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B.Sc. Chemistry (with Research) Semester II
End-term Examination 2023
Paper Name: Basics of Organic Chemistry
Paper Code: BCH-DSC 201

Time: 3 hours Maximum

Maximum Marks: 60

Note: This paper has 3 sections A, B, and C, Attempt all three sections

Section A: Answer all the questions;

Section B: Answer any 2 out of 4

Section C: Answer all the questions, each question has an internal choice

Abbreviations Used

CLO- Course Learning Outcome, PLO- Program learning Outcome, BTL- Bloom Taxonomy Level: BT level 1 1-Remember; BT level 2-Understand; BT level 3-Apply; BT level 4-Analyse; BT level 5-Evaluate, BT level 6-Create

Q.No

BTL CLO PLO

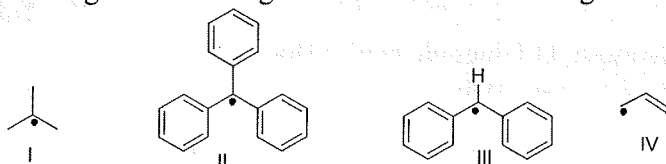
SECTION A: Attempt all questions (10*1.5= 15 Marks)

A1. What is an inductive effect in carbocation?

1 1 1

A2. Which one among the following free radicals has the longest half-life?

2 2 2



A3. Explain with structure, why sucrose is a non-reducing sugar.

2 2 2

A4. Brief discussion of Mutarotation.

2 2 2

A5. What is optical isomerism? Explain with an example.

1 1 1

A6. Define pI and Isoelectric point.

2 2 2

A7. Define the following: (Any two)

4 4 4

(i) Resonance (ii) Aromaticity

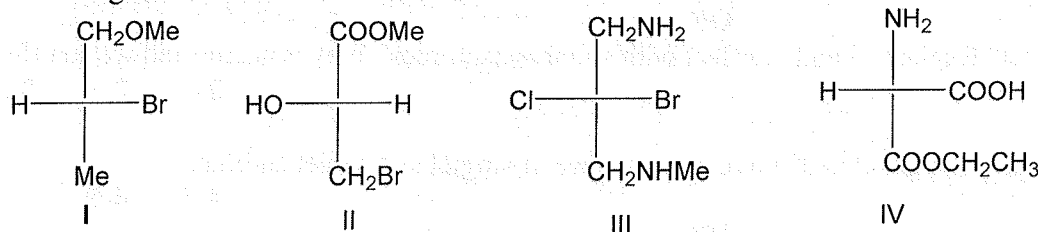
(iii) Hydrogen bond (intramolecular & intermolecular)

A8. What are the differences between a nucleotide and a nucleoside?

3/4 3/4 3/4

A9. Designate structure I-IV as R or S:

5 5 5



A10. Explain the stability order among the different conformations of butane.

3/4 3/4 3/4

SECTION B: Attempt any two out of four: (2*10=20 Marks)

- | | | | |
|--|-----|-----|-----|
| B1. The open chain structure of glucose fails to explain some of the properties of D (+) glucose.
What are those properties? | 4/5 | 4/5 | 4/5 |
| B2. What is DCC and what role does it play in peptide synthesis? Discuss with an example. | 4/5 | 4/5 | 4/5 |
| B3. Discuss the Wohl's or Ruff's Degradation method of sugar. | 5/6 | 5/6 | 5/6 |
| B4. In an electric field, an amino acid would migrate towards which electrode at:
(a) $pH < pI$ (b) $pH > pI$ (c) $pH = pI$. Explain | 6 | 6 | 6 |

SECTION C: Attempt all questions, each question has an Internal choice: (5*5=25 Marks)

- | | | | |
|--|-----|-----|-----|
| C 1. What are the advantages associated with solid-phase peptide synthesis?
Discuss the Merrifield synthesis of polypeptides. | 3-6 | 3-6 | 3-6 |
| OR | | | |
| Explain how to determine the <i>N</i> -terminal amino acid of a peptide using the Edman degradation technique. | 3-6 | 3-6 | 3-6 |
| C 2. Explain each of the following observations:
(a) D-fructose gives a positive Tollens test.
(b) D-glucose epimerises in base but D-glucitol does not.
(c) $NaBH_4$ reduction of D-fructose gives two alditols, but the same reduction of D-glucose gives only one. | 2-4 | 2-4 | 2-4 |
| OR | | | |
| Draw the structure: (Any four)
Maltose, D-Glucose, D-Fructose, D-Mannose, D-Gluconic acid, <i>t</i> -Boc | 1-4 | 1-4 | 1-4 |
| C 3. Define and give an example of the following: (any two)
(a) Mutarotation
(b) Glycoside.
(c) Invert sugar | 1-2 | 1-2 | 1-2 |
| OR | | | |
| Briefly define or describe the following: (any two)
(i) α -helix and β -pleated sheet and their differences
(ii) Electrophoresis
(iii) Denaturation of proteins | 1-2 | 1-2 | 1-2 |
| C4. Draw the chair conformation of cyclohexane indicating axial and equatorial bonds. Why chair form is more stable than boat form? | 4 | 4 | 4 |
| OR | | | |
| What is the Inductive effect? Explain +I and -I effect with suitable examples? Why is acetic acid weaker than formic acid? | 2-3 | 2-3 | 2-3 |
| C5. What are carbenes? How they are generated? Give the structure of singlet and triplet carbene. | 4-5 | 4-5 | 4-5 |
| OR | | | |
| What are polysaccharides, and why are cellulose and starch so essential in daily life? | 5-6 | 5-6 | 5-6 |