M.Sc. Sem III April 2017

Organic Chemistry P-III

Q.P. Code : 04694

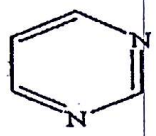
[Time: $2\frac{1}{2}$ Hours] **[Marks:60]**

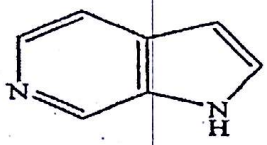
Please check whether you have got the right question paper.

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

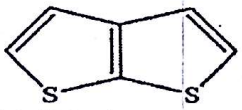
Q. 1 (a) Attempt **any two** of the following :- **08**

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

I)  Common name

II)  Hantzsch-Widman System

III)  Replacement nomenclature

IV)  Hantzsch - Widman System

(ii) Draw structures the following :-

I) 1H-indazole

II) Thiirane

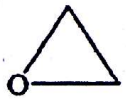
III) 1-oxa-2-aza cyclohexa-2, 4-diene

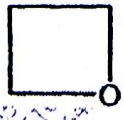
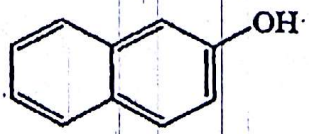
IV) Pyrano [2,3-c] pyrrole

(iii) I. Explain: Aziridine is a weak base with a pk_a of 7.98.

II. Complete the following reactions :-

A)  + $Na^+ HC^- (COOC_2H_5)_2$ ⟶

B)  + C_6H_5MgBr —ether⟶

C)  +  —10 % NaOH⟶

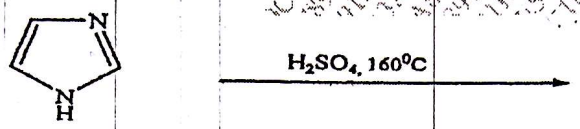
P.T.O

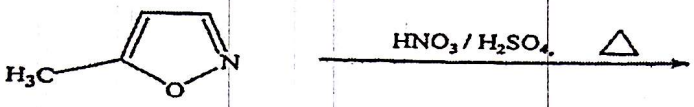
(iv) I) Give the synthesis of thiazole from ∝-halocarbonyl compound.

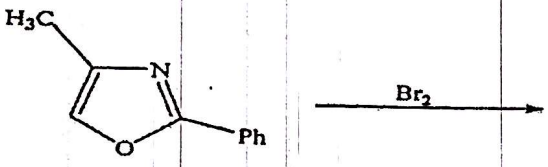
II) Discuss the photochemical conversion of isoxazoles to oxazoles.

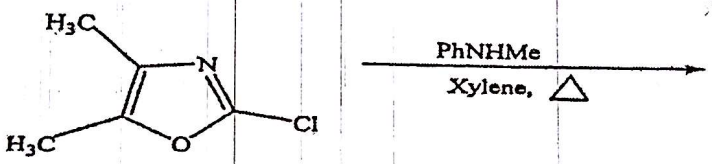
(b) Attempt **any one** of the following :- 04

i) Complete the following reactions :-

I 

II 

III 

IV 

ii) Draw all possible resonance structures for pyrazole and explain why electrophilc attack takes place at 4-position. Give any two electrophilic substitution reactions of pyrazole.

Q. 2 (a) Attempt **any two** of the following :- 08

i) Give an account of methylation studies used in the structure determination of lactose.

ii) Write notes on :-

I) deoxy sugars

II) amino sugars

iii) Give analytical evidences in support of the structure of β-carotene.

iv) Give the synthesis of grandisol from 2-methyl-1, 3-butadiene.

