

Total No. of Printed Pages—8

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

**2 0 2 2**

( June/July )

**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. Select the correct answer from the following :

1×5=5

(a) When the  $\lambda_{\max}$  of a compound shifts to a shorter wavelength on certain treatment, the compound is said to have undergone

(i) bathochromic shift

(ii) hypochromic effect

(iii) hyperchromic shift

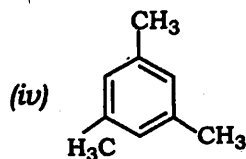
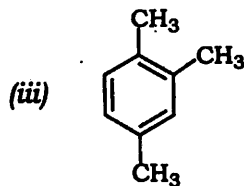
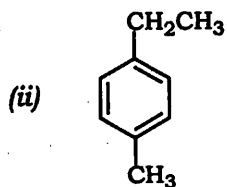
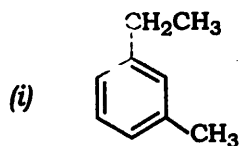
(iv) hypsochromic shift

( 2 )

(b) Dyes which can be applied directly to cotton from water solution are called

- (i) mordant dyes
- (ii) vat dyes
- (iii) sustentive dyes
- (iv) dispersive dyes

(c) The NMR spectrum of the compound  $C_9H_{12}$  shows two signals at  $\tau 3.22$  (s, 3H) and  $7.75$  (s, 9H). Which of the following structures is in conformity with the data?



22P/1005

( Continued )

( 3 )

(d) The monomers of Buna-S rubber are

- (i) isoprene and butadiene
- (ii) styrene and butadiene
- (iii) adipic acid and hexamethylene diamine
- (iv) chloroprene

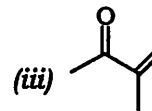
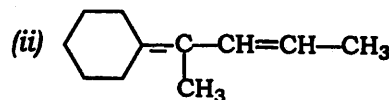
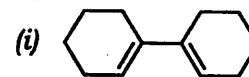
(e) Epimeric carbohydrates differ in their

- (i) configuration at  $\alpha$ -C atom
- (ii) number of —OH groups
- (iii) ring size
- (iv) None of the above

UNIT—I

2. Answer the following questions :

(a) Calculate  $\lambda_{\max}$  in UV spectrum for the following : 1×3=3



22P/1005

( Turn Over )

( 4 )

(b) Account for the following observations :  
2×2=4

(i) Ethylene is colourless, but a polyene, e.g.,  $\text{CH}_3(\text{CH}=\text{CH})_6\text{CH}_3$  is yellow.

(ii) 1,4-pentadiene does not absorb light above 200 nm.

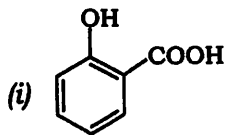
(c) Pent-1-ene absorbs at 176 nm. The absorption data,  $\lambda_{\text{max}}$  for three isomeric dienes A, B and C of molecular formula  $\text{C}_5\text{H}_8$  is 178 nm, 211 nm and 215 nm respectively. Write down the structures of A, B and C with proper reasoning. 2

Or

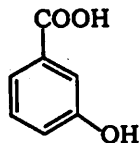
Using MO theory, account for the following trends in  $\lambda_{\text{max}}$  (nm) :

Ethylene (175), 1,3-butadiene (217) and 1,3,5-hexatriene (250)

(d) How will you differentiate between the following pairs of compounds using IR spectra?  $1\frac{1}{2}\times 2=3$

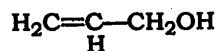


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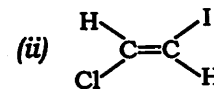
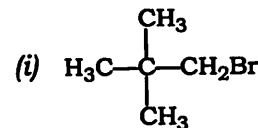
(ii)  $\text{CH}_3\text{CH}_2\text{CHO}$

and



( 5 )

(e) What will be the multiplicity of each kind of proton in the following molecules? 2



(f) A compound,  $\text{C}_9\text{H}_{10}\text{O}_2$ , shows the following signals in  $^1\text{H}$ NMR spectrum :

(i)  $\delta 2.3$  (3H, singlet)

(ii)  $\delta 3.6$  (3H, singlet)

(iii)  $\delta 6.4-7.5$  (4H, a pair of doublets  
 $J = 8 \text{ Hz}$ )

Assign a structure to the compound. 3

(g) Identify the compound by analyzing the following data : 2

IR  $\nu(\text{cm}^{-1})$  : 1600, 1715, 3000

Mass ( $m/e$ ) : 43, 91, 134 ( $\text{M}^+$ )

NMR  $\delta$  value : 2.1 (s, 3H), 3.6 (s, 2H),  
7.3 (m, 5H)

(h) Explain the effect of polar solvent on  $\pi-\pi^*$  and  $n-\pi^*$  transitions. 2

Or

Why is TMS used as a reference in NMR spectroscopy?

( 6 )

UNIT—II

3. Answer the following questions :

- (a) Establish the cyclic structure of D-glucose. 2

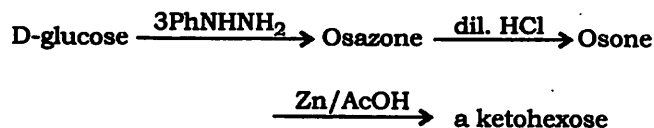
Or

Explain why D-glucose and D-fructose give the same osazone.

- (b) What is epimerization? Explain it considering the conversion of D-glucose to D-mannose. 1+2=3

- (c) Why does the anomeric —OH group undergo methylation with CH<sub>3</sub>OH and HCl under reflux but others do not? 2

- (d) Complete the following reaction : 3



UNIT—III

4. Answer any four of the following questions :

2×4=8

- (a) What are the requirements of a substance to act as a dye? Name two substances which meet these requirements.

( 7 )

- (b) How will you synthesize fluorescein?

- (c) How would you prepare Congo red from naphthionic acid? Discuss its use as acid-base indicator.

- (d) What are the chromophores and auxochromes present in the following dyes?

(i) Alizarin

(ii) Methyl orange

- (e) Give one example of a xanthene dye and mordant azo dye. Also write their structures.

UNIT—IV

5. Answer the following questions :

- (a) What is Ziegler-Natta catalyst? Discuss their importance in the formation of addition polymer. 2

- (b) What type of alkenes prefer to undergo cationic polymerization? Discuss the role of electron donating groups in cationic polymerization. 1+2=3

Or

Discuss the mechanism of a peroxide-initiated chain growth polymerization involving any vinyl monomer. 3