Name:

Enrolment No:

UPES

End Semester Examination, December 2024

Course: Advanced Instrumental Analysis-II **Semester:** VII

Program: Int BSc-MSc Chemistry **Time :** 03 hrs.

Course Code: CHEM 4006 **Max. Marks:** 100

Instructions: 1. Attempt all questions.

2. Internal choices are given for Q9 & Q11.

SECTION A

(5Qx4M=20Marks)

S. No.		Marks	CO
1	Elaborate the spectral interference in ICP method.	4	CO1
2	Differentiate between a flame and plasma.	4	CO1
3	Describe the significance of below mentioned terms. (i) NOESY (ii) COSY	4	CO3
4	Elaborate the sequecnce of steps in evaluating SEM image.	4	CO4
5	Briefly mention the significance of signal to noise ratio in data validation and how it will be measured when instruments are used?	4	CO4

SECTION B

(4Qx10M= 40 Marks)

6	Describe the significance of fragmentation in mass spectrometry and give fragmentation pattern of ethyl alcohol.	10	CO2
7	The following data was obtained for the separation of pesticides in a contaminated sample using 20-m capillary column and FID detector. Pesticide | Retention time(mins) | Peak width(mins) A | 16.98 | 0.17 B | 17.14 | 0.19 C | 17.47 | 0.17 Calculate the number of theoretical plates for the first and last peak.	10	CO2
8	Illustrate NMR-spectrometer and give significance of each component in it. Mention few applications of NMR-spectroscopy.	10	CO3
9	Rank the following compounds in terms of the expected elution order for a capillary GC separation run under isothermal conditions. Give reason. (a)Ethanol (b) n-Propanol (c) Methanol (d) n-Pentanol (e) n-Butanol	10	CO1

	OR Explore the working of thermal conductivity detector used in gas chromatography along with a neat sketch.		
SECTION-C (2Qx20M=40 Marks)			
10	(A) Draw how the secondary electrons and back-scattered electrons developed in SEM technique and show how it will form the image. (B) Specify the types of information obtained from SEM image in material characterization.	**10+10**	**CO4**
11	(A) Explain in detail the various factors that effect the following terms using appropriate illustrations (i) chemical shift (ii) spin-spin splitting (B) What type of solvents can be used in NMR processing and give few examples. OR (A) Explain shielding and deshielding in NMR spectroscopy with necessary illustrations. (B) Name the reference chemical used in NMR spectroscopy and give its structure and significance.	**10+10**	**CO3**