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BPHARMA
(SEM VIII) THEORY EXAMINATION 2021-22
ADVANCED INSTRUMENTATION TECHNIQUES

Time: 3 Hours**Total Marks: 75****Note: 1.** Attempt all Sections. If require any missing data; then choose suitably.**SECTION A****1.****a. Attempt all questions in brief.****10 x 2 = 20**

b.	Infer the applications of X-Ray diffraction method.
c.	Define the procedure for calibration of UV-Visible spectrophotometer.
d.	What is a coupling constant?
e.	Define spin-spin coupling.
f.	Explain the principle of RIA.
g.	List the stationary and mobile phases used in GC-MS technique
h.	Define the role of a fluorimeter in the structural analysis of pharmaceutical compounds.
i.	Discuss the role of the NMR technique in the structural elucidation of compounds.
j.	Explain the term FAB.
	Define the term "time of flight" used in mass spectroscopy.

SECTION B**2. Attempt any two parts of the following:****2 x 10 = 20**

a.	Discuss the principle, instrumentation, and applications of the LC-MS technique.
b.	Elaborate on the fragmentation rules and different fragmentation peaks of mass spectroscopy.
e.	Discuss the following terms i) Differential Thermal Analysis ii) X-Ray Crystallography.

SECTION C**3. Attempt any five parts of the following:****7 x 5 = 35**

b.	Discuss the factors affecting the chemical shift in mass spectroscopy.
c.	Summarize the applications of ¹ H NMR and ¹³ C NMR methods.
d.	Discuss the limitation and applications of Radioimmunoassay.
e.	Explain the principle and procedure of the X-Ray Crystallography technique.
f.	Discuss the principle and procedures involved in the solid-liquid extraction technique.
g.	Explain the principle and applications of Differential Scanning Calorimetry (DSC).
	Discuss the detectors used in Nuclear Magnetic Resonance spectroscopy.

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Time: 3 Hours**Total Marks: 75****Note:** Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt all questions in brief. 2 x 10 = 20

- (a) Differentiate ^1H -NMR and ^{13}C -NMR.
- (b) What is chemical ionization technique?
- (c) What is Thermogram?
- (d) What do you mean by Miller Indices?
- (e) Define Accuracy and Precision as per ICH guidelines.
- (f) How will you calibrate electronic balance?
- (g) What is n/p ratio? Mention its significance in radioactivity.
- (h) Enlist the radioisotopes used in Radioimmunoassay.
- (i) What do you understand by Scanning densitometry in HPTLC?
- (j) What is MS-MS technique?

SECTION B

2. Attempt any two parts of the following: 10 x 2 = 20

- (a) Discuss the instrumentation of NMR. Explain relaxation processes.
- (b) Describe the principle, instrumentation and applications of DSC.
- (c) Explain liquid-liquid extraction principle. Discuss the applications of LC-MS/MS.

SECTION C

3. Attempt any five parts of the following: 7 x 5 = 35

- (a) Discuss spin-spin coupling with example. Write the significance of 'J' value.
- (b) Describe the fragmentation pathway in mass spectrometry.
- (c) Write the principle and application of Thermogravimetric Analysis.
- (d) Explain X-Ray crystallography principle and its role in structure elucidation.
- (e) Discuss the calibration of HPLC with its parameters as per ICH guidelines.
- (f) Discuss the procedure of Radioimmunoassay with its applications.
- (g) Explain time of flight mass spectrometer. What is Quasi-equilibrium theory.



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BPHARM

(SEM. VIII) THEORY EXAMINATION 2025-26
ADVANCED INSTRUMENTATION TECHNIQUES

TIME: 3 HRS

M.MARKS: 75

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt all questions in brief.

10x2 = 20

- (a) What is Spin - spin coupling?
- (b) Explain the term "Time of flight".
- (c) Discuss the working principle of the fluorimeter.
- (d) What are the advantages of the GC method?
- (e) Define the importance of the ion base peak in mass spectra.
- (f) Paraphrase the principle of HPLC.
- (g) Discuss the applications of X-ray Crystallography
- (h) Recall the working principle of the UV-Visible spectrophotometer.
- (i) Define the principle of the HPTLC-MS technique.
- (j) What is the coupling constant J?

SECTION B

2. Attempt any two of the following:

2 x 10 = 20

- (a) Discuss the principle, instrumentation, and applications of Differential Thermal Analysis (DTA).
- (b) Explain the principle and fragmentation rule of Mass Spectrometry.
- (c) Give a note on the instrumentation and applications of the ^{13}C NMR Technique.

SECTION C

3. Attempt any five part of the following:

5 x 7 = 35

- (a) Discuss the principle and application of the IR spectrophotometer.
- (b) Give a note on the principle of the Flame Photometer.
- (c) List the different X-ray diffraction methods and their applications.
- (d) Write about the chemical shift and its impact on ^1H NMR spectroscopy.
- (e) Explain the solid phase extraction and liquid-liquid extraction methods.
- (f) Discuss the principle and applications of Thermogravimetric Analysis (TGA).
- (g) Describe the various components and applications of radioimmunoassay.