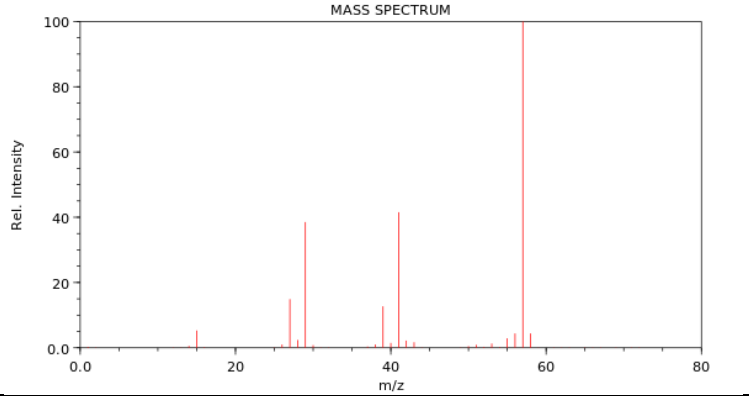
Name: **Enrolment No:**	

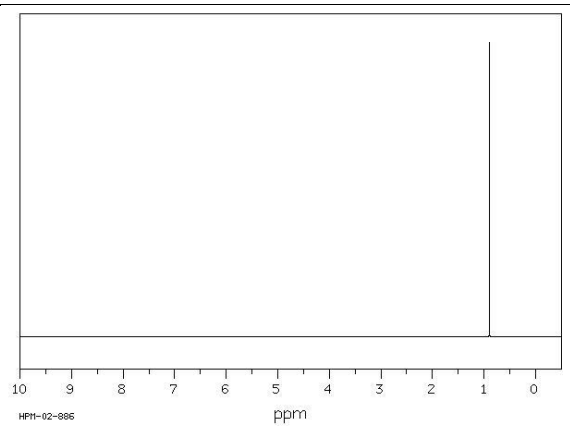
UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End semester Examination, May 2023

Course: Advanced Instrumentation Techniques (Elective) **Semester: VIII**
Program: B.Pharm **Time 03 hr**
Course Code: BP811ET **Max. Marks: 75**
Instructions: Read the Question Paper Carefully.

SECTION A

S. No.	CO	Multiple Choice Questions/objective/one line	Marks
Q1			**20**
1	CO2	What is the range of X rays	1
2	CO1	Give chemical shift value of aromatic protons in ^{1}H NMR a. 2-3 b. 5-6 c. 6-8 d. 11-12	1
3	CO2	DSC is used for distinguishing polymorphic forms. True /False	1
4	CO3	Define precision	1
5	CO3	Write relationship between LOD and LOQ	1
6	CO1	Two peaks in mass spectra which are of same intensity and have a mass difference of 2 indicates the presence of a. Sulphur b. Chlorine c. Bromine d. Iodine	1
7	CO5	Most common ionization source in GC-MS a. Electron impact b. MALDI c. FAB d. Time of flight	1
8	CO2	The sample is heated in a given environment (air, N2, CO2, He, Ar, etc.) at controlled rate and the change in the weight of the substance is recorded as a function of temperature or time. Name the instrument	1
9	CO5	Write the equation for Bragg's law	1
10	CO5	Which of the following gas is used in GC-MS instrument a. Methane b. Isopropane c. Helium d. None	1
11	CO5	Which validation parameter is important for identification tests as per ICH Q2.	1

12	CO2	Scintillation counters are used in a. X ray diffraction b. NMR c. RIA d. DSC	1
13	CO1	At what chemical shift value aldehydes is observed in ^{13}C-NMR a. 220ppm b. 150ppm c. 100ppm d. 20ppm	1
14	CO4	Give one application of radioimmuno assay technique	1
15	CO1	Calculate ring plus double bond (RDB) for a compound with MF – C_5H_5N	1
16	CO1	Which rays are used in NMR instrument a. Microwaves b. IR rays c. X rays d. Radiowaves	1
17	CO4	Reagent used for calibration of light source wavelength in UV spectrophotometer	1
18	CO2	Which is the variable mentioned on the x-axis in XRD spectra (Powder XRD)	1
19	CO3	Name two parts of GC which require calibration	1
20	CO3	What is the frequency of calibration of HPLC instrument a. 1 month b. 1 week c. 3 months d. 6 months	1
SECTION B			
Q2		**Answer any two**	**20**
1	CO1	Identify the hydrocarbon using the given ^{1}H NMR spectra and mass spectra 	10

		 Justify the peaks mentioned in the given spectra	
2	CO4	Explain Radioimmuno assay technique with a suitable diagram	10
3	CO1	Explain Mclafferty Rearrangement with a suitable example	10
		SECTION C **Answer any seven**	35
1	CO3	Discuss various validation parameters as per ICH Q2 guideline	5
2	CO4	Write about calibration of weighing balance	5
3	CO2	Give application of powder and single crystal XRD	5
4	CO1	Discuss terms using propane as an example a. Spin-spin splitting b. Coupling constant	5
5	CO1	Write about any soft ionization technique used in mass spectrometer	5
6	CO5	Write full forms of following terms a. TOF b. DTA c. FAB d. MALDI e. APCI	5
7	CO4	Discuss solid phase extraction technique and its role	5
8	CO5	What are hyphenated techniques and tandem techniques. What are the benefits of these techniques	5
9	CO4	What is the internal stand used in NMR. Give its advantages.	5