

91052

B. Sc. (Bio-Technology) 1st Semester

(w.e.f. 2012-13)

Examination – November, 2023

ORGANIC CHEMISTRY

Paper : BT-107

Time : Three Hours]

[Maximum Marks : 40

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt five questions in all, selecting one question from each Section. Question No. 1 is compulsory. All questions carry equal marks.

1. Briefly answer the following : $1 \times 8 = 8$

- (a) Describe 'Clathrates'.
- (b) The melting and boiling points of *o*-nitrophenol is lower than *p*-nitrophenol ? Give brief reason.
- (c) How many meso-forms are possible for the compound, $\text{HOOC}(\text{CHOH})_3\text{COOH}$?
- (d) Give the structure of the lowest molecular weight alcohol which is optically active.

- (e) Differentiate between threshold energy and energy of activation.
- (f) Name two reactions which occur by a carbene intermediate.
- (g) Arrange the isomeric pentane (n-pentane, isopentane, neopentane) according to their increasing boiling point.
- (h) If both propane and cyclopropane are equally available and equally prized, then which is the better fuel ?

SECTION – A

2. (a) Give reasons for the following : 4
- (i) Chloroacetic acid is stronger acid than acetic acid.
- (ii) Aniline is a weaker base than ammonia.
- (b) Define Hydrogen Bonding. Discuss the effect of hydrogen bonding on the stability and acidic strength of organic compounds. 4
3. (a) Discuss briefly keto-enol tautomerism in aldehydes and ketones. Also describe the conditions under which enol form predominates. 5
- (b) Distinguish between enantiomers and diastereomers with suitable examples. 3

SECTION – B

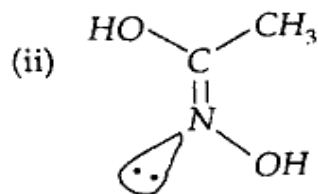
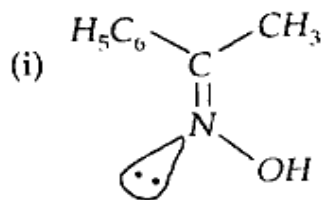
4. (a) Draw the potential energy diagram for the various conformations of cyclohexane. Why is the chair conformation of cyclohexane more stable than the boat conformation ? 5

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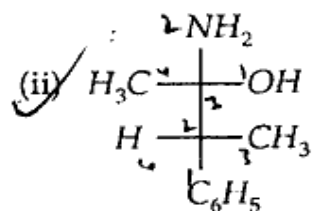
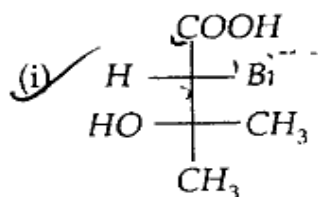
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(b) Assign 'E' and 'Z' configuration to following with reason : 3



5. (a) Discuss the geometrical isomerism in oximes and alicyclic compounds. 4

(b) Assign 'R' and 'S' configuration to following with reason : 4



SECTION - C

6. (a) Draw the orbital structure of carbene. Why triplet carbene are more stable than singlet carbene. 4
- (b) What is isotopic labeling ? Discuss its significance in determining the reaction mechanism. 4
7. (a) Explain the structure and stability of carboanions. 4
- (b) What are rearrangement reactions ? Discuss briefly the role of 1, 2-hydride and 1, 2-alkyl shifts in the rearrangement of carbocations. 4

SECTION - D

8. (a) What is Wurtz reaction ? Discuss its mechanism. Is this method suitable for the synthesis of unsymmetrical alkanes ? Comment. 4
- (b) Bromine is less reactive but more selective whereas chlorine is more reactive but less selective. Explain. 4
9. (a) Explain the Sachse-Mohr theory of strainless rings. 3
- (b) Why n-alkanes with even number of carbon atoms melt at a higher temperature than those with odd number of carbon atoms ? 3
- (c) What are banana bonds ? 2