic principle and working of HPLC. 7

(ii) Discuss the principle, working and applications of TLC. 7

3. (i) What is derivative spectroscopy ? Discuss its advantages over conventional approach. 7

(ii) Write a comparison of Optical Rotatory Dispersion and Circular Dichroism. Also explain Cotton effect. 7

OR

3. (i) Explain the Stoichiometry-method of continuous variation as an application of spectrophotometry. 7

(ii) Give a detailed account of Ringbom plot for photometric accuracy. 7

4. (i) Explain radiative and non-radiative process with the help of Jablonski diagram. 7
(ii) Discuss the quantitative applications of fluorescence spectroscopy. 7

OR

4. (i) Write a brief note on instrumentation for fluorescence measurement. 7
(ii) Discuss the effect of concentration on fluorescence spectrum and intensity of a molecule. 7

5. Answer any **seven** out of **twelve** : (each question carries **2** marks) **14**

- (i) State two limitations of liquid-liquid extraction.
(ii) Define protein precipitation.
(iii) State two applications of solid phase extraction.
(iv) How can we reduce Eddy diffusion and longitudinal diffusion ?
(v) Define capacity factor and give its equation.
(vi) Give two examples of common adsorbents used in adsorption chromatography.
(vii) Give two examples of photometric titration.
(viii) Why does fluorescence occur at longer wavelengths than the absorption ?
(ix) Which type of detector is preferred to detect weak signals in spectrofluorometer ?
And why ?
(x) Write any three structural requirements whose presence in a molecule may make it fluorescent.
(xi) Why do we need to take UV spectra in quartz cuvettes ?
(xii) A substance has a molar absorptivity of $14,000 \text{ cm}^{-1} \text{ mol}^{-1} \text{ dm}^3$ at the wavelength of its maximum absorption. Calculate the concentration of the substance whose solution in a cuvette of path length 1 cm has an absorbance of 0.85.
-