

Department of Chemistry
School of Chemical & Life Sciences, Jamia Hamdard
B.Sc.-M.Sc. Integrated Program, Chemistry, Semester-IV Examination-May, 2023
Paper Title: Heterocyclic and Natural Product Chemistry
Paper Code: BCH-CC09TH

Time 3 hours

Maximum Marks 75

Abbreviations Used

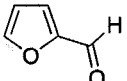
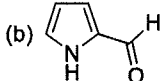
CLO- Course Outcome, PLO- Program Outcome, BTL- Bloom Taxonomy Level: BT level 1-Remember; BT level 2-Understand; BT level 3-Apply; BT level 4-Analyse; BT level 5-Evaluate, BT level 6-Create.

SECTION : A

Q1A. Select the most appropriate answer in the following question

1x15 = 15

Answer very briefly:

		BTL	CLO	PLO
i.	What is the name of saturated derivative of Pyrrole?	2/3	1/3	1/2
ii.	Identify the following compounds (a)  (b) 	1	1	1
iii.	What is the correct order of the reactivity of pyrrole, furan and thiophene towards electrophiles? Arrange them in decreasing order.	2	1/2	1/2
iv.	Write the name of the precursor of sesquiterpenoid and diterpenoid?	1/2	2	2
v.	What is gutta-percha?	2/3	3	3
vi.	What do you understand by 1-2,1-4 and 4-4 isoprene linkage. Show these linkages using suitable example.	4	2	3
vii.	Give one example of halogenated monoterpene. Draw its structure.	2/3	3	3
viii.	Give an example of an alkaloid which is yellow in colour.	1	1	1/2
ix.	Which alkaloid has been named after the generic name of the plant?	1	1	1
x.	Why are alkaloids basic in nature?	2/4	4	4
xi.	In nucleic acids which type of bond exists between the phosphate and hydroxyl group of a sugar.	4/5	4/5	4/5
xii.	Mention the difference between adenine and adenosine.	1/2	1/2	1/2
xiii.	What is the structural feature that is common to Uracil and Thymine?	5	4/5	3/4
xiv.	Which pyrimidine base contains an amino acid group at C4?	2	3	3
xv.	Why are nucleic acids called acids?	2/4	2	4

Q1B Select the most appropriate answer in the following question:

1x5=5

		BTL	CLO	PLO
i.	Purine base found in RNA is called (a) Uracil (b) Thymine (c) Guanine (d) Cytosine	1/2	1	2
ii.	Hager's reagent gives (a) White ppt (b) Yellow ppt (c) Green ppt (d) Blue ppt	2	1	3
iii.	The general formula of terpenes is (a) $(C_5H_8)_n$ (b) $(C_5H_5)_n$ (c) C_8H_5 (d) C_5H_5	3	2	2
iv.	Neral is a (a) Cis citral (b) Citral - b (c) Trans citral (d) Mixture of cis and trans citral	2	2	2
v.	α Terpineol on dehydration gives- (a) Limonene (b) Menthol (c) α - terpene (d) Menthone	3/4	3	3

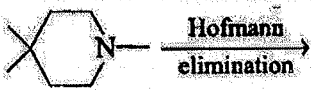
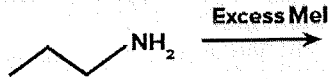
SECTION : B2. Answer any two of the following questions:**10x2 = 20**

Q. No	Question	BTL	CLO	PLO
B1	Discuss the classification, extraction and identification tests of alkaloids	2-4	3/4	3-5
B2	Pyridine undergoes both electrophilic and nucleophilic reactions. Justify the statement. Explain also why nucleophilic substitution reaction in pyridine occurs at 2 or α - position while electrophilic substitution occurs at 3 or β - position.	2/3	3	4/5
B3	Explain how the presence of double bond and tertiary hydroxyl groups are established in α - Terpineol. Sketch the synthesis of α - Terpineol by Perkin's method.	4	2-4	3-5
B4	Analyse the structural features and discuss the synthesis of Adenine.	4-6	4-6	4-6

SECTION C

Q3. Answer the following questions.

7x5 =35

Q. No	Question	BTL	CLO	PLO
C1	What are nucleotides and nucleosides? Illustrate with suitable structures. OR Draw and label a simple diagram and show how DNA is constructed from sugars, phosphates and bases. Also outline the structure of a DNA and RNA nucleotide and explain briefly.	3/4	2/4	3/4
C2	Farnesyl diphosphate (FPP) is synthesized by adding another five-carbon building block to geranyl diphosphate. What is this building block - IPP or DMAPP? Draw a mechanism for the formation of FPP. OR Write the mechanism of cyclization of geranyl pyrophosphate to form limonene.	3-5	2/3	3-5
C3	What are heterocyclic compounds? How are they classified? Explain why pyridine is less reactive than benzene in electrophilic substitution? OR Explain Hofmann elimination reaction (exhaustive methylation followed by heating with AgOH) with mechanism using the following two examples	3-5	3/5	3/4
	 			
C4	Discuss and analyse how the attachment of pyrrolidine ring with pyridine nucleus is established in nicotine. OR Explain briefly the structural features, numbering of carbon atoms in nicotine. Sketch the synthesis of nicotine.	4-6	3-5	5/6
C5	Write the reactions of citral and sketch its synthesis by Barbier-Bouveault-Tiemann's method OR Discuss the structural features of polynucleotide chain of DNA or RNA ?	4-6	6	5

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