PRN:		Course Code:	CHS603

Second Year **M. Sc. Chemistry** End Semester Examination May 2024

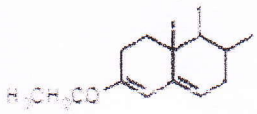
Advanced Spectroscopic Methods

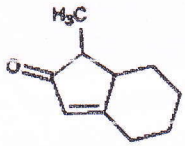
Day and Date: 03/06/2024, Mon Max Marks: **100**

Time: 10:30AM To 01:30PM Duration: **03** hrs

Instructions: All questions are compulsory.

Q.1	**Attempt the following**	Marks	Bloom's Level	CLO
a)	Solve the following. Determine DU/Hydrogen deficiency from molecular formulae given below. 1. $C_3H_7NO_3$ 2. $C_4H_4BrNO_2$	08	L2	CLO2
b)	What is Rule of 13? Explain with example.	08	L2	CLO2
c)	Using Woodward Fischer Rules, determine λ_{max} value from the structure of following molecules.	09	L3	CLO3

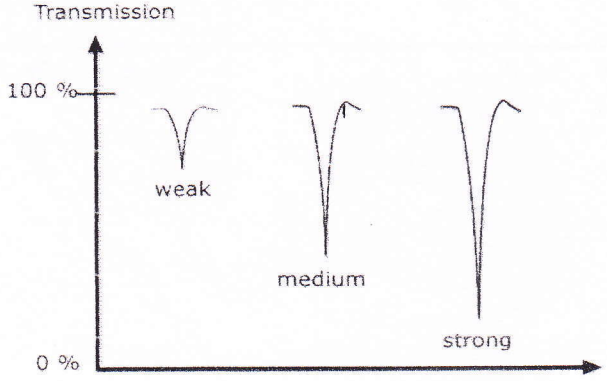




or

d)	Why UV spectrum appears broad? Justify your answer.	09	L3	CLO2

Q.2	**Attempt the following**			
a)	Discuss different fundamental modes of Vibrations in IR.	08	L2	CLO 2
b)	Explain with example how we get IR spectrum.	08	L2	CLO 2
c)	Below is the example of different intensity bands in IR spectrum. What is reason that we get different intensity peaks in an IR spectrum? Give example of functional group/bond that lead to each of these types of bands.	09	L3	CLO 2



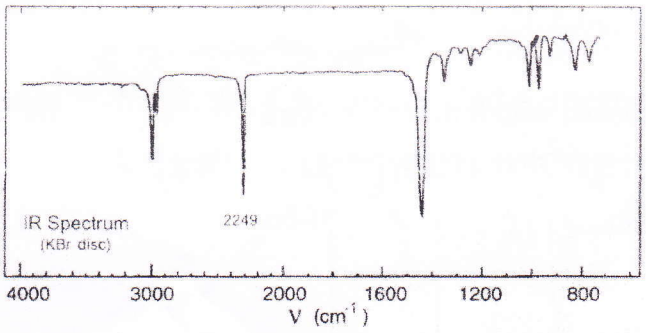
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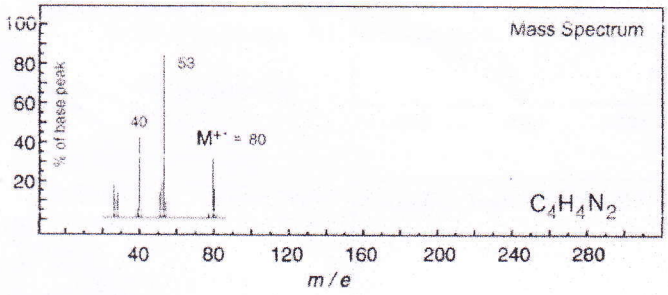
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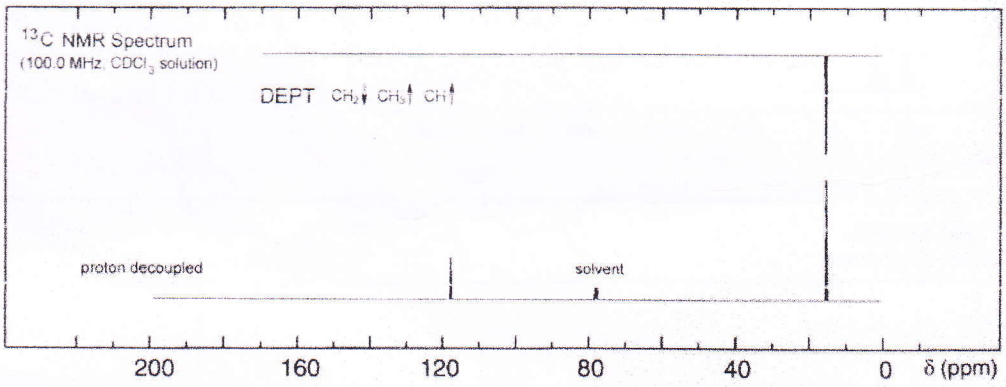
	d)	With an example explain, how the C=O and C-O bond stretching frequency get affected because of resonance in IR spectroscopy.	09	L3	CLO 2
Q.3		**Attempt the following.**			
	a)	Discuss how we get signal in ^{1}HNMR spectroscopy.	08	L2	CLO3
	b)	How many signals you will get for following molecules in ^{1}HNMR spectrum? Sketch and explain splitting pattern.	08	L3	CLO3
		CH_3CH_2Cl CH_3CH_2OH			
	c)	What is Spin-spin coupling? Explain with example.	09	L4	CLO1
		or			
	d)	i) Write note on coupling constant (*J*). (5 *Marks*) ii) Sketch the ^{1}H NMR spectrum for propyl bromide. (*4 Marks*)	09	L4	CLO1
Q.4		**Attempt the following**			
	a)	Discuss how H^1 NMR and C^{13} NMR spectroscopes differ? What information we can get from C^{13} NMR spectroscopy.	08	L2	CLO4
	b)	Explain with example how we get spectrum in Mass spectroscopy.	08	L2	CLO4
	c)	Elucidate the structure of compound with following spectra	09	L4	CLO5

