M.Sc. sem. III repeater
April 2016
paper III

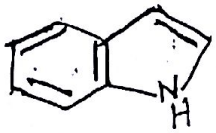
QP Code : 19599

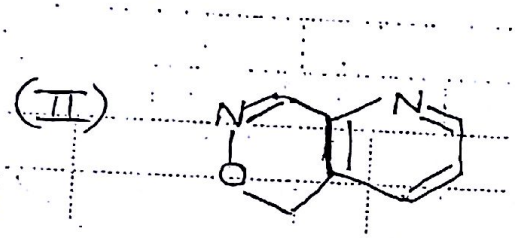
(2½ Hours) [Total Marks :60

N.B. : (1) All questions are **compulsory.**
(2) Figures to the **right** indicate full marks.

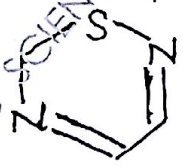
1. (a) Attempt **any two** of the following :- 8

(i) Name the following compounds according to the system of nomenclature mentioned alongside the structure.

(I)  Common name system

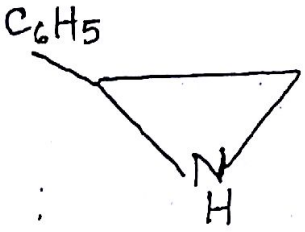
(II)  Hantzsch - Widman system

(III)  Replacement nomenclature

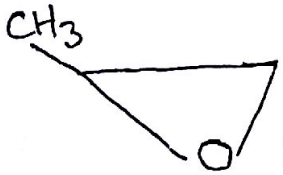
(IV)  Hantzsch - Widman system

(ii) Draw structure for the following :-
(I) 2-methyl -4H-oxete,
(II) 1 - methylindazole
(III) Benzo [c] pyridine
(IV) 1-oxa-4-aza-2, 5- cyclohexadiene.

(iii) (I) Explain:- Aziridine is a weaker base than azetidine.
(II) Complete the following reactions:-

(A) 

$\xrightarrow{HCl}$

(B) 

$\xrightarrow[2]{H^+,\ CH_3OH}$

(C) 

$\xrightarrow[10\%\ NaOH,\ \Delta]{C_6H_5CH_2SH,}$

(iv) (I) Give the synthesis of :
(A) 2- Methylthiazole from α-haloketone.
(B) Isoxazole from 1, 3- diketone.
(II) Illustrate with one example each nucleophilic and electrophilic attack on isoxazole.

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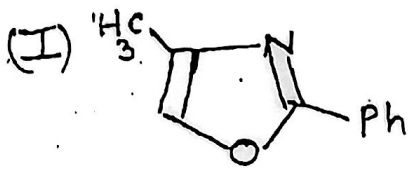
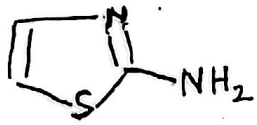
(b) Attempt **any one** of the following :-

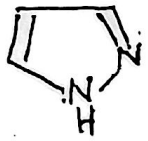
(i) Complete the following reactions:-

(I) 

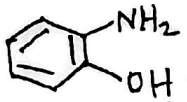
$\xrightarrow{NBS}$

(II) 

$\xrightarrow{\text{Fuming } HNO_3}$

(III) 

$\xrightarrow{SO_2Cl_2}$

(IV) 

+ $HC(OCH_3)_3$ $\xrightarrow{HCl}$

(ii) (I) Give the synthesis of imidazole by Radiszewski method and explain why imidazole is more basic than pyrazole.

(II) Give examples of electrophilic substitution reactions on imidazoles.

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2. (a) Attempt **any two** of the following :-

(i) Discuss the oxidative studies of myo-inositol.

(ii) Explain the structural features and applications of,

(I) chitin

(II) starch.

(iii) Discuss the structural elucidation of β- carotene.

(iv) Give the synthesis of disparlure from 6-methylhept-1-ene.

4

(b) Attempt **any one** of the following :-

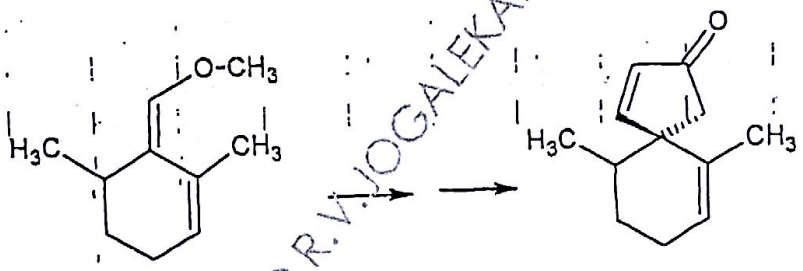
(i) Give structural features and biological importance of:-

(I) flavones

(II) porphyrins.

