

(2½ Hours)

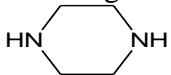
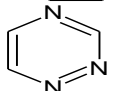
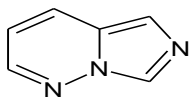
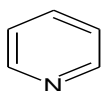
[Total Marks: 60

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

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

8

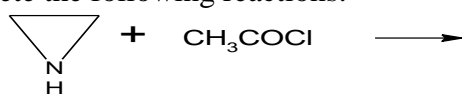
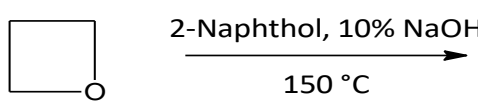
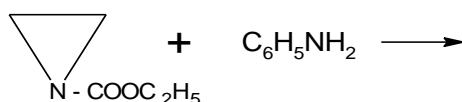
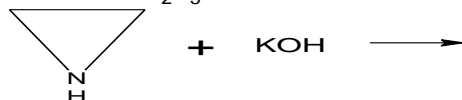
(i) Name the following compounds according to the system of nomenclature mentioned alongside the structure:-

- (I)  Common name system
- (II)  Hantzsch-Widman system
- (III)  Hantzsch-Widman system
- (IV)  Replacement nomenclature system

(ii) Draw structures for the following:

- (I) 3,3-dimethylthietane
 (II) 1H-indazole
 (III) 1,2,4-thiadiazole
 (IV) Pyrrolo[3,2-b]pyridine.

(iii) Complete the following reactions:-

- (I)  $\text{CH}_3\text{COCl} \longrightarrow$
- (II)  $\xrightarrow[150^\circ\text{C}]{\text{2-Naphthol, 10\% NaOH}}$
- (III)  $\text{C}_6\text{H}_5\text{NH}_2 \longrightarrow$
- (IV)  $\text{KOH} \longrightarrow$

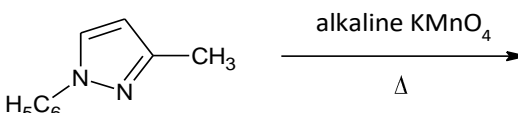
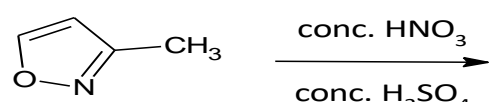
(iv) How would you synthesise thiazoles from:

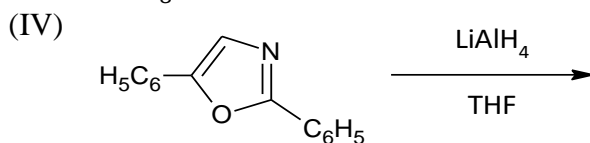
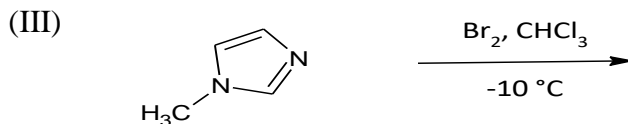
- (I) α -halocarbonyl compound
 (II) Gabriel method.

1. (b) Attempt any **one** of the following:

4

(i) Complete the following reactions:-

- (I)  $\xrightarrow[\Delta]{\text{alkaline KMnO}_4}$
- (II)  $\xrightarrow[\text{conc. H}_2\text{SO}_4]{\text{conc. HNO}_3}$



(ii) Discuss the reactions of pyrazole with electrophilic reagents.

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

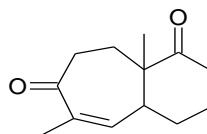
- (i) How are methylation studies useful in the structure elucidation of lactose?
- (ii) Explain the structural features and applications of Starch and Heparin.
- (iii) What are flavones? Draw the structure of β -carotene & give analytical evidence of the presence of conjugated double bonds and the presence of two β -ionone units.
- (iv) Give the synthesis of disparlure from 6-methylhept-1-ene.

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

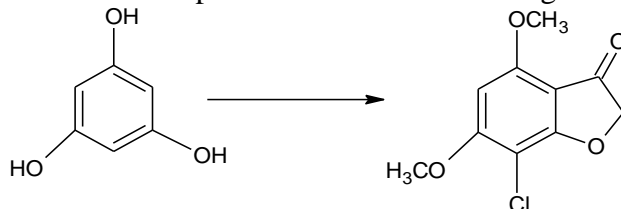
- (i) Give analytical evidence to prove the presence of the following in papaverine:- the presence of methylene group, four methoxy groups and isoquinoline unit. Also write the structure of papaverine.
- (ii) Explain the structural features & biological importance of: Anthocyanins and Porphyrins.

