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Total Pages : 5

SE/MDQ/0-20

3748

ORGANIC CHEMISTRY (GENERAL)

Paper - XIV

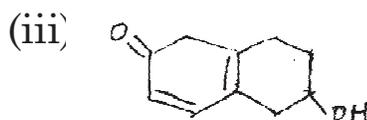
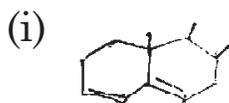
Time allowed : 3 Hours

Maximum Marks : 60

**Note:** Attempt any five questions in all. Selecting at least one question from each section.

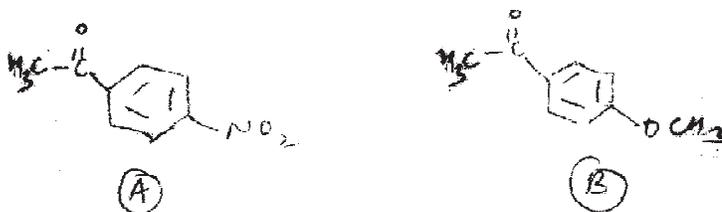
SECTION-A

1. (a) Which structural features in a compound may produce a bathochromic or a hypsochromic effect?
- (b) Discuss the effect of solvation on the electronic transitions of  $\alpha$ ,  $\beta$ - unsaturated carbonyl compounds.
- (c) Calculate  $X_{\max}$  for the following substances



3,3,6

2. (a) Discuss sample handling for Infrared spectroscopy in case of gas liquid or solid samples. 3
- (b) Differentiate between overtones and fermi resonance. 3
- (c) Which of the following compound shows C = O stretching at lower frequency? Justify. 3



- (d) Elaborate the effect of hydrogen bonding on vibrational frequencies in case of methyl salicylate. 3

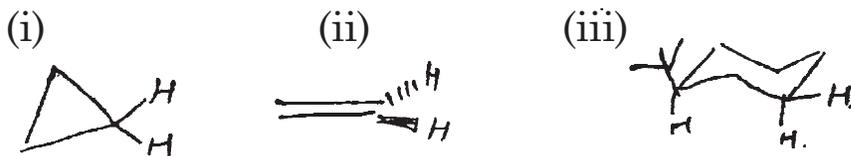
### SECTION-B

3. (a) How will you distinguish between protons of benzene and acetylene on the basis of  $^1\text{H NMR}$  spectroscopy.
- (b) Comment on the effect of hydrogen bonding on the absorption of hydroxyl protons of alcohols in (i) dilute and (ii) concentrations solution.
- (c) Write a note on Pascal's triangle.

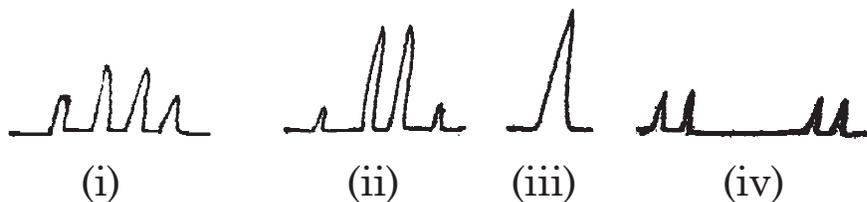
- (d) The PMR spectrum of ethyl 2-butenate shows the signals  $\delta = 6.96$  (dq  $J=16, 6.8\text{Hz}$ , 1H), 5.81 (dq,  $J=16, 1.7\text{ Hz}$ , 1H), 4.13 (q,  $J=7\text{Hz}$ , 2H), 1.88 (dd,  $J=6.8, 1.7\text{ Hz}$ , 3H) and 1.24 (t,  $J=7\text{Hz}$ , 3H) ppm.

Assign the  $\delta$  values to various hydrogen. Also write whether the double bond is cis or trans. 12

4. (a) Write down the geminal coupling constant values for the following systems. Also discuss the factors effecting the geminal coupling.



- (b) Discuss  $1_{\text{H}}$  to  $19_{\text{F}}$  coupling taking the example of 2-Fluoroethanols.
- (c) The following patterns represent the two coupled protons. Assign each pattern in relation to chemical shift difference between these two protons.



5. (a) Explain the utility of shift reagents. Discuss the shift reagents of europium.
- (b) How DEPT-45, DEPT-90 and DEPT-135 spectra are useful?
- (c) Differentiate COSY and HETCOR. 12

### SECTION-C

6. (a) Describe chemical ionization. How it is different from electron ionisation.
- (b) Distinguish between 3-methyl and 4-methyl cyclohexene on the basis of mass spectroscopy.
- (c) Give a short note on isotope ratio data. 12
7. (a) Compare  $^1\text{H}$  NMR and  $^{13}\text{C}$  NMR spectra of methyl ethyl ketone. For  $^{13}\text{C}$  NMR. Consider both proton decoupled and off-resonance spectrum.
- (b) Write the major peaks in the mass spectrum of
- (i) cresol
  - (ii) acetophenone
  - (iii) 1,1-dichlorobutane 12
8. A compound with molecular formula  $\text{C}_8\text{H}_8\text{O}_2$  has the following spectral data

$$\text{UV} (\lambda_{\text{max}}) = 253, 259, 265 \text{ nm}$$

IR ( $\nu_{\max}$ ) = 3030, 1770, 1593, 1230, 1040  $\text{cm}^{-1}$

$^1\text{H NMR}$  ( $\text{CDCl}_3$ ) =  $\delta$  2.20 (3H, s), 6.85-7.30 (5H, m)

Mass = m/z 136, 94 (100%). 66, 65, 43, 39

Explaining the given data, deduce the structure of the organic compound. 12