(ii) (I) Give reactions to prove the presence of ,
(A) Four methoxy groups
(B) Isoquinoline unit in papaverine.
(II) Discuss the structural features and importance of insect pheromones.

3. (a) Attempt **any two** of the following :- 8
(i) Explain the stereochemistry of β-vetivone.
How is decalinedione derivative prepared from resorcinol as a part of the synthesis of longifolene?
(ii) Write the synthesis of griseofulvin from phloroglucinol.
(iii) Give the synthetic strategy for the synthesis of reserpine.
In the synthesis of 4-demethoxy daunomycin, how is ethylacetoacetate converted to 2- (2-methyl-1, 3-dithiolanyl) -1,3-butadiene?
(iv) Write the structure of 4-demethoxy daunomycin.
Outline the steps involved in the following conversion.



(b) Attempt **any one** of the following :- 4
(i) Write the structure of reserpine.
Give the biological importance of prostaglandins.
(ii) How is structure of PGE_1 elucidated ?

4. (a) Attempt **any two** of the following :- 8
(i) What is NOE ? Discuss its importance in NMR spectroscopy.
(ii) Draw the structures for the following compounds, label the protons and designate the spin system.
(I) 1,2,3 -trihydroxybenzene
(II) vinylchloride
(III) 2-bromo-5-chlorothiophene
(IV) 1,4-dichloro-2- nitrobenzene

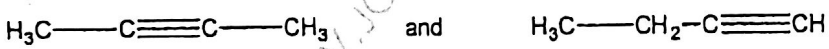
(iii) An organic compound having molecular formula C_4H_6O exhibits the following spectral data. Assign a suitable structure and justify.
IR (cm^{-1}) :- 2855 (w), 2740 (w), 1700 (s) and 1650 (m).
^1H NMR δ (ppm) :- 2.05 (3H,d), 6.2 (1H, dd, J = 7 and 17 Hz), 6.9 (1H, pair of quartet, 17Hz) and 9.7 (1H, d, 7Hz).

(iv) Two organic compounds [A] and [B] having molecular formula $C_3H_6O_2$ exhibit strong absorption at 1735 cm^{-1} in their IR spectra. Their ^1H NMR data is as follows :-
Compound [A] :- δ 2.7 (3H. s) and 3.7 (3H,s)
Compound [B] :- δ 1.3 (3H, t), 3.9 (2H, q) and 8.0 (1H, s).
Deduce the structures for compounds [A] and [B] with justification.

(b) Attempt **any one** of the following :- 4

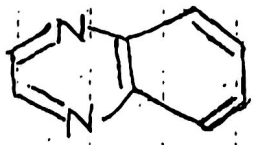
(i) Explain the principle of FT-IR spectroscopy.
Explain in brief ^{19}F NMR spectroscopy.

(ii) Discuss the application of ^{31}P NMR spectroscopy.
How would the following pairs of compound differ in their IR spectra?

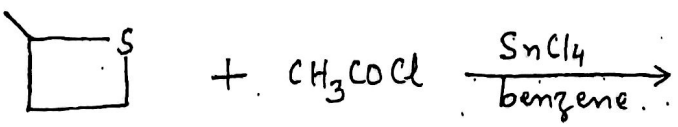


5. Attempt **any four** of the following :- 12

(a) Name the following compound by
(i) recognised common name.
(ii) systematic Hantzsch- Widman system.
(iii) replacement nomenclature.



(b) (i) Discuss the photochemical conversion of isoxazoles to oxazoles.
(ii) Write the product formed in the following reaction:



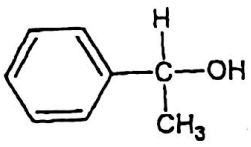
(c) (i) Write a note on deoxysugars.
(ii) Draw the structure and give the physiological importance of morphine.

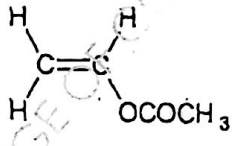
(d) Give the synthesis of ubiquinone from 3,4,5 - trimethoxyacetophenone.

(e) Give the structure of JH_2.
Write a note on uses of arylacetic acid.

(f) What are insect growth regulators ?
Discuss the structural features of gibberellic acid.

(g) State the splitting pattern for each signal in the following compounds :-

(I) 

(II) 

(h) Discuss in brief long range coupling.
