

Total No. of Printed Pages—8

**6 SEM TDC CHMH (CBCS) C 14**

**2 0 2 3**

( May/June )

**CHEMISTRY**

( Core )

Paper : C-14

( **Organic Chemistry** )

Full Marks : 53

Pass Marks : 21

Time : 3 hours

*The figures in the margin indicate full marks  
for the questions*

1. Choose the correct answer from the following : 1×5=5

(a) The absence of absorption bands near  $1600\text{ cm}^{-1}$ ,  $1580\text{ cm}^{-1}$  and  $1500\text{ cm}^{-1}$  is a proof for the absence of

(i) carbonyl group

(ii) aromatic ring

(iii) —OH group

(iv) secondary amino group

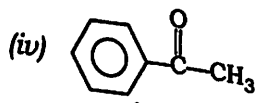
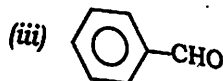
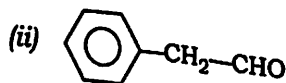
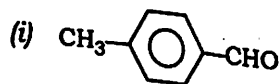
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( 2 )

(b) Which of the following is an auxochrome?

- (i)  $-\text{N}=\text{O}$
- (ii)  $-\text{NO}_2$
- (iii)  $-\text{N}=\text{N}-$
- (iv)  $-\text{OH}$

(c) The NMR spectrum of an unknown compound exhibits signals  $\delta$  7.5-8.0, (m, 5H) and 10.0 (s, 1H). Which of the following structures represents these data?



(d) Invert sugar is

- (i) sucrose
- (ii) mannose
- (iii) a mixture of glucose and fructose
- (iv) None of the above

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( Continued )

( 3 )

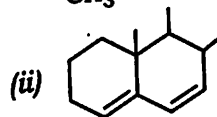
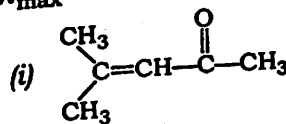
(e) Which one of the following is a natural polymer?

- (i) Celluloid
- (ii) Viscose rayon
- (iii) Terylene
- (iv) Cellulose

UNIT—I

2. Answer the following questions :

(a) Using Woodward-Fieser rule, calculate  $\lambda_{\text{max}}$  for the following : 1×2=2



(b) Explain how *cis*-cinnamic acid and *trans*-cinnamic acid can be distinguished with the help of UV spectroscopy. 2

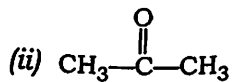
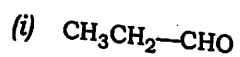
(c) Aniline absorbs at 280 nm,  $\epsilon_{\text{max}}$  8600, however in acidic solution the main absorption band is seen at 203 nm. Explain. 2

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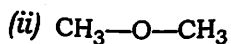
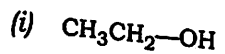
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(d) Distinguish the following pair of isomers with the help of IR spectra : 2



Or



(e) A compound with molecular formula  $\text{C}_8\text{H}_8\text{O}$  gives the following signals in NMR spectrum :

(i) Multiplet  $J$  2.72 (5H)

(ii) Doublet  $J$  7.2 (2H)

(iii) Triplet  $J$  0.22 (1H)

Identify the structure of the compound. 3

Or

Predict the structure of an organic compound with molecular mass 88, whose NMR data are given below :

(i) A triplet,  $\delta$  1.2, 2H

(ii) A singlet,  $\delta$  1.97, 3H

(iii) A quartet,  $\delta$  4.06, 2H

(f) Define  $M^+$  and  $M^{+\cdot}$  ions. What do you mean by base peak in the mass spectrum of a compound? 1+1=2

Or

Write a short note on McLafferty rearrangement. 2

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( Continued )

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(g) An organic compound with molecular mass 72 absorbs at 274 nm,  $\epsilon_{\text{max}} 17$ . In IR region, a strong absorption band is found at  $1715\text{ cm}^{-1}$  and medium absorption bands are found at  $2941\text{-}2857\text{ cm}^{-1}(m)$  and at  $1460\text{ cm}^{-1}(m)$ . The signals in the NMR spectrum are—

(i) 7.52  $J$ , quartet;

(ii) 7.88  $J$ , singlet;

(iii) 8.93  $J$ , triplet.

Establish the structure of the compound. 4

(h) Explain shielding of acetylene protons and deshielding of ethylenic protons. 2+2=4

Or

Write in short about chemical shift. 4

### UNIT—II

3. Answer the following questions :

(a) Define epimerization. 1

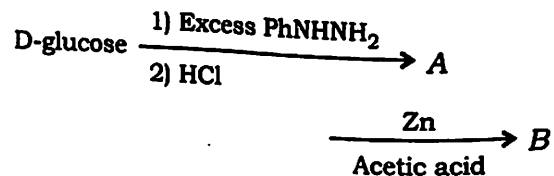
(b) Sketch the stable conformational structure of the  $\alpha\text{-D-glucopyranose}$ . 1

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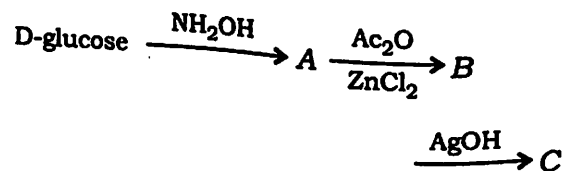
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- (c) Identify A and B from the following : 2



- (d) Complete the following reactions and identify A, B and C : 2



- (e) Convert D-arabinose into D-glucose with the help of Kiliani-Fischer synthesis. 2

- (f) Write a short note about mutarotation. 2

Or

When D-glucose is treated with dilute aqueous alkali, a mixture of D-mannose, D-fructose and D-glucose is obtained. Explain the mechanism of the reaction. What is the name of the reaction?

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( Continued )

( 7 )

UNIT—III

4. Answer the following questions :

- (a) Write the structural formulas of the following dyes and mark the chromophore and auxochrome in each case : 2

- (i) Congo red  
(ii) Rosaniline

- (b) How can alizarin be synthesized from anthracene? 2

Or

Write down the preparation of Congo red.

- (c) Synthesize crystal violet from dimethyl aniline. 2

- (d) How will you synthesize malachite green? 2

Or

Account the colour changes occurring when phenolphthalein is used as indicator in acid-base titration.

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( Turn Over )

UNIT—IV

5. Answer the following questions :

- (a) What are polyurethanes? How are they formed? 1+1=2
- (b) How can phenol-formaldehyde resin be prepared? Explain. 2
- (c) What is biodegradable polymer? Give one example of it. 1+1=2
- (d) Explain vulcanization of natural rubber. 2
- (e) How can Terylene be synthesized? 1

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