

M.Sc. CHEMISTRY
Third Semester (Repeat)
ORGANIC CHEMISTRY-III
(MSC - 301)

Duration: 3Hrs.

Full Marks: 70

Part-A (Objective) =20
Part-B (Descriptive) =50

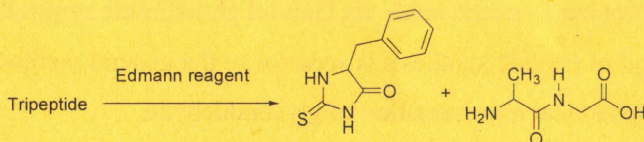
(PART-B: Descriptive)

Duration: 2 hrs. 40 mins.

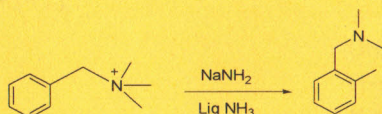
Marks: 50

Answer any four from Question no. 2 to 8
Question no. 1 is compulsory.

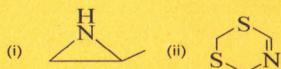
1. Describe all the steps involved in the synthesis of Ala-Gly-His peptide bond. (10)
2. (a) Write the correct sequence of amino acid in the tripeptide when it is subjected to Edman degradation. (2)



- (b) Write down the mechanism for the following- (2)



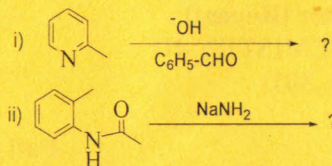
- (c) Glucose react with NH_2OH to form glucose oxime but glucose penta-acetate does not form its corresponding oxime. Explain. (2)
- (d) Give systematic nomenclature for the following heterocyclic molecules: (2)



- (e) Discuss the role of haemoglobin as oxygen carrier and explain its oxygen binding mechanism. (2)

3. (a) Describe with a plausible mechanism of Skraup's quinoline synthesis. (4)

(b) Write down the product with mechanism- (3)



(c) Write a synthetic method for imidazole. (3)

4. (i) Calculate the pI of the following amino acids: (2×3=6)

a) with pKavalues COOH = 2.35; N⁺H₃ = 2.35 having a neutral side chain

b) with pKa values COOH = 1.88; N⁺H₃ = 9.68 having acidic side chain (pKa value of side chain carboxylic group is 3.65

c) with pKa values COOH = 2.16; N⁺H₃ = 9.18 having basic side chain (pKa value of side chain N⁺H₃ group is 10.79

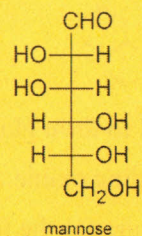
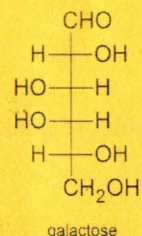
(ii) How can you synthesize □-amino acids via Gabriel phthalimide synthesis? (2)

(iii) How DCC method of peptide synthesis is superior to the general method? (2)

5. (i) Show the of stereochemical representation of glyceraldehyde. (2)

(ii) Study the following Fischer projections to answer the questions below.

(1+1+2+1=)



a. Is galactose a D-sugar or an L-sugar?

b. Is mannose a D-sugar or an L-sugar?

c. Are these two carbohydrates enantiomers? If not, in how many places do they differ?

d. Is the term to describe the relationship between galactose and mannose?

(iii) What are the main differences between reducing sugar non-reducing sugar.

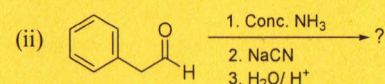
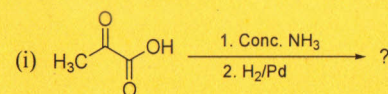
Describe with example. (3)

6. Answer the following questions: (5×2=10)

(i) Draw the structure of porphyrin. How many π electrons are involved in delocalization? Will it follow Huckel's rule of aromaticity?

(ii) Describe briefly about the phenomenon of photosynthesis.

7. (a) (i) Predict the products of the following reaction: (2+3=5)



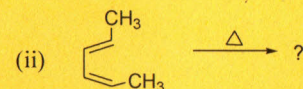
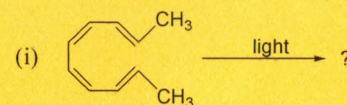
(ii) Describe briefly about the biosynthesis of amino acid.

