

(For candidates admitted from 2022-2023 onwards)

M.Sc. DEGREE EXAMINATION, NOVEMBER 2022.

Chemistry

ORGANIC CHEMISTRY — I

Time : Three hours

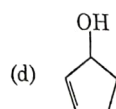
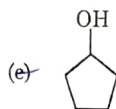
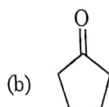
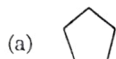
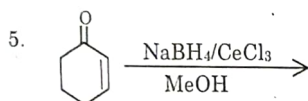
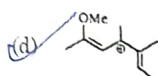
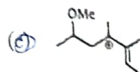
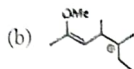
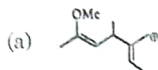
Maximum : 75 marks

PART A — (20 marks)

Answer ALL questions.

I. Multiple choice questions : (5 × 1 = 5)

1. Which of the following is the most stable cation?

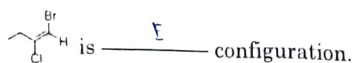


II. Fill in the blanks. (5 × 1 = 5)

6. Carbonium ions are the intermediates in which the positive charge is carried by the carbon atom with 6 electrons in the valence shell.

7. In Hammett equation, the substituted benzoic acid have electron donating group for this σ value is no sign

8. Assign E or Z configuration to the given compound



2. The Grunwald-Winstein equation is

(a) $\log(K_X/K_H) = \rho\sigma$

(b) $\log(K_X/K_H) = \rho[\sigma + r(\sigma^+ - \sigma)]$

(c) $\log(K_{t-BuCl, sol}/K_{t-BuCl, 80\% EtOH, 20\% H_2O}) = \gamma$

(d) $\log(K_{Nuc}/K_{H_2O}) = \alpha.E_n + \beta.H$

3. The formula of enantiomeric excess is _____

(a) $\left[\frac{(d+l)}{(d-l)} \right] \times 100$

(b) $\left[\frac{(d)}{(d+l)} \right] \times 100$

(c) $\left[\frac{(d-l)}{(d)} \right] \times 100$

(d) $\left[\frac{(d-l)}{(d+l)} \right] \times 100$

4. Gauche conformation is less stable due to _____

(a) Hydrogen bonding

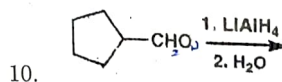
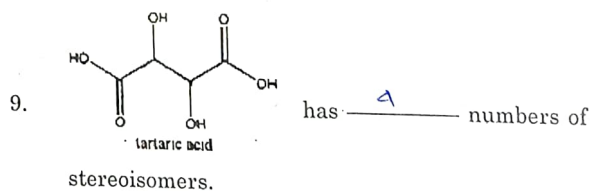
(b) Covalent bonding

(c) Vander Waal's repulsion

(d) Torsional strain

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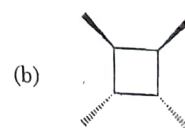
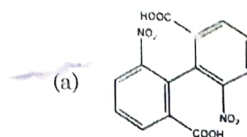
III. Answer the following questions : (5 × 2 = 10)

11. What is a non-classical carbocation?

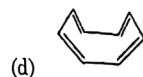
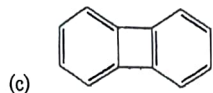
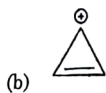
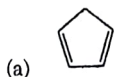
12. Illustrate hyperconjugation with a suitable example.

13. The resonance energy of benzene is much higher than 1,3-butadiene, why?

14. Which among the following are optically active? Why?



15. Which of the following are aromatic, non-aromatic or antiaromatic and why?



PART B — (5 × 5 = 25)

Answer ALL questions, choosing either (a) or (b).

16. (a) Outline Hantzsch-Widman method for the nomenclature of fused heterocyclic compounds.

Or

- (b) What are nitrenes? Give any two methods of preparation and properties of nitrenes.

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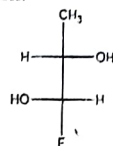
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17. (a) Illustrate any two methods to determine cross-over products.

Or

- (b) Write notes on isotopic labelling.

18. (a) Convert the following compound into flying wedge, sawhorse and Newman projection formulae. Indicate the most stable conformation.



Or

- (b) Write notes on Conformational analysis of cyclohexane.

19. (a) Discuss Mobius aromaticity?

Or

- (b) Discuss the mechanism and stereochemistry of free radical bromination of (R)-1-bromo-2-methyl butane.

20. (a) Discuss Huckel's rules of aromaticity.

Or

- (b) Explain enantioselective reduction with an example.

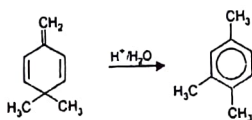
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PART C — (3 × 10 = 30)

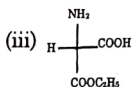
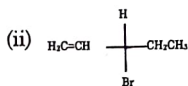
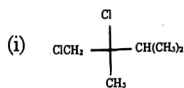
Answer any THREE questions.

21. Write a mechanism for the following conversion:



22. Discuss the thermodynamic and kinetic aspects of organic reactions with suitable example.

23. (a) Designate as R or S the configuration of



- (b) What are allenes give example? How do you assign R and S configuration to allenes?

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24. Discuss the Conformations analysis of Disubstituted Cyclohexanes.

25. (a) Discuss homoaromaticity and antiaromaticity
(b) Baeyer-Villiger reduction.

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