

B.Sc. Semester - 5 (CBCS) Examination
Oct/Nov - 2024 (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.

Que.1(A) Answer the following question. (04)

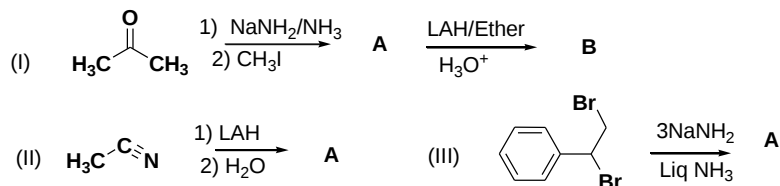
Give synthesis of N-(4-Ethoxyphenyl) urea from paracetamol and write its uses.

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

1. Explain constitution of molecule whose molecular formula is $C_{15}H_{15}NO_4$.
2. Give synthesis of alanylglycylvaline tripeptide using Bergmann method.
3. A) What is Chirality?
 B) Write difference between Racemic Compound and Racemic Mixture.
 C) Explain difference between α/β and axial/equatorial bonds in cyclohexane.
 Identify each of them in chair conformation of cyclohexane.

Que.2(A) Answer the following question. (04)

Write constitution of the products (A/B) for the following three conversions:



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

1. Give synthesis of Nicotine from Nicotinonitrile.
2. Derive point group of boat form of cyclohexane, calculate its order, construct multiplication table and show only those operations which depicts law of closure.
3. What is axis of symmetry? Define principal axis and write conditions to determine it. Show characteristic operations of C_5 and C_6 symmetry axis with suitable example.

Que.3(A) Answer the following question. (04)

Discuss important features of mass spectra of saturated aliphatic hydrocarbons.

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

1. Give synthesis of (I) 2-(4-Isobutylphenyl)propanoic acid from benzene
 (II) An acidic azo dye.
2. Give difference between coupling constant J and Chemical shift δ .
3. Discuss paramagnetic and diamagnetic anisotropic effects with suitable examples.

Que.4(A) Answer the following question. (04)

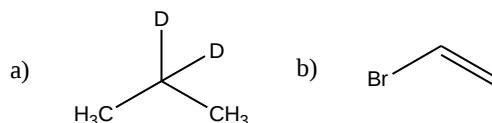
Draw Newmann projection formulae of both the forms of cyclohexane and chair form of axial methyl cyclohexane. Write and show total number of butane gauche interactions in each of them.

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

1. Give synthesis of Papaverine from 1,2-Dimethoxybenzene.
2. Prove that Coniine has n-propyl side chain at second position of piperidine.

3. Answer the following questions.

(1) Label Hydrogens based on NMR signals also write total number of signals for a and b.



(2) Complete the table with details related to PMR for the below compound giving 3-signals.

	signal	Multiplicity	Relative value of precessional frequency for H at a given value of magnetic field (write one from Highest/medium/lowest against each signal)
a			
b			
c			

Que.5(A) Answer the following question.

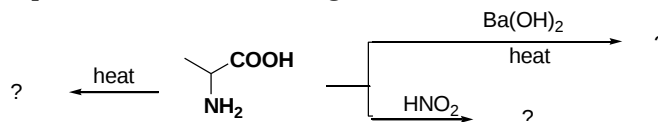
(04)

1. Deduce point group of glycine and calculate its order h.
2. Draw Fischer and Newmann projection formula of active and meso stereoisomer of tartaric acid and decide RS descriptors of its asymmetric carbons. Also deduce their point groups.

Que.5(B) Answer the following questions. (Any two)

(10)

1. A) Write products of the following reactions



B) What are α and β amino acids? Draw zwitter ionic constitution of valine.

2. Perform C_n and S_n operations on PCl_5 to prove that $C_n^n = E$ but, $S_n^{2n} = E$ when n is odd.
3. Calculate DBE and deduce constitution of a compound giving effervescences of CO_2 with $NaHCO_3$ and having Mol. formula: $C_{13}H_{18}O_2$ giving the following signals in NMR.

- | | | | |
|-----------------|--------------|--------------|-------------|
| a) 6H d 1.0 | b) 3H d 1.47 | c) 1H m 2.2 | d) 2H d 2.5 |
| e) 1H quart 3.8 | f) 4H d 7.1 | g) 1H s 11.0 | |

NMR Spectral Data

Chemical shift values in δ ppm

Primary R-CH₃ 0.9-1.2, CH₃-CH-COOH 1.4-1.7, Secondary R-CH₂ 1.3-2.5, Tertiary R-CH 1.5-2.25, Ar-H 7-8 ppm, CH-COOH 2-2.3.8, R-COOH 10.5-12.0 R-OH 3.4-4.0
