

(2 ½ Hours)

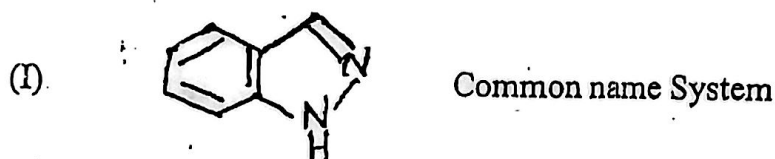
[Total Marks : 60

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

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

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

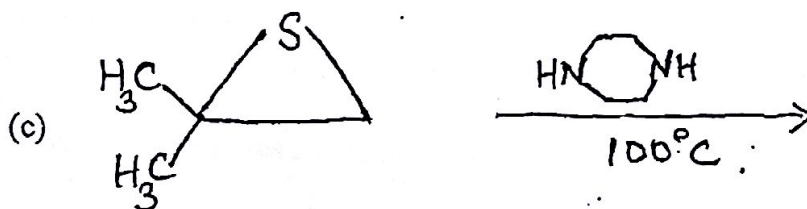
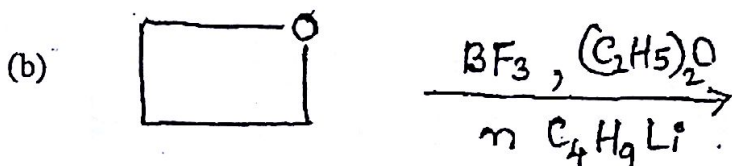
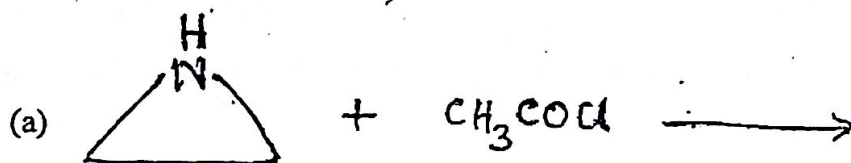


(ii) Draw structures for the following :

- (I) 1,3 -Diazetidene
- (II) Pyrimidine
- (III) 5H - Pyrido [2, 3 -d] 1, 2 -oxazine.
- (IV) Benzo [b] furan.

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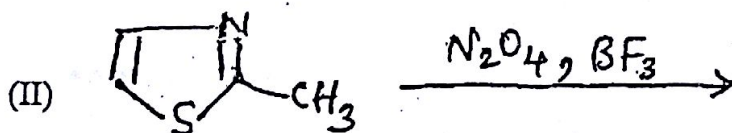
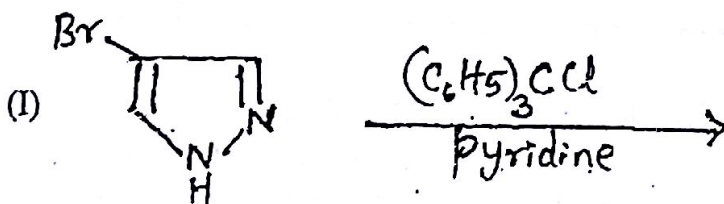
- (iii) (I) Explain the difference in the basicities of aziridine and azetidine.
 (II) Complete the following reactions :-



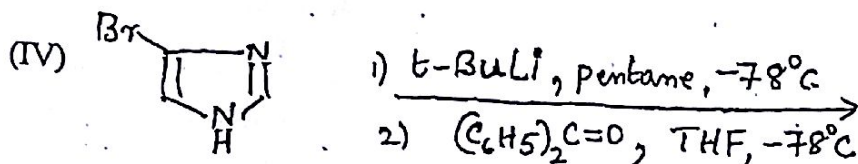
- (iv) (I) How will you prepare oxazole from α -acylaminoketone? Give an example of Diels Alder reaction of oxazole.
 (II) Give the preparation of benzimidazole from 1, 2 - diaminobenzene.
 Explain -why imidazole is stronger acid than pyrrole.

(b) Attempt any one of the following :

- (i) Complete the following reactions :



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

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

- (i) Give an account of the methylation studies used in the structure determination of lactose. 8
- (ii) Explain the structural features and applications of,
 - (I) Cellulose
 - (II) Chitin
- (iii) Discuss the structural elucidation of β - carotene.
- (iv) Give the synthesis of bombykol from acetylene.

(b) Attempt any one of the following :-

- (i) Give the structural features and biological importance of
 - (I) Flavones
 - (II) Porphyrins4
- (ii) Give analytical evidences in support of the structure of papaverine.

