

No. of Printed Pages : 5

MCHE-012

**MASTER OF SCIENCE IN CHEMISTRY
(MSCCHEM)**

Term-End Examination

December, 2025

**MCHE-012 : SPECTROSCOPIC
IDENTIFICATION OF ORGANIC COMPOUNDS**

Time : 2 Hours

Maximum Marks : 50

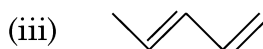
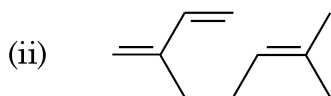
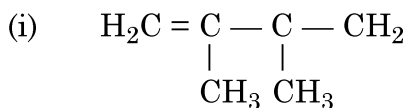
Note : Attempt any ***five*** questions. All questions carry equal marks.

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1. (a) Why is UV-Vis spectroscopy called the electronic spectroscopy ? Explain and illustrate your answer. 5

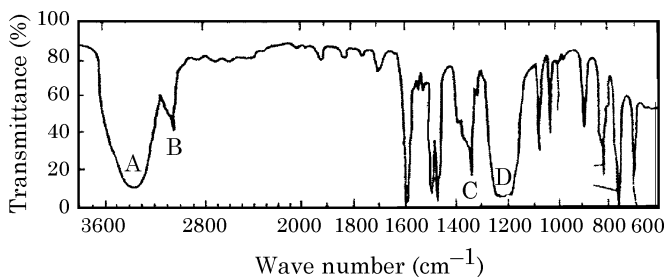
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- (b) Using Woodward-Fieser's rules, calculate λ_{max} for any *two* of the following : 5



2. (a) With the help an example, explain the fingerprint region in an IR spectrum. 5
- (b) Given below is the IR spectrum of an organic compound having molecular formula $\text{C}_6\text{H}_6\text{O}$. Identify the peaks marked A, B, C, D in the spectrum and write the structure of the compound : 5



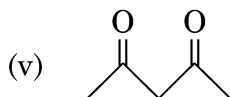
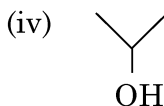
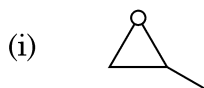
3. (a) What is the effect of hydrogen bonding on the absorption frequency in IR spectroscopy ? Explain. 5
- (b) Write the full form of TMS. Give any *four* advantages of using TMS as a good reference compound in NMR spectroscopy. 5
4. (a) With the help of an example, explain enantiotopic and diastereotopic protons. 5
- (b) Write the structure of the compound having molecular formula, $\text{BrCH}_2\text{CH}_2\text{COCH}_3$ following NMR peaks : 5

$\delta 2.11$, 3H, singlet

$\delta 3.52$, 2H, triplet, $J = 6 \text{ Hz}$

$\delta 4.40$, 2H, triplet, $J = 6 \text{ Hz}$

5. (a) Predict the number of signals expected to appear in the ^{13}C -NMR spectrum of the following compounds : 5



- (b) How will you distinguish between different isomers of dimethoxybenzene on the basis of their ^{13}C -NMR spectra ?

5

6. (a) What is DEPT ? Give its full form and application. 5

- (b) Compare the chemical ionization and electrospray ionization methods in terms of the nature, the size and the amount of the sample subjected to mass spectrometry. 5

7. (a) Describe in brief the process of electrospray ionization in mass spectrometry. 5
- (b) Predict the important spectral signals which are expected in the IR and mass spectra of benzoic acid. 5

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