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

(i) How is Longifolene synthesized from

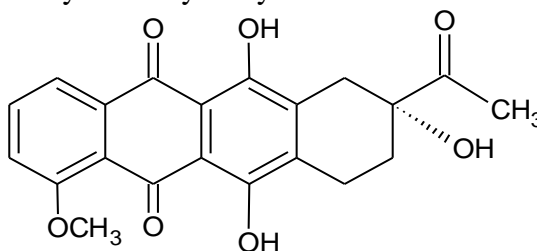


(ii) Outline the steps involved in the following conversion:-

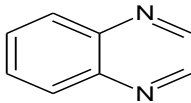


Write the structure of β -vetivone.

- (iii) How would you convert 6-methoxytryptamine and cyclohexanecarboxaldehyde derivative into reserpine ?
- (iv) Give the synthetic strategy for the synthesis of Longifolene. How is 4-Demethoxydaunomycin synthesized from



3. (b) Attempt any **one** of the following: 4
- (i) Write the structure of JH₃. What are prostaglandins? Give their classification and partial structures.
 - (ii) Give analytical evidence for the structural determination of PGE₁.
4. (a) Attempt any **two** of the following: 8
- (i) Explain the principle of FT-IR spectroscopy. Discuss the applications of ¹⁹F NMR spectroscopy.
 - (ii) Draw the structures of the following compounds, label the protons and designate the spin system:
 - (I) 1-Bromo-2-chloroethane
 - (II) Pyrogallol
 - (III) Pyrrole-2-carboxylic acid
 - (IV) 2-Chloroethanol.
 - (iii) What is relaxation? Explain longitudinal (spin-lattice) relaxation.
 - (iv) Two organic compounds [A] and [B] having molecular formula C₇H₁₄O₂ exhibit strong absorption at 1735 cm⁻¹ in their IR spectra. Their ¹H NMR data is as follows:-
 Compound[A]: 0.93 (6H, d), 1.52 (2H,m), 1.69 (1H,m), 2.04 (3H,s) and 4.10 (2H,t) ppm.
 Compound[B]: 0.94 (6H, d), 1.15 (3H,t), 1.91 (1H,m), 2.33 (2H,q) and 3.86 (2H,d) ppm.
 Deduce the structures for compounds [A] and [B] with justification.
4. (b) Attempt any **one** of the following: 4
- (i) An organic compound with molecular formula C₆H₅NO₃ shows the following Infrared and NMR spectra. Interpret the given spectral data with possible structure of this compound:
 IR (cm⁻¹): 3460 (s), 3035 (m), 1608 (m), 1585 (m), 1510 (s), 1360 (s), 1320 (s) and 740 (s).
¹H NMR δ (ppm): 7.25 to 7.39 (4H, unsymmetrical pattern) and 7.9 (1H, s).
 - (ii) What is nuclear overhauser effect (NOE)? What is its significance? Give two examples of NOE effect.
5. Attempt any **four** of the following: 12
- (a) Name the following compound by
 Common name system,
 Hantzsch-Widman system and
 Replacement nomenclature system


 - (b) Discuss the ring opening reactions of oxirane with nucleophiles.
 - (c) Write note on deoxysugar. Give the importance of pheromones.
 - (d) Give the synthesis of ubiquinone from 3,4,5-trimethoxyacetophenone.
 - (e) Draw the structure of JH₂. Give a brief account of aryl acetic acid as plant growth regulators.
 - (f) What are insect growth regulators? Write structural features of gibberelic acids.
 - (g) Discuss in brief: Long range coupling.
 - (h) A compound C₃H₅N exhibits in its IR spectrum a peak at 2250 cm⁻¹. On reduction with LiAlH₄ it forms, C₃H₉N the IR spectrum of which lacks the peak at 2250 cm⁻¹ instead records two peaks at 3300-3500 cm⁻¹. Write this reaction and interpret the given IR spectral values with possible structures in this reaction.
