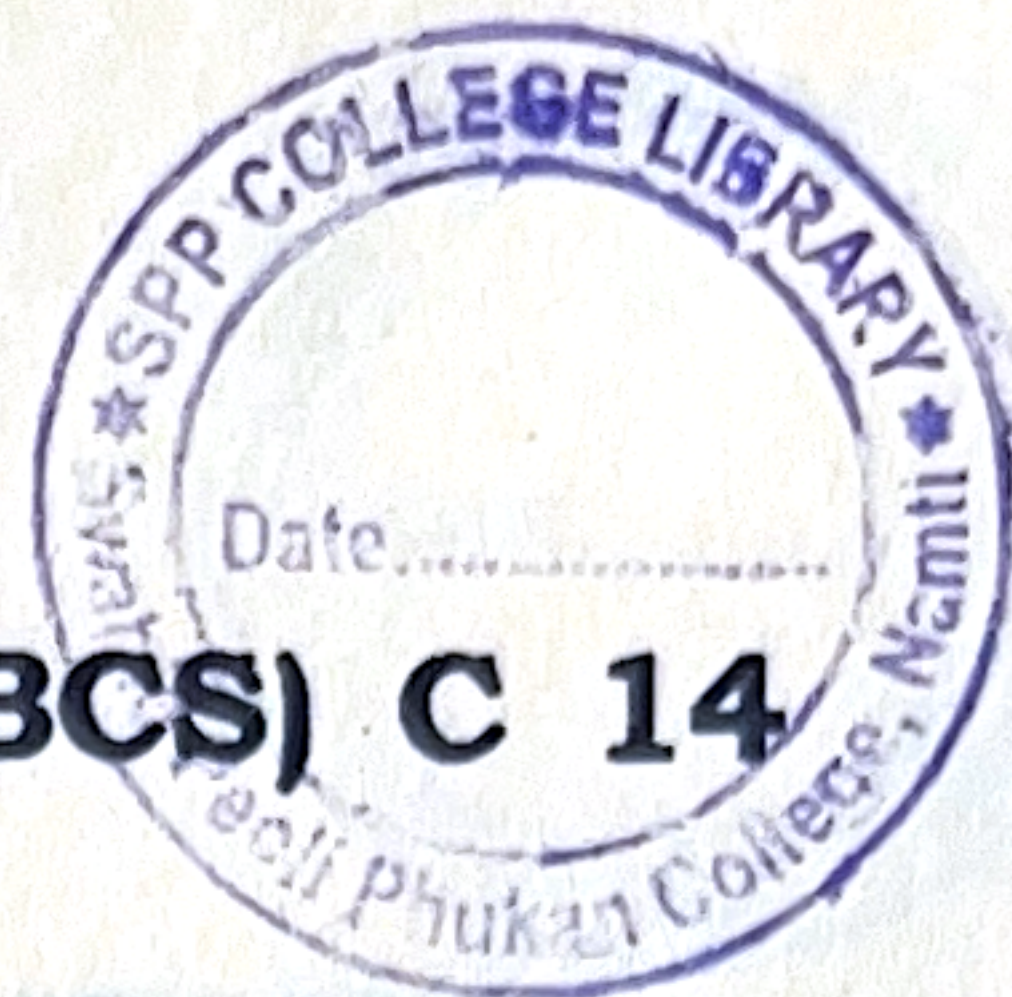


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**6 SEM TDC CHMH (CBCS) C 14**

**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



( 2 )

(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

( 3 )

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

- (i)  $(\text{C}_4\text{H}_2\text{O})_n$
- (ii)  $(\text{C}_6\text{H}_2\text{O})_n$
- (iii)  $(\text{CH}_2\text{O})_n$
- (iv)  $(\text{C}_2\text{H}_2\text{O})_n\text{COOH}$

### 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  $^{12}\text{C}$  is NMR inactive but  $^{13}\text{C}$  is NMR active. Explain.
- (c) Conjugate diene has higher  $\lambda_{\text{max}}$  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 or hydrogenation yield *n*-pentane. What are the possible structure 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

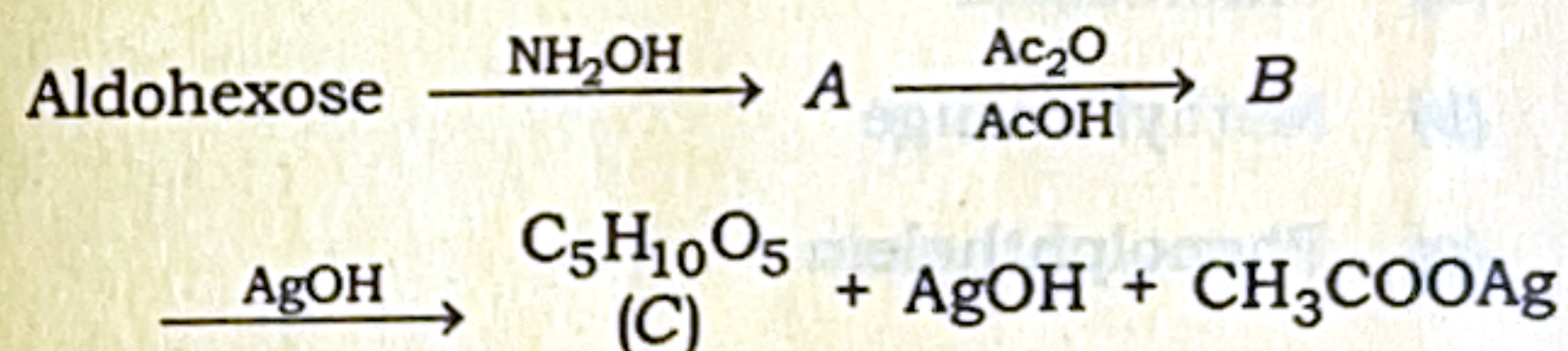
(a) How will you show that D glucose is reducing sugar?

(b) Sketch the stable conformer of the anomer of  $\alpha$ -D-glucopyranose.

(c) How do you establish that configuration at  $\text{C}_3$ ,  $\text{C}_4$  and  $\text{C}_5$  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.



( 6 )



### UNIT—III

7. Answer the following questions (any three) :

2×3=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) :

1½×2=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?

1½+1½=3

Or

Write a short note on phenol-formaldehyde resin.

3

( 7 )



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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