(b) (i) Write short notes on Claisen Rearrangement. (2+3=5)

(ii) Under which condition [4+2]-cycloaddition reaction is allowed. Explain with the help of FMO approach.

8. (a) Draw the Correlation diagram for disrotatory conversion of butadiene to cyclobutene. Is the process allowed or forbidden? Explain. (5)

(b) Predict whether conrotatory or disrotatory motion will take place under the conditions mentioned against each compound. Write the structure of the product with stereochemistry in each case. (5)



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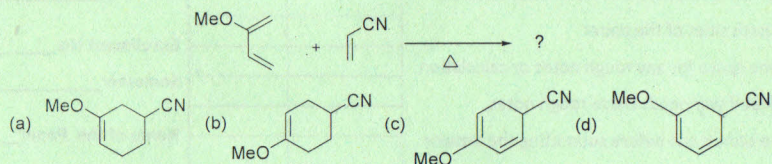
Marks – 20

(PART A - Objective Type)

I. Choose the correct answer:

1×20=20

1. The major product of the following reaction is-



2. α and β -maltoses are

- (a) enantiomers
- (b) epimers
- (c) anomers
- (d) geometrical isomers

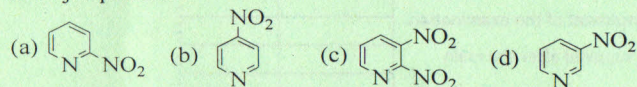
3. The catalyst used in Fischer's Indole synthesis-

- (a) $ZnCl_2$
- (b) PPA
- (c) H_2SO_4
- (d) All of these

4. Which one of the following amino acid will not respond to positive test to Ninhydrin?

- (a) Glycine
- (b) Alanine
- (c) Proline
- (d) Serine

5. Pyridine undergoes electrophilic nitration at elevated temperature to produce the following as major product-



6. The four protein chains of haemoglobin comprises of two α chains and two β chains. The number of residues of each of two α and each of β chains are respectively-

- (a) 141 & 146
- (b) 142 & 145
- (c) 140 & 147
- (d) 150 & 151

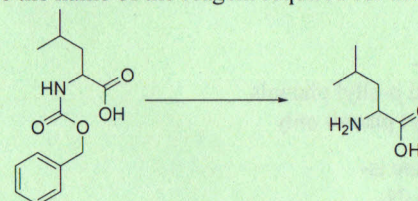
7. Oxidation of pyridine by peracids leads to-

- (a) Ring opening of pyridine
- (b) Removal of hydrogen
- (c) Formation of epoxide
- (d) Formation of pyridine N-oxide

8. Which one of the following amino acid is optically inactive?

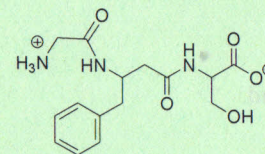
- (a) Alanine
- (b) Leucine
- (c) Glycine
- (d) Phenylalanine

9. Write the name of the reagent required for the following transformation.



- (a) Trifluoroacetic acid
- (b) HF
- (c) H_2/Pd
- (d) HCl

10. The IUPAC name of the following tri-peptide is-



- (a) Gly-Ser-Ala
- (b) Gly-Phe-Ser
- (c) Ala-gly-Ser
- (d) Ser-cys-Phe

11. Oxidation of sucrose with HIO_4 will have the following result-

- (a) consume 1 HIO_4 and produce 1 $HCOOH$
- (b) consume 2 HIO_4 and produce 2 $HCOOH$
- (c) consume 3 HIO_4 and produce 1 $HCOOH$
- (d) consume 3 HIO_4 and produce 2 $HCOOH$

12. Which of the following is not a polymer of glucose?

- (a) Glycogen
- (b) Amylopectin
- (c) Chitin
- (d) Cellulose

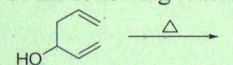
13. Which of the following pairs of monosaccharides will not form the same osazone?

- (a) Glucose & Mannose
- (b) Glucose & fructose
- (c) Glucose & galactose
- (d) Ribose & arabinose

14. Vit-B₁ contains which of the following heterocyclic moiety?

- (a) Thiazole
- (b) Oxazole
- (c) Imidazole
- (d) Isothiazole

15. The product of the following reaction is-



- (a) C1=CCCC(O)C1
- (b) C1=CC(=O)CC1
- (c) C1=CCCC(O)C1 (trans)
- (d) C1CCCC(O)C1

