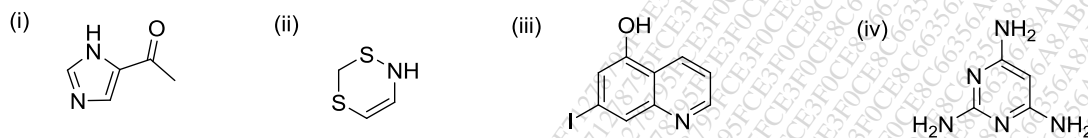


Time: 3hrs

Marks: 80

N.B.: 1. All Questions are compulsory
2. Figures to right indicate full marks

Q.1. A. (i) Give IUPAC nomenclature of the following: (Any three) (03)



(ii) Write the structures for the following: (Any two) (02)

a) 4-Acetylimidazole b) 2-propenyl pyridine c) 2*H*-1,3-Thiazine-3-carbaldehyde

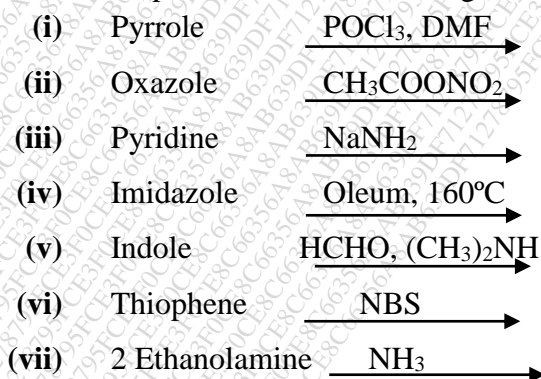
B. Answer the following in brief (10)

- Calculate the isoelectric point for Lysine given that $pK_{a1} = 2.18$, $pK_{a2} = 8.95$, and $pK_{a3} = 10.53$. Write the structure of the zwitterion
- Measurements on two fractions, A and B of a linear polymer, yield molecular weights of 50,000 and 200 000, respectively. A mixture is prepared from one part by weight of A and two parts by weight of B. Determine the number-average molecular weight of the mixture.
- Illustrate the coupling step in DNA synthesis.
- Give the products of quinoline on reaction with $KMnO_4$
- Electrophilic substitution in pyrrole takes place in 2-(or 5) position. Justify.

C. Answer the following:

- Write resonating structures of (a) indole (b) oxazole (02)
- Discuss the reductive desulfurization of thiazole (02)
- Draw the structure and denote the stereochemistry for 5 β -cholestane (01)

Q.2. A. Give the products of the following reactions (Any six) (06)



B. Complete the following reactions: (03)

- (i) 5α -cholestan-3 α ,6 β -diol $\xrightarrow{\text{ClCOOC}_2\text{H}_5}$
- (ii) Bis-2 chloroethylether $\xrightarrow{\text{RNH}_2}$
- (iii) 5α -Cholestan-3-one $\xrightarrow{\text{Br}_2}$

C. Deduce the first amino acid fragment obtained during the sequencing of a peptide Ala-Cys-Glu-Ser-Leu-Phe-Tyr-Val using (03)

- (i) carboxypeptidase method
(ii) Edman degradation method.

Q.3. A. Write the following reactions with mechanisms (Any three) (06)

- (i) Radiszewskii Reaction
(ii) Hantzsch Pyrrole synthesis
(iii) Bischler Napieralski synthesis
(iv) Fischer indole synthesis

B. Write all the steps involved in the synthesis of the dipeptide Ala-Gly. (03)

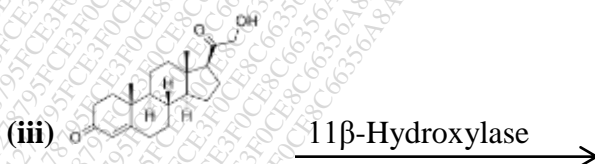
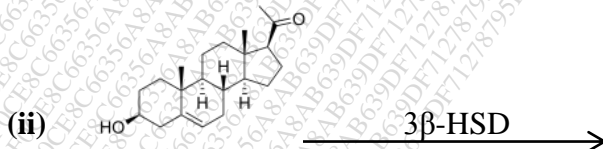
C. Discuss stereochemistry of polymerization. (03)

Q.4. A. Give suitable explanations for the following: (Any three): (06)

- (i) Rate of esterification of 5α -cholestan-3 β -ol is faster than that of 5β -cholestan-3 β -ol.
(ii) Treatment of 5α -Cholest-2-ene with a) KMnO_4 and b) H_2O_2 gives diols with different stereochemistry.
(iii) Nucleophilic substitution in pyridine takes place in 2 or 4 position in pyridine.
(iv) Thiophene is more aromatic than furan.

B. Complete the following reactions: (03)

- (i) 2 moles of ethanolamine $\xrightarrow[\text{Under pressure}]{\text{NH}_3, 150-220^\circ\text{C}}$



C. Briefly discuss the Merrifield solid phase synthesis of DNA (03)

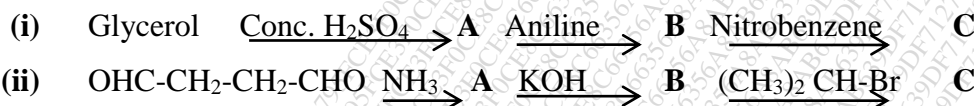
Q.5. A. Compare the basicity of imidazole, pyrrole and pyridine with justification (03)

B. Attempt the following conversions (Any five) (05)

- (i) Pyrrole to Pyrrole-2-carboxaldehyde
- (ii) Furan to Furoic acid
- (iii) Indole to 3-Dimethylaminomethylindole
- (iv) Pyridine to 4-Nitropyridine
- (v) Barbituric acid to pyrimidine
- (vi) Benzaldehyde to isoquinoline

C. Classify polymers on the basis of their physical properties giving one example from each class. Discuss any one in detail (04)

Q.6. A. Identify and write the structures of **A**, **B** and **C** in the following reaction sequence (06)



B. Arrange the following in order of increasing susceptibility to oxidation: 5 α -Cholestan-1 α -ol, 5 α -Cholestan-4 β -ol and 5 α -Cholestan-2 β -ol. Justify (03)

C. Explain the following terms with suitable examples (Any three) (03)

- (i) Thermoplastic polymer
- (ii) T_g
- (iii) Free radical polymerisation
- (iv) Ziegler Natta catalyst