

B.Sc. Semester - 5 (CBCS) Examination
Oct/Nov - 2022 (NEW COURSE)
Organic Chemistry and Spectroscopy(Core)

Time: 2:30 Hours

Marks: 70

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate marks.

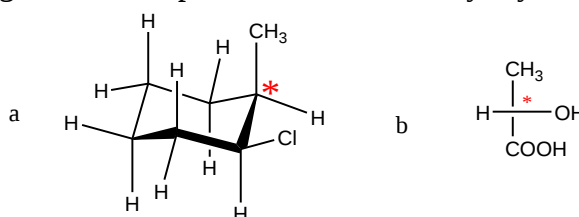
Q.1(A) **Answer the following question.** (04)

Give any one synthesis of Dulcin.

Q.1(B) **Answer the following questions. (Any two)** (10)

A. Answer the following a and b.

a) Assign R/S Descriptors to the starred only asymmetric carbon in a and b.



b) Match the following isomers given in A with their appropriate relationship given in B.

A	B
1) cis and trans but-2-ene	Anomers
2) α and β -D-Glucose	Epimers
3) Glucose and Mannose	π -Diastereomers

B. Prove constitution of Thyronine in detail.

C. Give synthesis of synthesis of glycylalanylvaline tripeptide using Bergmann method.

Q.2(A) **Answer the following question.** (04)

Discuss Arndt-Eistert reaction with mechanism and at least one application.

Q.2(B) **Answer the following questions. (Any two)** (10)

A. Give synthesis of alkaloid which is isolated from tobacco plant.

B. Deduce point group for H₂S. Calculate its order and construct multiplication table giving required symmetry operations.

C. For PCl₅ use operations and products to compare and prove that $S_n^m = \sigma h \times C_n^m$ when m is odd and also $C_n^m = E$ always but, $S_n^{2m} = E$ when m is odd.

Q.3(A) **Answer the following question.** (04)

Give principle of mass spectrometry. Explain briefly: Molecular ion, base peak, and Nitrogen rule.

Q.3(B) **Answer the following questions. (Any two)** (10)

- A. What is anisotropic effect? Explain it in Ethene, acetylene and 18-Annulene.
 B. Give synthesis (I) Adrenaline from catechol and (II) Orange II from Sulphanilic acid.
 C. A nitrogen containing compound with molecular mass 73 shows three NMR signals. a. 1H singlet $\delta=0.6$ (exchangeable with D₂O) b. 6H Triplet $\delta=1.05$ c. 4H Quartet $\delta=2.61$. Deduce the structure of the molecule.

Q.4(A) **Answer the following questions.** (04)

- A. Give point group of trans-2-butene and its π -diastereomer.
 B. For a molecule, rotation of 480° gives equivalent orientation. Calculate the value of n and k in S_n^k.

Q.4(B) **Answer the following questions. (Any two)** (10)

- A. Draw chair, boat and twist boat conformations of cyclohexane and give their point group. Also write the relative order of their stability.
 B. Prove constitution of Coniine.
 C. Write five differences between chemical shift and coupling constant.

Q.5(A) **Match A and B (Write matching pairs only in answer sheet)** (04)

A	B
a) NMR signals for 1-Chloroethene in PMR will be	2
b) For CH ₃ -CHD-OH, CH ₃ protons will split into signals	3
c) How many signals will be obtained for 1-Bromocyclobutane	4
d) If τ for a H in 100 MHz instrument is 6, its δ in 200 MHz will be	5

Q.5(B) **Answer the following questions. (Any two)** (10)

- A. Write chemical reactions of glycine with
 (I) nitrous acid (II) LiAlH₄ (III) phenylisocyanate
 (IV) ninhydrin (V) benzoyl chloride
 B. Differentiate various types of symmetry planes and show it in BF₃, [PtCl₄]⁻² and Allene.
 C. Write a note on applications of NMR in identifying constitutional isomers, geometrical isomers and H-Bonding.

NMR Spectral data

Type of proton	Chemical shifts (approximate) in δ ppm
R-CH ₃	0.9-1.1
R ₂ -CH ₂	1.3-1.5
CH-NH	1.5-2.1
Ar-H	7.0-8.0
HN-CH ₂	2.2-3.7
CH ₃ -N-H	0.5-5.0