

M Pharm 1st Year 2nd semester examination 2025
ADVANCED SPECTRAL ANALYSIS (MPC201T)

Answer five questions taking at least one question from each group

Group A

1. i) **Explain the principle, instrumentation, and applications of Atomic Absorption Spectroscopy (AAS) based on the following:** [4+4=8]
 - a) Describe the working of AAS.
 - b) Discuss its use in detecting heavy metals.ii) **Explain the synergistic and reductionist approaches in drug discovery with Omics- application as follows:** 3+4=7
 - a) Compare and contrast both approaches.
 - b) Illustrate with an example such as turmeric or any phytopharmaceutical.
2. i) **Define and discuss metabolomics on following aspects:** 4+4=8
 - a) How is metabolite profiling performed?
 - b) Mention the role of biomarkers in metabolomics.ii) **Discuss the following concept and its role in pharmacokinetics.** 4+3=7
 - a) How do hyphenated techniques assist in these studies?
 - b) How are ADME studies used in drug development?
3. **Answer in brief for the following:** 10 x 1.5 = 15
 - a) What is a peak in spectroscopy?
 - b) Define heavy metals and list two health hazards caused by them.
 - c) What is the function of a 96-well plate in a bioassay?
 - d) Differentiate between standard deviation and standard error.
 - e) What are p-values and how are they interpreted in bioassays?
 - f) Write a short note on ICP-MS
 - g) Define biomarkers with a suitable example.
 - h) What is supercritical fluid extraction and where is it used?
 - i) Write a short note on stem cell therapy.
 - j) What is next-generation sequencing (NGS)? Mention one application in medicine.

Group-B

4. What is the importance of 2D NMR? Why are cross peaks and diagonal peaks observed in 2D COSY NMR? Discuss 2D NOESY with examples. [3 +5+7]
5. Discuss the factors responsible for the sensitivity of NMR experiments. Discuss the approaches to sensitivity enhancement and inverse detection in heteronuclear NMR, providing examples. [5+10]
6. What are the different stretching and bending vibrations in IR spectra? Describe the significance of shape and intensity of IR peaks for their interpretation with some examples. Discuss a general strategy for the analysis of IR spectra. [3+4+8]

Group-C

7. Discuss in detail about the factors influencing the chromatography. Discuss in detail about the polarity index for mobile phases. 9 + 6 = 15
8. Write an account on implication of silica particles in HPLC. Discuss in detail about Van Deemter plot. Write short notes on refractive index detector and deflection type RI detector. 4 + 5 + 6 = 15
9. Discuss in detail about various evaluation parameters in HPLC. Discuss in detail about isocratic versus gradient elution. Discuss about typical HPLC pump and injection in HPLC. 7 + 3 + 5 = 15