

2024/TDC (CBCS)/EVEN/SEM/
CHMHCC-602T/308

TDC (CBCS) Even Semester Exam., 2024

CHEMISTRY

(6th Semester)

Course No. : CHMHCC-602T

(Organic Chemistry—V)

Full Marks : 50

Pass Marks : 20

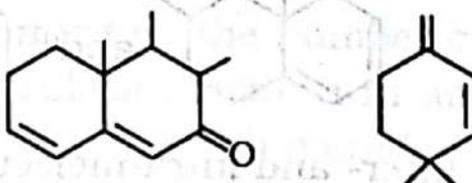
Time : 3 hours

The figures in the margin indicate full marks
for the questions

UNIT—1

1. Answer any two questions from the
following : 2×2=4

(a) Calculate λ_{\max} for the following
compounds :



(b) Explain why *cis*-stilbene absorbs at
shorter wavelength than *trans*-stilbene.

(2)

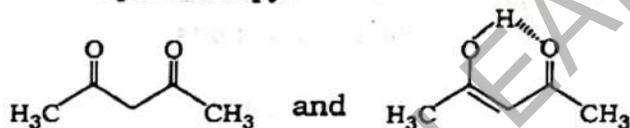
(c) What is fingerprint region? What is its significance?

2. Answer any one question from the following : 6

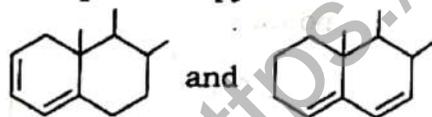
(a) (i) In a more polar solvent $n \rightarrow \pi^*$ transitions show a blue shift but $\pi \rightarrow \pi^*$ transitions show a red shift. Explain. 2

(ii) Between cyclopentanone and cyclohexanone, which one will exhibit higher $\nu_{C=O}$ stretching values? Justify your answer. 2

(iii) How will you distinguish the following tautomers by IR spectroscopy? 2



(b) (i) How will you distinguish the following pair of compounds by UV-vis spectroscopy? 2



(ii) Inter- and intra-molecular H-bonds can be distinguished by IR spectroscopy. Explain with suitable example. 2

24J/911

(Continued)

(3)

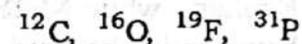
(iii) $\nu_{C=C}$ (stretching) for but-1-ene and but-1,3-diene are 1650 cm^{-1} and 1610 cm^{-1} respectively. Explain. 2

UNIT-2

3. Answer any two questions from the following : 2×2=4

(a) Why is TMS used as an internal standard in NMR spectroscopy?

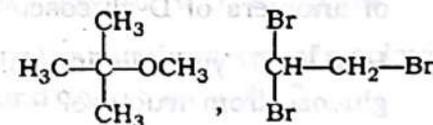
(b) Which of the following atoms do not exhibit nuclear magnetic resonance? Justify your answer.



(c) Both CH_3COCH_3 and $\text{CH}_3\text{CH}_2\text{CHO}$ have molecular formula $\text{C}_3\text{H}_6\text{O}$. How will you distinguish them by ^1H NMR spectroscopy?

4. Answer any one question from the following : 6

(a) (i) What do you mean by chemical shift in NMR spectroscopy? Comment on the number of signals and splitting pattern in any one of the following compounds : 1+2=3



24J/911

(Turn Over)

(4)

- (ii) A compound with molecular formula $C_7H_5OCl_3$ shows a three-proton singlet at $\delta 3.9$ and two one-proton doublets ($J = 8 \text{ Hz}$) at $\delta 6.76$ and $\delta 7.3$. Identify the compound. 3
- (b) (i) Sketch the expected $^1\text{H NMR}$ spectra indicating probable values of chemical shift, splitting pattern and relative intensities for the compound, $\text{CH}_3\text{CH}_2\text{Cl}$. 3
- (ii) What are shielding and deshielding effects in NMR spectroscopy? Explain why NMR spectrum of benzene is observed at a lower field whereas that of acetylene is observed at higher field. 1+2=3

UNIT—3

5. Answer any two questions from the following : 2×2=4
- (a) What are the limitations of open-chain structure of glucose?
- (b) What are anomers? Draw the structures of anomers of D-glucose.
- (c) How will you distinguish chemically glucose from fructose?

24J/911

(Continued)

(5)

6. Answer any one question from the following : 6
- (a) (i) Explain why D-glucose and D-fructose form the same osazone. 3
- (ii) What happens when—
- (1) D-glucose undergoes fermentation by the enzyme zymase in yeast;
- (2) D-glucose reacts with HI and red P;
- (3) D-fructose reacts with hydroxyl amine? 3
- (b) (i) Explain why sucrose is also called invert sugar. 2
- (ii) Convert the following : 2×2=4
- (1) D-arabinose to D-glucose
- (2) D-glucose to D-mannose

UNIT—4

7. Answer any two questions from the following : 2×2=4
- (a). What are vat dyes? Explain with example.
- (b) What are chromophores and auxochromes? Explain with examples.
- (c) What are the requirements of a coloured compound to act as a dye?

24J/911

(Turn Over)

8. Answer any *one* question from the following : 6

- (a) (i) Give the preparation of phenolphthalein. Explain the colour change on the basis of quinonoid theory. 2+2=4
- (ii) Discuss briefly the modern theories of colour and chemical constitution. 2
- (b) (i) What are azo dyes? Give the preparation of methyl orange. Explain why methyl orange is used as indicator in acid base titration. 1+1+2=4
- (ii) How are dye classified? Give an example of each class of dyes. 2

UNIT—5

9. Answer any *two* questions from the following : 2×2=4

- (a) How do thermoplastic polymers differ from thermosetting polymers? Give two examples of each type.
- (b) How will you synthesis Nylon-6,6 from 1,3-butadiene?
- (c) What are homopolymers and copolymers? Give examples of each type.

10. Answer any *one* question from the following : 6

- (a) (i) What is polymerization reaction? Discuss free radical polymerization reaction by taking suitable example. 1+2=3
- (ii) What are synthetic rubbers? How can Buna-S rubbers be synthesized? Give applications of Buna-S rubber. 3
- (b) (i) What are high-density polyethylene? How can HDPE be synthesized using Ziegler-Natta catalyst? What are the uses of HDPE? 1+2+1=4
- (ii) What are polyesters? What are the monomers of poly(ethylene-terephthalate)? 2
