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**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

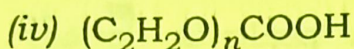
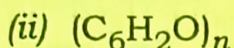
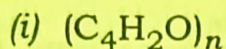
- (i)  $^{12}\text{C}$
- (ii)  $^{19}\text{F}$
- (iii)  $^2\text{H}$
- (iv)  $^{16}\text{O}$

(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  $\lambda_{max}$  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.  $\text{CH}_3\text{OH}$  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  $2940\text{ cm}^{-1}$ ,  $2855\text{ cm}^{-1}$  and  $1715\text{ cm}^{-1}$ , 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  $\text{C}_5\text{H}_8$  shows  $\lambda_{\text{max}}$  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  $\lambda_{\text{max}}$  of pent-1-ene is 176 nm. Justify your answer.

(c) (i) NMR signal of ethylenic proton is observed at higher  $\delta$  value than acetylenic proton. Explain. 2

(ii) What do you mean by finger print region? 2



## UNIT—II

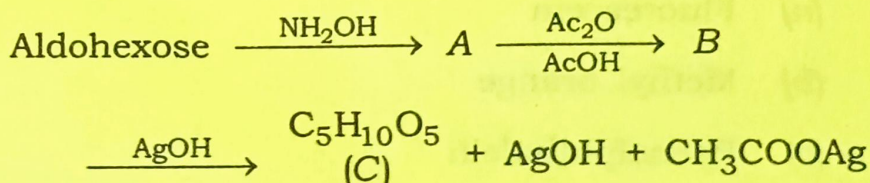
5. Answer the following questions (any *three*) :

2×3=6

- (a) How will you show that D glucose is reducing sugar?
- (b) Sketch the stable conformer of the anomer of  $\alpha$ -D-glucopyranose.
- (c) How do you establish that configuration at C<sub>3</sub>, C<sub>4</sub> and C<sub>5</sub> 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 :

3



Or

What product do you expect when methyl-D-(+)-glucopyranoside is subsequently subjected to periodic oxidation,  $\text{Br}_2\text{—H}_2\text{O}$  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.

3



10. Answer the following questions :

2×3=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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