

6 SEM TDC CHMH (CBCS) C 14

2025

(May)

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) Natural rubber is a polymer of

- (i) 2-methyl-1, 3-butadiene
- (ii) 2-chloro-1, 3-butadiene
- (iii) 2-methyl but-2-ene
- (iv) 1, 3-butadiene

(b) The different types of energies associated with a molecule are

- (i) electronic energy
- (ii) vibrational energy
- (iii) rotational energy
- (iv) All of the above

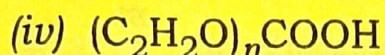
(c) Among the following the NMR active nucleus is

- (i) ^{12}C
- (ii) ^{19}F
- (iii) ^2H
- (iv) ^{16}O

(d) Which of the following is a basic dye?

- (i) Congo red
- (ii) Aniline yellow
- (iii) Alizarin
- (iv) Indigo

(e) Which of the following is the general formula of carbohydrates?



UNIT—I

2. Answer the following questions (any *five*) :

2×5=10

(a) Polar solvent shift $\pi \rightarrow \pi^*$ transition to higher wavelength. Explain.

(b) The nuclei of ^{12}C is NMR inactive but ^{13}C is NMR active. Explain.

(c) Conjugate diene has higher λ_{max} than isolated diene. Explain.

(d) Chemical shift depend upon applied magnetic field but spin spin coupling N coupling constant is independent of the applied magnetic field. Explain.

(e) How can you study H-bonding using IR spectroscopy?

(f) What do you mean by fundamental band and overtone band?

3. CH_3OH is good solvent for UV spectroscopy but bad solvent for IR spectroscopy. Explain. 3

4. Answer the following questions (any two) :
4×2=8

(a) The mass spectrum of an organic compound shows an abundant molecular ion peak at $\frac{m}{2} = 72$. The compound gives a characteristic band at 275 nm ($\lambda_{\text{max}} = 17$) in its UV spectrum. The IR spectrum shows prominent peak at 2940 cm^{-1} , 2855 cm^{-1} and 1715 cm^{-1} , PMR spectrum of the compound is as follows :

$\delta 2.5(q, 2H)$, $\delta 2.12(s, 3H)$ and $\delta 1.07(t, 3H)$

Determine the structure of the compound and explain the peaks.

(b) Three isomeric dienes A, B and C with molecular formula C_5H_8 shows λ_{max} 178, 211 and 215 nm. All the dienes on hydrogenation yield *n*-pentane. What are the possible structures of A, B and C? Given that λ_{max} of pent-1-ene is 176 nm. Justify your answer.

(c) (i) NMR signal of ethylenic proton is observed at higher δ value than acetylenic proton. Explain. 2
(ii) What do you mean by finger print region? 2

UNIT—II

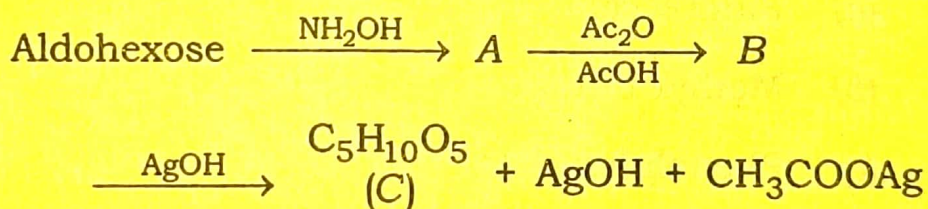
5. Answer the following questions (any three) :

2×3=6

- (a) How will you show that D glucose is reducing sugar?
- (b) Sketch the stable conformer of the anomer of α -D-glucopyranose.
- (c) How do you establish that configuration at C₃, C₄ and C₅ of D-glucose and D-mannose are same?
- (d) Convert D-glucose to epimeric aldohexose.

6. Assign the structures (A) to (C) from the following reaction :

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Or

What product do you expect when methyl-D-(+)-glucopyranoside is subsequently subjected to periodic oxidation, Br₂—H₂O oxidation, strontium salt formation and hydrolysis with dil HCl.

UNIT—III

7. Answer the following questions (any *three*) : $2 \times 3 = 6$

- (a) What are requisites for a compound to be true dye?
- (b) Write one method for the synthesis of indigo.
- (c) Discuss briefly the Witt's theory for colour and constitution.
- (d) Explain the following terms with suitable example : $1 + 1 = 2$
 - (i) Hypsochromic shift
 - (ii) Auxochrome

8. Write one synthesis each of the following (any *two*) : $1 \frac{1}{2} \times 2 = 3$

- (a) Fluorescein
- (b) Methyl orange
- (c) Phenolphthalein

UNIT—IV

9. What is vulcanization of rubber? How does it affect the quality of the polymer? $1 \frac{1}{2} + 1 \frac{1}{2} = 3$

Or

Write a short note on phenol-formaldehyde resin.

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10. Answer the following questions : $2 \times 3 = 6$

- (a) Write down the structure of the polymer-polyurethane and nylon-6. $1+1=2$
- (b) Write the difference between addition and condensation polymerization.
- (c) Write a short note on biodegradable polymer.

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