



Seat No. : _____

NF-130

November-2025

M.Sc., Sem.-III

CHE(A) 501 : Analytical Chemistry

(Separation Techniques and Bioanalytical Chemistry)

Time : 2:30 Hours]

[Max. Marks : 70

1. (i) Write a note on Affinity chromatography. 7
(ii) Write a note on Gel-permeation. 7

OR

- (i) Give a detailed note on Preparative chromatography. 7
(ii) Explain in detail instrumentation of Ultra performance liquid chromatography. 7
2. (i) Discuss the application of Gas Chromatography in pharmaceutical, food, flavour and fragrance analysis in detail. 7
(ii) Explain the difference between Packed and Capillary columns in Gas Chromatography. Write a note on construction and working of different types of capillary columns. 7

OR

- (i) Explain the different types of Stationary Phases used in Gas Chromatography in detail. 7
(ii) Write principle, working methodology, advantages and application of Alkali Flame Ionization Detector (AFID). Explain the role of Alkali Ion source using diagram. 7
3. (i) Describe the principle and instrumentation of SFC. 7
(ii) Discuss the application of SFC in the analysis of pharmaceuticals. 7

OR

- (i) Compare and discuss the role of SFC vs GC and HPLC in analytical separation. 7
(ii) Briefly discuss the fundamentals of chiral and achiral SFC. 7

4. (i) Explain in detail pharmacokinetic profile of drug. 7
(ii) Write a note on stability, recovery, and matrix effect in bioanalysis. 7

OR

- (i) Explain in detail incurred sample reanalysis. 7
(ii) Discuss Extraction. Chromatography and Mass detection in Quantitative Bio-analytical Study. 7
5. Answer any **seven** out of twelve : (Each question carries 2 marks) 14
- (i) State the difference between Isocratic and Gradient Elution modes.
(ii) Define Ion-exchange chromatography.
(iii) Define: Peak tailing and Peak fronting.
(iv) Why are capillary columns usually preferred for the analysis of complex mixture in Gas Chromatography ?
(v) Name the detector specifically used for sulfur detection in Gas Chromatography and explain why.
(vi) Why is carrier gas in Gas Chromatography required to be chemically inert ? Give examples of inert carrier gases used this technique.
(vii) Why CO₂ is a preferred supercritical fluid compared to water or NH₃.
(viii) Define the triple point for any supercritical fluid.
(ix) Which co-solvents are added to modify the mobile phase polarity in SFC.
(x) Define : Full and Partial validation.
(xi) Define Bioavailability.
(xii) What is the composition of whole blood ?
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