P.T.O

(b) Attempt **any one** of the following :- 04

i) Give structural features and biological importance of

I) Anthocyanins

II) Pterins

ii) Give analytical evidences to prove the presence of

I) four methoxy groups

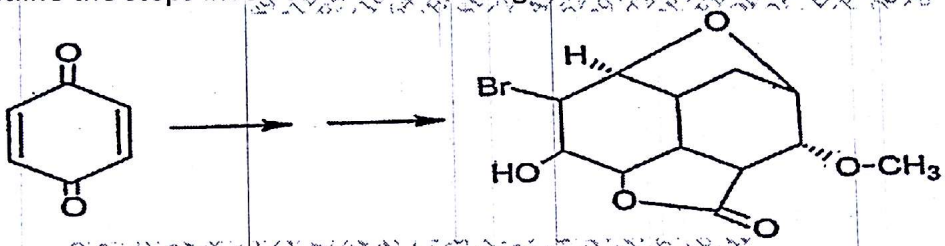
II) active methylene group

III) isoquinoline unit

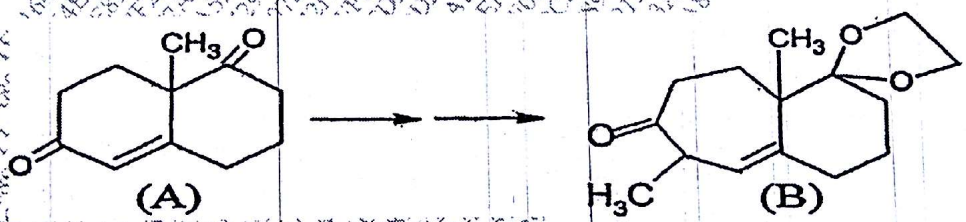
in papaverine. Draw the structure of papaverine and explain the reactions.

Q. 3 (a) Attempt **any two** of the following :- 08

i) Outline the steps involved in the following conversion:



ii) In the synthesis of longifolene, how is compound (A) converted to compound (B)



Draw the structure of 4-demethoxydaunomycin.

iii) How is griseofulvin synthesized from phloroglucinol?

iv) How is 5, 12-dimethoxy-2-(2-methyl-1 ,3-dithiolan-2-yl)-1 ,4-dihydronaphthacene synthesized from ethyl acetoacetate?

(b) Attempt **any one** of the following :- 04

i) Draw the structure of β-vetivone.

What are prostaglandins? Give the biological importance of prostaglandins.

ii) How is structure of $PGF_{1\alpha}$ elucidated.?

P.T.O

Q. 4 (a) Attempt **any two** of the following :- **08**

i) What is double resonance? Discuss its use in simplifying the complex NMR spectra.

ii) Draw the structures of the following compounds, label the protons and designate the spin system:

I) Styrene

II) β–chloroethoxybenzene

III) Phenylethylcetate

IV) 3, 4-dimethoxybenzaldehyde.

iii) An organic compound with molecular formula $C_9H_{10}O_2$ shows the following spectral analysis for NMR and infrared spectra. Interpret the given spectral data with possible structure of this compound :

IR (cm^{-1}) : 3040, 1715,1470, 1430 and 1055

^1H NMR δ (ppm) (at 60 MHz) : 1.96, 5.01 and 7.22 with integral ratios 3:2:5.

iv) Two organic compounds (A) and (B) having molecular formula $C_6H_{10}O_4$ exhibit strong absorption at 1738 cm^{-1} in their IR spectra. Their ^1H NMR spectral data is as follows :-

Compound (A) δ (ppm) : 2.6 (4H, s), 3.7 (6H, s)

Coumpound (B) δ (ppm) : 1.4 (3H, d), 3.5 (lH, q) and 3.7 (6H, s).

Deduce the structures for compound (A) and (B) with justification.

(b) Attempt **any one** of the following :- **04**

i) Explain the principle of FT-IR spectroscopy. Discuss the applicatons of ^{31}P NMR spectroscopy.

ii) Explain in brief ^{19}F NMR spectroscopy. The dehydration of 1,2- dimethyl cyclohexanol, yields three alkenes. Write their structures and show how you can distinguish these using infrared spectroscopy.

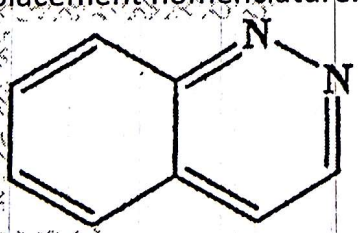
Q. 5 Attempt **any four** of the following :- **12**

(a) Name the following compound by

i) recognized common name

ii) systematic Hantzsch-Widman system.

iii) replacement nomenclature.



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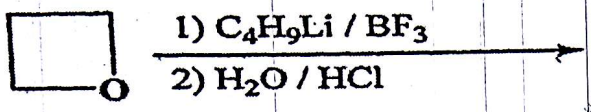
(b) i) Write the product formed :



ii) Give the synthesis and explain electrophilic substitution reactions of benzimidazole.

(c) Give the structural features and applications of inositol. What are branched sugars?

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

(e) What are insect growth regulators? Discuss the structural features of arylacetic acids.

(f) Write the structure of JH_2. Give the applications of gibberelic acid.

(g) What is Nuclear Overhauser Effect (NOE)? What is its significance?

(h) Discuss in brief: Long range coupling.
