

Name:
Enrolment No:



UPES
End semester Examination, May 2025

Course: Advanced Instrumentation Techniques
Program: B. Pharm
Course Code: BP811ET
Instructions: Read the Question Paper Carefully.

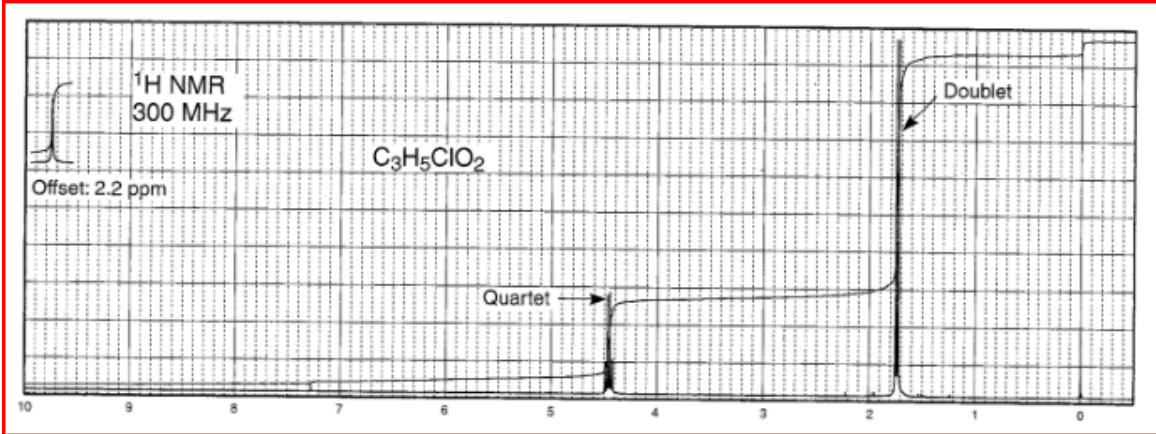
Semester: VIII
Time 03 hr
Max. Marks: 75

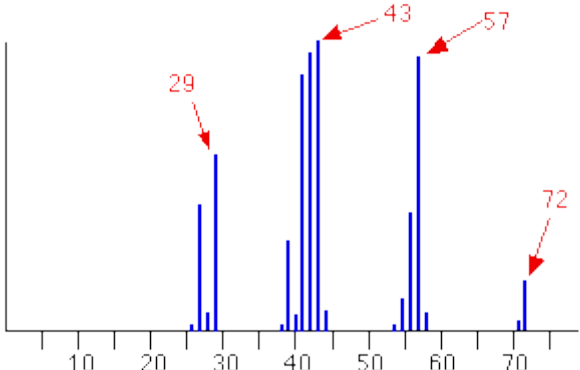
SECTION A

S. No.	CO	Multiple Choice Questions/objective/one line	Marks
Q1			20
1	CO2	Which part of UV requires calibration.	1
2	CO1	Identify the chemical shift values observed in the ¹ H NMR spectra of Cyclohexane. a. 1-2 b. 3-4 c. 4.5-5.5 d. 9-11	1
3	CO2	Give the wavelength range of UV rays.	1
4	CO3	How often does GC requires calibration (in months)?	1
5	CO3	Fast atom bombardment (FAB) is a a. Ionization source in Mass spectrometer b. Monochromator in XRD c. Detector in DSC d. Analyzer in Mass spectrometer	1
6	CO1	Two peaks in mass spectra of a molecule are at a difference of 2 mass unit and peak intensity ratio of 75:25. Identify the presence of an atom in this molecule. a. Sulphur b. Chlorine c. Bromine d. Carbon	1
7	CO5	Which of the following is not an analyzer in Mass spectrometer? TOF a. MALDI b. Quadrupole c. Ion trap	1
8	CO2	_____ is a technique used to analyze the polymorphic forms of solid materials.	1
9	CO5	Write the equation used in X ray diffraction.	1
10	CO5	Which ICH guideline discuss the stability of compounds? a. Q1 b. Q2 c. Q4	1

		d. Q6	
11	CO5	Name the internal standard used in NMR?	1
12	CO2	Geiger muller counters are used in a. X ray diffraction b. NMR c. RIA d. DSC	1
13	CO1	At what chemical shift value aliphatic carbon is observed in ^{13}C -NMR spectra? a. 220ppm b. 180ppm c. 140ppm d. 20ppm	1
14	CO4	State any one application of DSC technique.	1
15	CO1	Which of the following is NMR is inactive a. $^{13}_6\text{C}$ b. $^{16}_8\text{O}$ c. ^1_1H d. ^2_1H	1
16	CO1	Which of the following rays are used in XRD ? a. Microwaves b. IR rays c. X rays d. Radio waves	1
17	CO4	Find RDB of C_7H_8 (Toluene).	1
18	CO2	Give the isotopic abundance of ^{12}C and ^{13}C carbon in nature.	1
19	CO3	State the name of two parts of GC which require calibration.	1
20	CO3	What is accuracy?	1

SECTION B

Q2		Answer any two	20
1	CO1	<p>Compound has a molecular formula $\text{C}_3\text{H}_5\text{O}_2\text{Cl}$. NMR data is given below.</p>  <p>Identify the structure and denote each peak to the respective hydrogen on the deduced structure.</p>	10
2	CO4	Define calibration. Discuss calibration of GC instrument.	10

3	CO1	<p>Identify the fragments in the given mass spectra and deduce the structure of the compound.</p>  <p>In the given spectra</p> <ol style="list-style-type: none"> Give the x and y axis Identify the molecular ion peak Identify the base peak Identify the fragment ion peak Show any one fragmentation reaction using the above spectra 	10
		<p style="text-align: center;">SECTION C Answer any seven</p>	35
1	CO3	Discuss limit of detection and limit of quantification.	5
2	CO4	Describe the methods used for calibration of HPLC spectrometer.	5
3	CO2	Discuss the principle and applications of Differential Thermal Analysis.	5
4	CO1	<p>Discuss the following terms using propane as an example.</p> <ol style="list-style-type: none"> Spin-spin coupling Shielding 	5
5	CO1	Illustrate the importance of crystal XRD.	5
6	CO5	<p>Write the full forms of the following abbreviations.</p> <ol style="list-style-type: none"> FAB UPLC DEPT EI-LC-MS TOF 	5
7	CO4	Differentiate liquid liquid extraction and solid phase extraction techniques	5
8	CO5	Describe McLafferty rearrangement using pentanone.	5
9	CO4	Discuss the principle of RIA using a flow chart.	5