Name: **Enrolment No:**	

UPES

End semester Examination, May 2024

Course: Advanced Instrumentation Techniques **Semester: VIII**

Program: B. Pharm **Time 03 hr**

Course Code: BP811ET **Max. Marks: 75**

Instructions: Read the Question Paper Carefully.

SECTION A

(20Qx1M=20 Marks)

S. No.	Statement of question.	Marks	Cos
1	Goniometer is a part of which analytical instrument?	1	CO2
2	Identify the chemical shift values observed in the ^{1}H NMR spectra of hexane. a. 1-2 b. 2-4 c. 2.5-3.5 d. 11-12	1	CO1
3	DSC instrument can be used to distinguish polymorphic forms of theobroma oil. **True /False**	1	CO2
4	Define accuracy of an analytical method.	1	CO3
5	State the relationship between limit of detection, signal response and noise of a peak in FT-IR spectra.	1	CO3
6	Two peaks in mass spectra of a molecule are at a difference of 2 mass unit and peak intensity ratio of 100:33. Identify the presence of an atom in this molecule. a. Sulphur b. Chlorine c. Bromine d. Carbon	1	CO1
7	Which of the following is not an ionization source? a. Electron impact b. MALDI c. FAB d. Time of flight	1	CO5
8	The sample is heated in a given environment (air, N_2, CO_2, He, Ar, etc.) at controlled rate and the change in the weight of the substance is recorded as a function of temperature or time. Identify the instrument mentioned in the statement above.	1	CO2
9	$n\lambda = 2d \sin(\theta)$ Identify the instrument where this equation is used.	1	CO5
10	Which of the following gas is used in GC-MS instrument? a. Methane b. Carbon dioxide c. Nitrogen d. None	1	CO5
11	State the name of calibration standard used in UV spectrometry?	1	CO5

12	Scintillation counters are used in …….. a. X ray diffraction. b. NMR. c. RIA. d. DSC.	1	CO2
13	At what chemical shift value acids is observed in ^{13}C-NMR spectra? a. 220ppm b. 180ppm c. 100ppm d. 20ppm	1	CO1
14	State any one application of radioimmuno-assay technique.	1	CO4
15	Calculate ring plus double bond (RDB) for a compound with Molecular Formula – $C_6H_5NH_2$.	1	CO1
16	Which of the following rays are used in NMR instrument? a. Microwaves b. IR rays c. X rays a. Radio waves	1	CO1
17	State the name of the calibration standard used in IR spectrometry.	1	CO4
18	Define calibration.	1	CO2
19	State the name of two parts of GC which require calibration.	1	CO3
20	What is the frequency of calibration of GC instrument? a. 1 month b. 1 week c. 3 years d. 6 months	1	CO3
SECTION B (20 Marks) **(2Qx10M=20 Marks)** **Attempt 2 Question out of 3**			
	Answer any two		
1	Illustrate and label the NMR spectra of isopropyl alcohol with the correct chemical shift values, splitting and integration.	10	CO1
2	Discuss radio-immuno assay technique with a suitable diagram.	10	CO4
3	Describe the role of isotopic abundance in mass spectrometry. State the name of elements that can be detected using this concept. Discuss the method of determination of charge on a molecule using isotopic abundance.	10	CO1
SECTION-C (35 Marks) **(7Qx5M=35 Marks)** **Attempt 7 Question out of 9**			
	Discuss various validation parameters as per ICH Q2 guideline.		
1	Describe the methods used for calibration of UV spectrometer.	5	CO3
2	Discuss the applications of single crystal XRD.	5	CO4
3	Discuss the following terms using propane as an example. a. Spin-spin splitting Chemical shift	5	CO2
4	b. Illustrate hard ionization technique used in mass spectrometry with a suitable diagram.	5	CO1

5	Write the full forms of the following abbreviations. a. MALDI-TOF b. HS-GC c. DESI d. EI-LC-MS e. APCI	5	CO1
6	Define HLB scale. Discuss about the stationary phases used in solid phase extraction technique.	5	CO5
7	Discuss McLafferty rearrangement.	5	CO4
8	Discuss the principle of NMR spectrometry in detail.	5	CO5
9	Goniometer is a part of which analytical instrument?	5	CO4