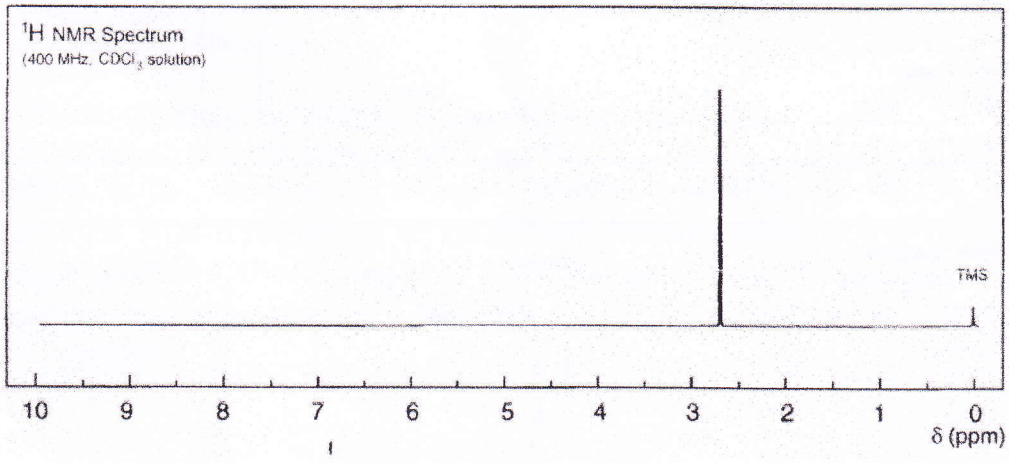
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No significant UV
absorption above 220 nm

