April 2025
B.A./B.Sc.
Sixth Semester
CORE – 14
CHEMISTRY
Course Code: CHC 6.21
(Organic Chemistry - V)

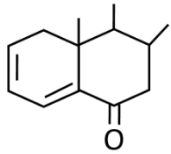
Total Mark: 70 *Pass Mark: 28*
Time: 3 hours

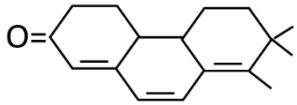
Answer five questions, taking one from each unit.

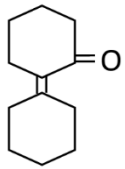
UNIT–I

1. (a) Briefly discuss the various types of transition in UV-spectroscopy. 4

   (b) Calculate the absorption maximum (λ_{max}) of the following compounds based on Woodward's rule. 2×3=6

   (i) 

   (ii) 

   (iii) 

   (c) Write short notes on bathochromic shift and hypsochromic shift. 4

2. (a) Write the principle of infrared spectroscopy. 4

(b) Briefly explain the different types of stretching and vibration in IR spectroscopy. 4

(c) Using an IR spectroscopy, how will you distinguish between the following pair of compounds? 3×2=6

(i) CH_3CH_2OH and CH_3COCH_3

(ii) $CH_3CH_2COCH_3$ and $CH_2{=}CHCOCH_3$

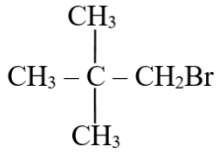
UNIT–II

3. (a) Explain the basic principles of proton magnetic resonance spectroscopy. 4

(b) What are anisotropic effects in aromatic compounds? 3

(c) What is chemical shift in NMR spectroscopy? Explain the concept with the help of a labelled diagram. 4

(d) Predict the multiplicity of each kind of proton in the following compounds: 1×3=3

(i)


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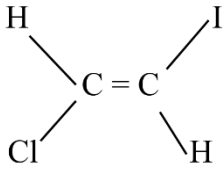
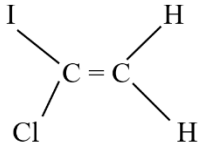


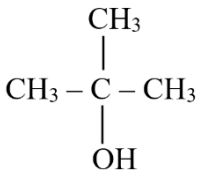
(iii)


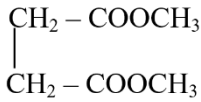
4. (a) What is a coupling constant in NMR? Mention the different types of coupling observed. 2+2=4

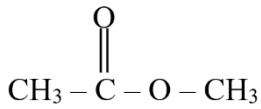
(b) Why is TMS used as a reference standard in NMR? 3

(c) Indicate the expected NMR signals (number and type) for the following compounds: 1×4=4

(i) $CH_3 - CH_2 - CH_2 - CH_3$

(ii) 

(iii) 

(iv) 

(d) Predict the number of signals and their multiplicities in the ^{1}H NMR spectrum of ρ -nitrotoluene. 3

UNIT–III

5. (a) How will you convert the following? 2×2=4
   (i) Aldolhexose to aldopentose
   (ii) Aldopentose to aldohexose
   (b) What do you understand by α- and β-glycosidic linkage? 4
   (c) Give the structure elucidation of fructose. 6

6. (a) Write the biological importance and classification of carbohydrates. 5
   (b) Discuss Killiani-Fischer synthesis in detail. 6
   (c) Differentiate between epimers and anomers. 3

UNIT–IV

7. (a) How are dyes classified based on their sources and chemical constitution? 3
   (b) Outline the synthesis and applications of the following dyes.
   (i) Crystal violet 4×2=8
   (ii) Fluorescein
   (c) What are phthalein dyes? Discuss their structure and uses briefly. 3

8. (a) Write a note on Witt's theory of colours. 3

(b) Describe the synthesis of rosaniline and highlight its applications. 4

(c) Describe the role of diazotization and coupling reactions in the synthesis of Congo red. 3

(d) Elucidate the structure and synthetic pathway of alizarin. 4

UNIT–V

9. (a) Write a note on number average molecular weight and weight average molecular weight. 4

(b) Discuss condensation polymerization by giving suitable example with their applications. 5

(c) Write the mechanism of anionic polymerization reaction. 3

(d) What are biodegradable polymers? Give example. 2

10. (a) Write the synthesis and application of the following polymers: 3×3=9

(i) Buna-S

(ii) Polyester

(iii) Bakelite

(b) How do double bonds in rubber molecule affect their structure and reactivity? 2

(c) What are polyamides? Give the preparation of nylon-6,6. 3