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**M.Sc. (Semester-I)
Examination, Dec.-Jan. (2025-26)**

CHEMISTRY

(Organic Chemistry-I)

Time Allowed : Three Hours

Maximum Marks : 70

Note : This question paper is divided into **four** sections. Attempt questions of **all four** sections as per given direction. Distribution of marks is given in each section.

SECTION-A

(Objective Type Questions)

Note : Attempt any **ten** questions. Each question carries **1** mark. [10x1=10]

1. (i) What is the primary characteristics of an aromatic compound?
- (a) Presence of double bond

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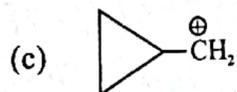
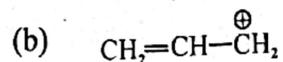
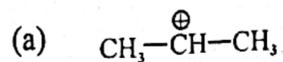
(1)

[P.T.O.]



- (b) Presence of benzene ring
- (c) Planarity and conjugation
- (d) High reactivity

(ii) Which of the following is bridgehead carbocation?



(iii) The following is the rate law of an $\text{S}_{\text{N}}2$ reaction:

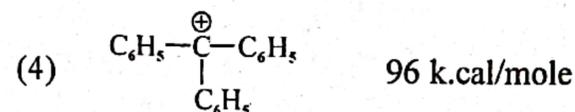
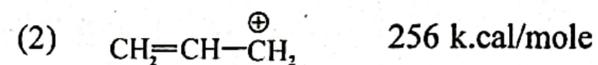
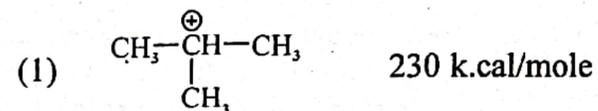
$$\text{Rate} = [\text{MeI}] [\text{OH}^-]$$

What will be the effect on the rate of reaction if the concentration of MeI is doubled and that of OH^- is halved.

- (a) The rate becomes two-times faster

- (b) The rate becomes four-times faster
- (c) No change in the rate of reaction
- (d) The rate becomes half

(iv) Hydride affinities of four carbocations are given below. Arrange these carbocations in their decreasing order of the stability on the basis of hydride ion affinity :



Select the correct answer from the codes given below :

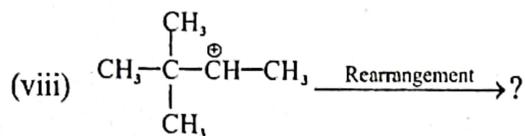
- (a) (4) > (3) > (2) > (1)
- (b) (4) > (2) > (1) > (3)
- (c) (4) > (3) > (1) > (2)
- (d) (2) > (1) > (3) > (4)

(v) Which of the following is an antiaromatic compound?

- (a) Benzene
- (b) Cyclobutadiene
- (c) Naphthalene
- (d) Anthracene

(vi) S_N2 reaction always involves.....

(vii) Carbenes are intermediates in which the radical is carried by the carbon atom with.....electrons in the valence shell.



(ix) $[\text{AgI}_2]^-$ is stable because Ag^+ isacid and I^- isbase.

(x) HSAB concept is given by

(xi) Singlet carbene is more stable than triplet carbene. (True/False)

(xii) Primary carbanion is more stable than tertiary carbanion. (True/False)

SECTION-B

(Very Short Answer Type Questions)

Note : Attempt any five questions. Each question carries 2 marks. (Word limit 25-30 words) [2x5=10]

- (i) What are non-classical carbocations?
- (ii) Give the mechanism of one reaction involving carbanions.
- (iii) What is Cage effect?
- (iv) Explain Carbenoid.
- (v) What do you understand by Chiral pool?
- (vi) Describe the S_N1 mechanism.
- (vii) Explain ambident nucleophile.

SECTION-C

(Short Answer Type Questions)

Note : Attempt any five questions. Each question carries 4 marks. (Word limit : 250 words) [5x4=20]

3. (i) Discuss generation and stability of free radicals.
- (ii) What are nitrenes? How are they generated? Discuss their structure and chemical reactions.
- (iii) Explain the effect of substrate structure on the nucleophilic substitution..
- (iv) What is HSAB principle? Explain its applications.
- (v) Explain Benzenoid and non-benzenoid aromatic systems.
- (vi) Write notes on alternant and non-alternant hydrocarbon.
- (vii) Describe S_Ni mechanism

SECTION-D

(Long Answer Type Questions)

Note : Attempt any three questions. Each question carries 10 marks. (Word limit : 500 words) [3x10=30]

4. (i) Differentiate S_N2 and S_N1 reactions in the following heads :
 - (a) Potential energy diagram

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(6)

- (b) Rate of reaction
 - (c) Stereochemistry
 - (d) Effect of solvent
 - (e) Reaction intermediate
- (ii) Explain neighbour group participation in detail.
 - (iii) Discuss formation, structure and reactions involving carbene.
 - (iv) What is asymmetric synthesis? Describe the following :
 - (a) An asymmetric synthesis using a chiral auxillary.
 - (b) An asymmetric synthesis using chiral catalyst

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(7)