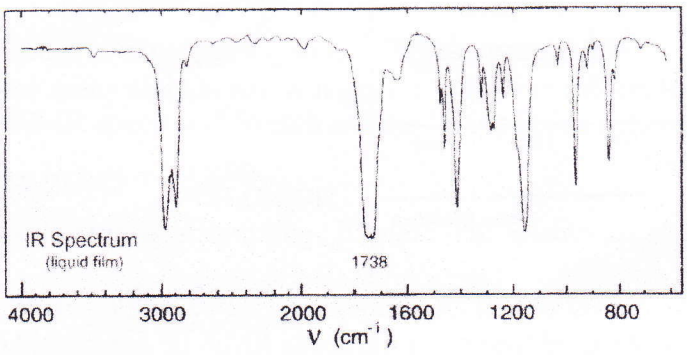


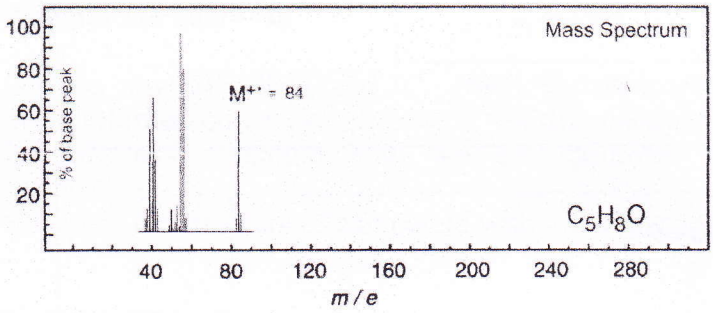


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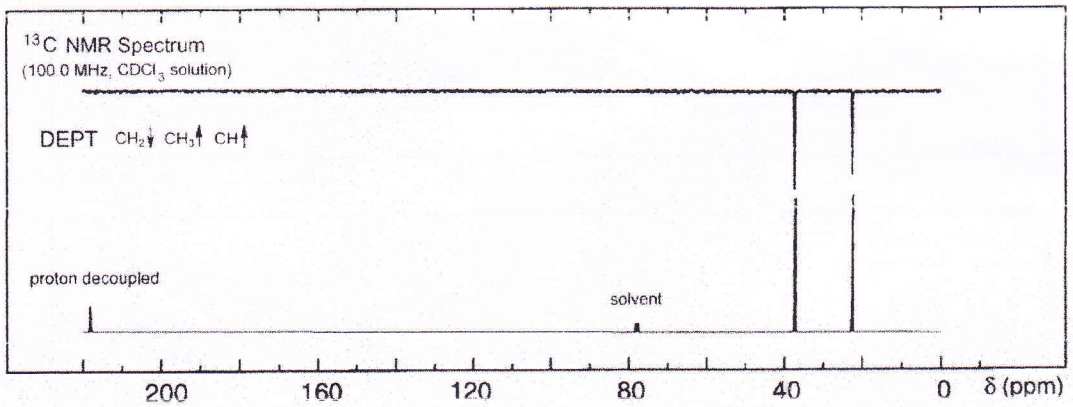
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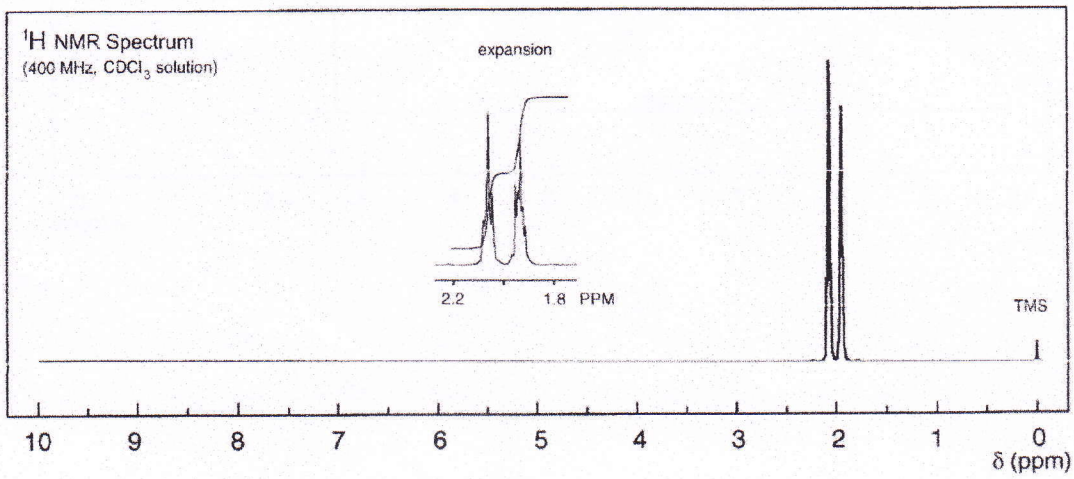
d) Elucidate the structure of compound with following spectra 09 L4 CLO5





No significant UV absorption above 220 nm





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