

April 2025
B.A./B.Sc.
Fourth Semester
CORE – 9
CHEMISTRY
Course Code: CHC 4.21
(Organic Chemistry - III)

Total Mark: 70
Time: 3 hours

Pass Mark: 28

Answer five questions, taking one from each unit.

UNIT-I

1. (a) Complete the following reactions: 1×4=4
- (i) $\text{CH}_3\text{CH}_2\text{CH}_3 \xrightarrow{\Delta/400^\circ\text{C}}$
- (ii) $\text{R-CN} \xrightarrow{\text{H}^+/\text{H}_2\text{O}}$
- (iii) $\text{CH}_3\text{CH}_2\text{NO}_2 + \text{H}_2\text{O} \xrightarrow{\text{H}^+}$
- (iv) $\text{RCONH}_2 \xrightarrow{\text{P}_2\text{O}_5/\Delta}$
- (b) How do amines react with Heinsberg's reagent? 4
- (c) Give any two methods of preparation of diazonium salts. 2
- (d) Describe the preparation, acidity, and applications of picric acid. 4
2. (a) How can primary, secondary, and tertiary nitroalkanes be distinguished? 4
- (b) Give reason to the following statements: 2×2=4
- (i) Amines have higher boiling point than their corresponding alcohols.
- (ii) Aromatic diazonium salts are more stable than aliphatic diazonium salts.
- (c) With a suitable chemical reaction, explain Hofmann's exhaustive methylation. 4
- (d) How do cyanides and isocyanides behave under reduction? 2

UNIT-II

3. (a) What are polynuclear hydrocarbons? Give two examples. 3
(b) Discuss in brief the nitration of naphthalene with mechanism. 5
(c) Write one synthesis of phenanthrene with chemical reaction. 4
(d) Naphthalene is more reactive than benzene. Give reason. 2
4. (a) Convert the following: $2 \times 3 = 6$
(i) Naphthalene into β -naphthol.
(ii) Anthracene into anthraquinone.
(iii) Nitronaphthalene into naphthylamine.
(b) Naphthalene on sulphonation at different temperature (160°C and 80°C) gives different products. Illustrate with chemical reaction. 4
(c) Discuss the structural elucidation of anthracene. 4

UNIT-III

5. (a) Write the synthesis on any four of following compounds with mechanism. $3\frac{1}{2} \times 4 = 14$
(i) Hantzsch synthesis of pyridine
(ii) Paal-Knorr synthesis of furan
(iii) Bischler synthesis of indole
(iv) Skraup synthesis of quinoline
(v) Knorr pyrrole synthesis.
6. (a) Give reason to the following statements. $3 \times 3 = 9$
(i) Pyrimidine gives electrophilic substitution at position-5 whereas nucleophilic substitution at position-4.
(ii) Furan exhibits diene character.
(iii) Piperidine is a stronger base than pyridine.
(b) Give the resonance structure of isoquinoline. What are the oxidation products of isoquinoline? $2 + 3 = 5$

UNIT-IV

7. (a) Using a flow-sheet diagram, explain the isolation of alkaloids. 4
(b) Establish the structure of hygrine. Give one synthesis of hygrine. $4 + 2 = 6$
(c) Give the medicinal uses of morphine and nicotine. $2 + 2 = 4$

8. (a) Briefly explain Hoffmann exhaustive methylation. 6
(b) Write the structure of reserpine and quinine. Mention their medicinal uses. 2+3=5
(c) Give a method of extraction of alkaloids from natural source. 3

UNIT-V

9. (a) What are terpenes? Give the classification of terpenoids. 1+4=5
(b) Establish the structure of neral. How does it differ from citral? 4+2=6
(c) Explain isoprene rule with example. 3
10. (a) Discuss the structural elucidation of α -terpineol. Give one synthesis of α -terpineol. 4+2=6
(b) What is the difference between citral-*a* and citral-*b*? 2
(c) Explain the following synthesis with their chemical reaction.
(i) Arens and van Drop synthesis of citral 3×2=6
(ii) Perkin Junior synthesis of α -terpineol
-