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Roll No. | | | | | | | | | | | | | **Total No. of Pages : 03**

Total No. of Questions : 11

M.Sc.(Chemistry) (2018 Batch) (Sem.–1)

SPECTROSCOPY - I

Subject Code : CHL404-18

M.Code : 75116

Time : 3 Hrs. **Max. Marks : 70**

INSTRUCTION TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains EIGHT questions carrying FIVE marks each and students have to attempt any SIX questions.**
3. **SECTION-C will comprise of two compulsory questions with internal choice in both these questions. Each question carries TEN marks.**

SECTION-A

1. Answer briefly : **(2×10=20)**

a) "*Increase in polarity of the solvent shifts π- π * band to longer wavelength but n - π * band to shorter wavelength*". Comment on the statement.

b) When a UV light is passed through the given solution, the radiant power is reduced to 50%. Calculate the absorbance.

c) Write a short note on line width in UV-visible spectroscopy.

d) What are selection rules in IR spectroscopy?

e) What is the effect of hybridization of carbon on the stretching frequency of C-H bonds?

f) How lanthanide shift reagent is helpful in simplifying the NMR spectra?

g) Write a short note on HMBC spectrum.

h) How many different types of protons are present in CH_3-CH(C1)-$COCH_3$ and CH_3-CH_2-CHO?

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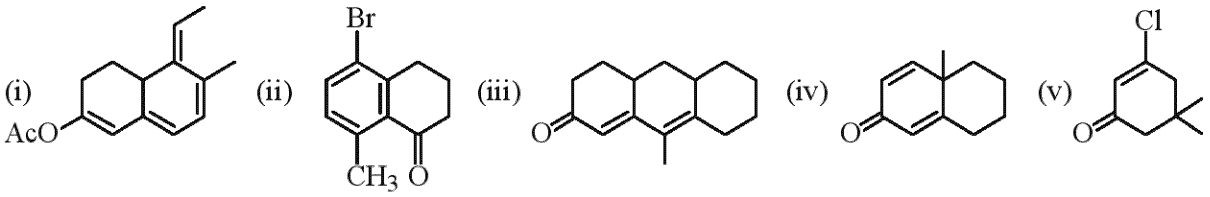
i) What do you understand by Metastable ions?

j) Determine the structure of the compound whose m/e values in the mass spectrum are 100, 85, 71,57, 43 (base), 41, 29 and 27.

SECTION-B

2. "*A conjugated diene absorbs at a higher wavelength with higher value of extinction coefficient as compared to a diene in which double bonds are isolated*". Comment on this statement with examples giving the chemistry involved. 5

3. Apply Woodward-Fieser rule to calculate λ_{max} value for the following compounds : 5



4. Describe the various molecular vibrations in the IR spectroscopy. Explain the applications of IR. 5

5. How will you detect the presence of : 5

a) primary, secondary and tertiary amines

b) conjugated and unconjugated nitro-compounds and

c) acetaldehyde and acetone?

6. What do you understand by the terms ^{1}H decoupling and noise decoupling in ^{13}C NMR spectroscopy? How these are helpful in simplifying the spectra? 5

7. Discuss the first and second order spectra of AX, AX_2 and A_2B_2 proton NMR with suitable examples. 5

8. Describe some important features of the mass spectra of amines and nitriles. 5

9. What is McLafferty rearrangement? In the mass spectrum of an organic compound, the molecular ion peak appears at m/e 102. Some other important peaks appear at 87, 59, 45 (100%) and 43. Name the compound and confirm the structure by showing various fragmentation modes. 5

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SECTION-C

10. What is meant by the term chemical shift? Name the various factors on which the value of chemical shift depend and discuss each in detail. 10

OR

Explain the principle of electronic spectroscopy. 10

11. a) Describe in detail EI and CI instrumentations for scanning the mass spectrum of an organic compound. 6

b) Draw and describe the electronic transitions in UV-visible spectroscopy. 4

OR

Discuss fragmentation pattern for amides, nitriles and carboxylic acids. 10

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NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.

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