

----- your Roll No.

SEMESTER-IV EXAMINATIONS-2022

M.Sc. CHEMISTRY

PAPER CODE: MCHCCO-403

PAPER TITLE: HETEROCYCLIC CHEMISTRY

(Write your Roll No. at the top immediately on receipt of this question paper)

Time: Three Hours

Maximum Marks: 75

Note: This paper has 3 sections A, B, and C, Attempt all the 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 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		(10x2=20 Marks)		
Q	Very Short Type Questions (attempt all)	BTL	CLO	PLO
A 1.	Cyclopropane when burned releases more energy than propane. Explain	2/3	1/3	1/2
A 2.	Pyrrole undergoes electrophilic substitution reaction about 10^5 faster than furan under similar conditions, though the resonance energy of pyrrole is greater than that of furan-Explain.	3/4	3/4	2
A 3.	The side-chain reactivity of which ion facilitates a targeted synthesis of cyanine dyes?	3/4	2	3/4
A 4.	What causes the anomeric effect in saturated heterocycles?	1/3	2	2
A 5.	What is diamagnetic susceptibility exaltation?	1/2	2-4	2
A 6.	Write mesomeric structures for pyrimidine.	1/3	3-5	3/4
A 7.	Give the structure of 4 π -excedent systems.	1/2	2/3	4
A 8.	What is oxepin-benzene oxide isomerization?	2/3	3/4	4
A 9.	How are arenes formed from Thiepins?	2/3	3/4	5
A 10.	How can you identify 2 H-Pyran-2-ones in the mass spectrum by their characteristic fragmentation pattern?	2/3	3/4	5

Section B

Long Type questions (Attempt any two out of four)

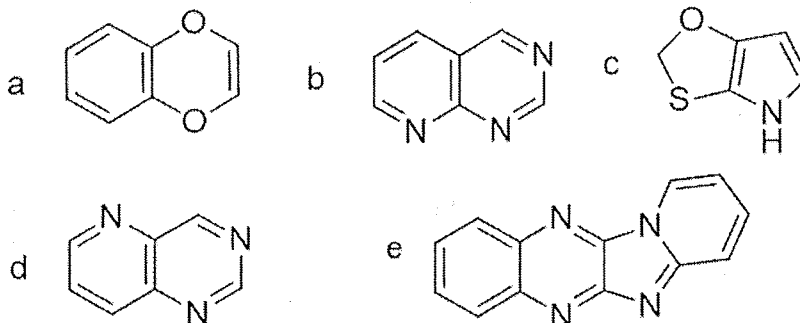
(2x10=20) Marks

BTL CLO PLO

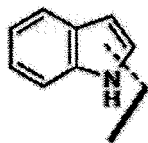
B 1. i) Draw the structures of the following heterocyclic compounds.

- a) 2-methoxy-4-H-oxete b) 6 H-1,2,5-Thiadiazine c) Quinoxaline-2(1H)-one
d) 2,3,7,8-tetrachlordibenzo [1,4] dioxin

ii) Give a name to the following compounds according to the Hantzsch-Widman system of nomenclature of heterocyclic compounds.



B 2. Propose different ways of synthesizing indoles on the basis of the following disconnection approach



B 3. Explain the chemical behavior of pyridine with respect to electrophiles by giving suitable examples

B 4. Give a mechanistic explanation for one-pot synthesis of pyridazin-3(2H)-ones using Schmidt-Druey synthesis

SECTION C

Attempt all questions, each question has an Internal choice

(7 x 5 =35) Marks

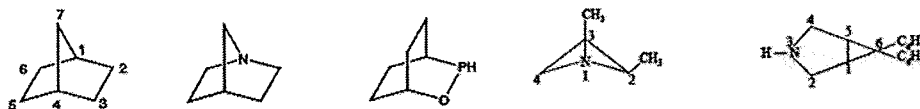
C 1. How is HOMA calculated for all carbon systems?

4/5 2-4 3-4

OR

Name the following compounds

4/5 1-3 2-4



C 2. Give mechanistic details of formation of benzofurans from 2 - (ortho - Hydroxy (or Mercapto)aryl) - Acetaldehydes, - Ketones or - Acids.

4/5 2-5 2-4

OR

How are Pyridine N-Oxides prepared? How are they synthetically important, illustrate giving examples.

4/5 1-3 2-4

C 3. Lithiation of N-blocked indoles provides means for the introduction of substituents into 2- position, Justify.

2/3 1-4 4-5

OR

Give an account of the oxidation and reduction behavior of pyridine

2/3 2-3 4-5

C 4. Discuss Pechman's synthesis of Coumarins.

4/5 1-6 5-7

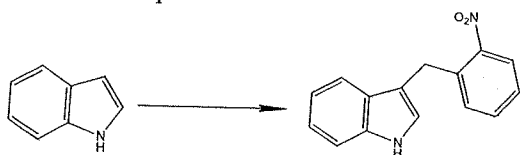
OR

1,3-Dicarbonyl compounds and aryl methyl ketones condense in acetic anhydride to give 2,4,6-trisubstituted pyrylium salts. Give the reaction and what could be the variations to this synthetic method

4/5 1-6 5-7

C 5. Carry out the following conversion via a dithiane intermediate. You may need more than one step

4/5 3-4 3-4



OR

Propose a synthetic route for Dihydroazepines from azatrienes.

4/5 3-4 3-4

C 6. Justify the statements.

4/5 3-4 3-4

- (i) Phosphole is a non-aromatic compound.
- (ii) Phosphobenzene is aromatic

OR

Explain the behaviour of phosphorene toward the CH_3Li

3/4 3-5 3-4

C 7. How can you distinguish between Oxepin and benzene oxide by NMR spectroscopy?

3/4 3-4 3-4

OR

Give a retrosynthetic analysis and suggest a suitable synthetic route for the following compounds.

4/5 3-4 3-4

