SG – 244

Total No. of Pages : 4

Seat No.	

M.Sc. (Part - II) (Semester - III) (CBCS) Examination, March - 2023

ORGANIC CHEMISTRY (Paper - X)

Advanced Spectroscopic Methods

Sub. Code : 80475/85411

Day and Date : Thursday, 22 - 06 - 2023 **Total Marks : 80**

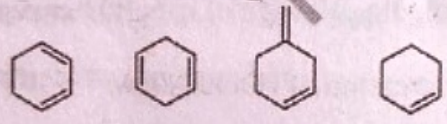
Time : 10.30 a.m. to 01.30 p.m.

Instructions : 1) Question 1 is compulsory.
2) Attempt any two questions from each section.
3) Answers to the two sections must be written in the same answer book.
4) All questions carry equal marks.
5) Figure to the right indicates full marks.

Q1) **Answer the following :** **[16]**

a) Why D_2O exchange technique is used in NMR analysis?

b) Which of the following molecule absorbs at the longest wavelength?



I II III IV

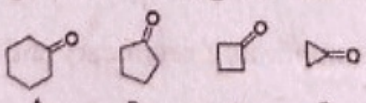
c) Identify the ketone which will show McLafferty rearrangement.

I II III IV

d) Write any two solvents used for scanning NMR.

e) Identify the shift which aniline shows in acidic medium.

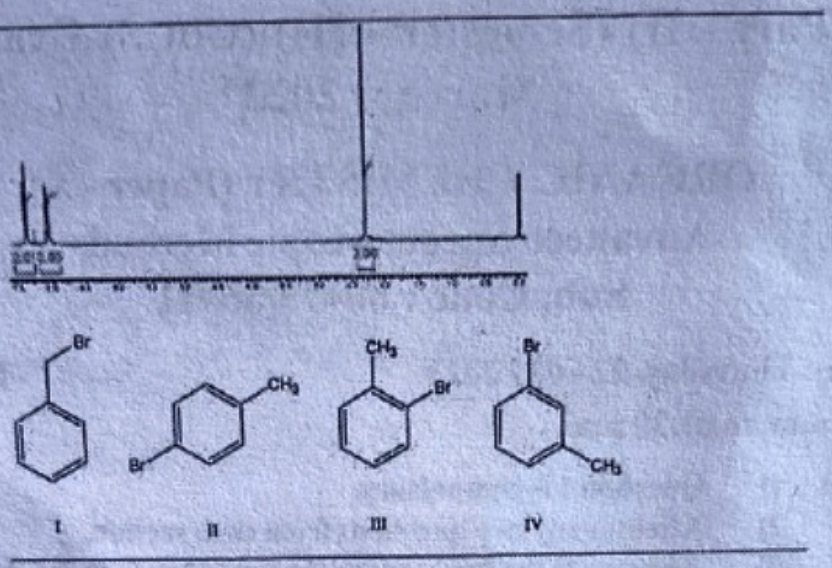
f) Arrange the following ketones in desending order of carbonyl stretching.



A B C D

P.T.O.

g) Choose the plausible structure from following for the compound with molecular formula C_7H_7Br, whose ^1H NMR spectrum is shown below.



I II III IV

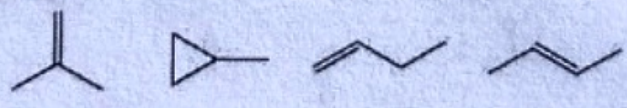
h) Which is the common observation in DEPT-45, DEPT-90 and DEPT 135?

i) How many signals does the aldehyde $(CH_3)_3CCH_2CHO$ have in ^1H NMR spectrum?

j) Identify the fragment and calculate the m/z value of peak obtained in mass spectrum due to benzylic cleavage of n-butyl benzene.

k) Give the mathematical expression of Hooke's law.

l) Among the following four constitutional isomers which one would exhibit the most stable fragment ion at m/z 41?



I II III IV

m) Deduce the structure of the compound from the following spectral data

M.F. C_3H_7ON

IR- 3500, 3400, 3370, 1670, 1800 cm^{-1}

PMR-δ 2.25 (q, 2H); 6.40 (s, 2H); 1.20 (t, 3H)

n) How will you distinguish between primary, secondary and tertiary amines by IR spectroscopy?

o) How many signals are observed in ^{13}C- NMR spectrum of acetone?

p) Which monohalogeno compound shows M and M+2 peaks with equal intensity?

SECTION - I

Q2) a) Explain factors affecting on carbonyl stretching frequencies with suitable examples. **[8]**

b) Explain Homotopic, enantiotopic and distereotopic protons with suitable examples. **[8]**

Q3) a) Explain McLafferty rearrangement with suitable examples. **[10]**

b) Predict the structure of an organic compound based upon following data. **[6]**

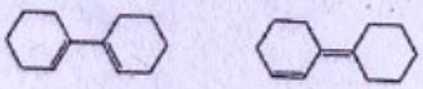
M.F. = C_7H_9N

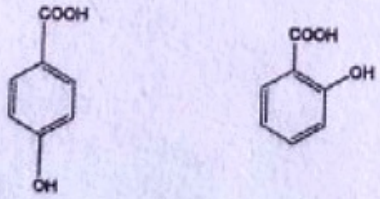
IR = 3480, 3395 cm^{-1}

^1H NMR = δ 02.16 (3H, s), 3.24 (2H, s) ,7.37(2H, d, J = 7Hz), 7.79 (2H, d, J = 7 Hz).

Q4) a) How will you differentiate between following pairs using depicted spectroscopic technique. **[10]**

i)  [MS]

ii)  [UV]

iii) 

[IR]

b) Explain DEPT technique in ^{13}CMR spectroscopy? [6]

SECTION - II

Q5) a) Explain various factor affecting chemical shift. **[10]**

b) Predict the structure of an organic compound based upon following data. **[6]**

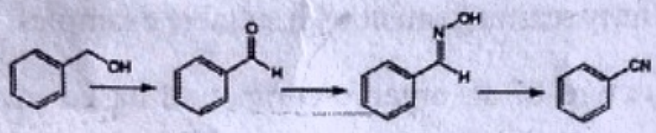
M.F. $C_5H_7NO_2$

IR = 2200, 1747, 1200 cm^{-1}

^{1}HNMR = δ 1.1 (3H, t), 3.8 (2H, q), 1.2 (2H, s)

Q6) a) Explain various ionization techniques in mass spectroscopy. **[10]**

b) Explain the use of IR spectroscopy in monitoring following transformations. **[6]**



Q7) Write notes on (**any four**) : **[16]**

a) Retro Diels Alder reaction in Mass spectroscopy.

b) Sampling techniques in IR spectroscopy.

c) Pascal triangle.

d) Significance of coupling constant.

e) Chromophore and auxochrome.

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