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

- (i) Write the structure of griseofulvin. 8
How is 2-(2-methyl-1,3-dithiolanyl) - 1,3-butadiene prepared from ethylacetoacetate?
- (ii) How is longifolene synthesised from homodecalinedione derivative?
- (iii) Explain the stereochemistry of β - vetivone.
Write the synthesis of 4,6 - dimethoxy benzofuranone from phloroglucinol.
- (iv) How would you convert 6-methoxytryptamine and a cyclohexane carboxaldehyde derivative into (\pm) reserpine?

(b) Attempt any one of the following :-

- (i) Write the structure of 4- demethoxy daunomycin. 4
How are prostaglandins classified? Give their partial structures.
- (ii) Give the analytical evidences for structure determination of PGF_{1 α}

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

- (i) What are lanthanide shift reagents? How are they useful in NMR? 8
- (ii) Draw the structures of the following compounds, label the protons and designate the spin system.
- (I) 1, 1, 2- trichloroethane
 (II) 5 - nitro-*m*-xylene
 (III) 3-bromo-2-t-butoxythiophene
 (IV) 2- chloroethanol.
- (iii) Two isomeric compounds [A] and [B] have molecular formula $C_4H_8O_2$. Both exhibit $C=O$ absorption at 1730 cm^{-1} in their IR spectra. Their 1H NMR Spectra are as follows :-
 Compound [A] : δ 1.2 (3H, t), 2.35 (2H, q) and 3.7 (3H, s)
 Compound [B] : δ 1.0 (3H, t), 1.65 (2H, m), 4.1 (2H, t) and 8.0 (1H, s).
 Assign suitable structures to compounds [A] and [B] with proper justification.
- (iv) An organic compound having molecular formula C_8H_8O exhibits the following spectral data. Assign a suitable structure and justify.
 IR (cm^{-1}) : 3042 (m), 2941 (w), 2862 (w), 1722 (s), 1605 (m), 1575 (m) and 1462 (m).
 1H NMR : δ 2.8 (d), 7.27 (m) and 9.78 (t).

(b) Attempt any one of the following :-

- (i) Propene and propyne show C-C multiple bond stretching bands in IR Spectrum while ethylene and ethyne do not show such bands, Explain. 4
 Discuss the principle of ^{19}F NMR spectroscopy.
- (ii) Discuss in brief the applications of ^{31}P NMR spectroscopy.
 A compound C_3H_5N exhibits in its IR Spectrum a peak at 2250 cm^{-1} . On reduction with $LiAlH_4$ it forms, C_3H_9N the IR spectrum of which lacks the peak at 2250 cm^{-1} instead records two peaks at $3300-3500\text{ cm}^{-1}$. Suggest the probable structure.

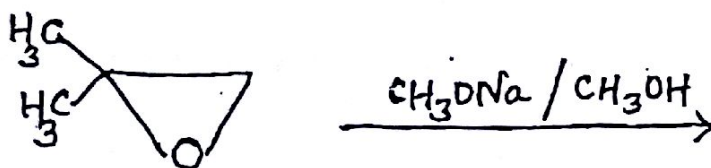
5. Attempt any four of the following :-

- (a) Name the following compound by 12
- (i) recognised common name
 (ii) Systematic Hantzsch-Widman System.
 (iii) replacement nomenclature.



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- (b) (i) Complete the following reaction :-



- (ii) Discuss the thermal conversion of isoxazoles to oxazoles.
- (c) Give the structure of any aminosugar and write its name.
Write a note on insect pheromones.
- (d) Give the synthesis of ubiquinone from 3, 4, 5 - trimethoxyacetophenone.
- (e) Give the structure of JH_3 .
Give the application of triacontanol.
- (f) What are insect growth regulators? Give a brief account of arylacetic acid as plant growth regulators.
- (g) Discuss in brief :- long range coupling.
- (h) In the following compounds state whether the types of protons indicated by arrows in each CH_2 group are homotopic / enantiotopic / diastereotopic.
- (i) $\text{CH}_3 \text{CO} \underset{\uparrow}{\text{CH}_2} - \text{CH}(\text{Cl}) \text{CH}_2 \text{CH}_3$
- (ii) $(\text{CH}_3)_2 \text{CH} - \underset{\uparrow}{\text{CH}_2} - \text{CH}_3$
- (iii) $\text{Br} \text{CH}_2 \text{CH}_2 - \underset{\uparrow}{\text{CH}_2} - \text{CH}(\text{Br}) \text{CH}_3$