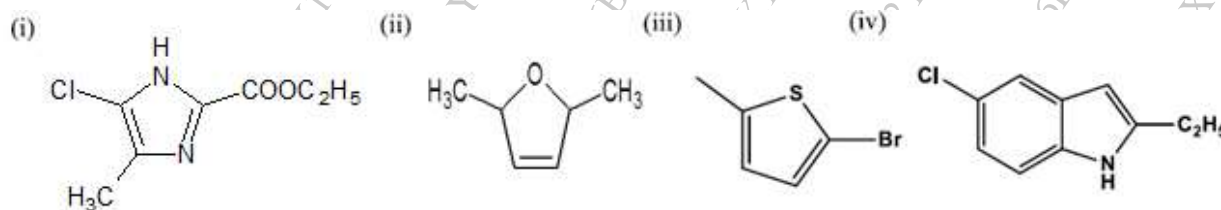


Time: 3 hrs

Marks: 80

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

**Q1.A.** (a) Give IUPAC nomenclature of the following: (Any 3) (03)



(b) Draw the structures for the following: (Any 2) (02)

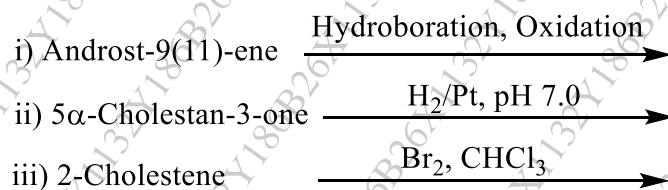
- 2-Hydroxymethylisoquinoline
- 1,2-dihydropyrimidin-4-amine
- 2-Methyl-5-cyanofuran

**Q1.B. a)** Attempt the following conversions: (05)

- Pyridine to 2-Aminopyridine
- Barbituric acid to pyrimidine
- Thiazole to thiazole-5-sulphonic acid
- Indole to 3-Formyl-Indole
- Furan to Furoic acid

**Q1.B. b)** Identify the strongest base from the following heterocycles: pyrrole, pyridine, pyrimidine. Justify your answer. Depict resonance in pyrrole. (05)

**Q1.C. a)** Complete the following reactions: (03)



**Q1.C. b)** Draw resonating structures for Pyrimidine (02)

**Q2. A.** Depict the mechanism for the following synthesis: (Any 3) (06)

- (i) Knorr Pyrrole Synthesis
- (ii) Bischler Napieralski synthesis.
- (iii) Robinson-Gabriel Synthesis for oxazole
- (iv) Malonic ester synthesis of pyrimidine

**Q2. B.** Illustrate the Edman degradation analysis for the tripeptide Lys-Phe-Glu. (03)

**Q2. C.** Draw the general structures for androstane, pregnane and estrane backbone of steroids (03)

**Q3.** Answer the following in brief: (2M each) (12)

(i) Calculate the isoelectric point for Aspartic acid given that  $pK_{a1} = 1.88$ ,  $pK_{a2} = 3.65$ , and  $pK_{a3} = 9.60$ . Write the structure of the zwitterions.

(ii) Which is the most favorable position for electrophilic aromatic substitution occur in furan? Why?

(iii) Size exclusion chromatography of monodisperse fractions of a linear polymer X and Y, yield molecular weights 8,00,000 and 4,00,000 respectively. Mixture is prepared from 5 parts by weight of X and 3 parts by weight of Y. Determine weight average molecular weight.

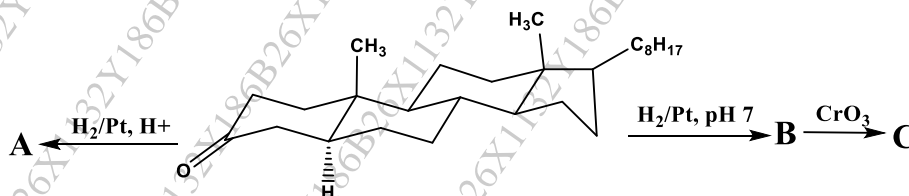
(iv) During DNA synthesis, A, G and C requires protecting group while thymine does not. Justify.

(v) Justify: Electrophilic aromatic substitution in pyridine occurs at position 3.

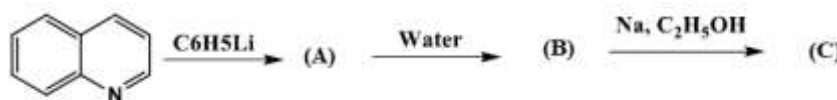
(vi) Identify the most aromatic ring from the following: Furan, Pyrrole, thiophene. Depict resonance in thiophene.

**Q4. A.** Identify and write the structures of A, B and C in the following reactions: (06)

(i)



(ii)



**Q.4. B.** Write all steps required for synthesis of Leu-Ala dipeptide. (03)

**Q.4. C.** What are co-polymers? Explain different types of co-polymers. (03)

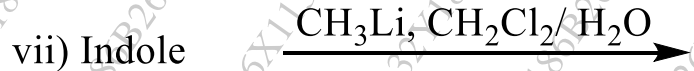
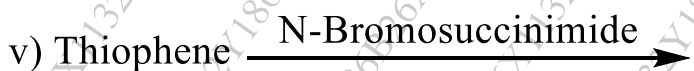
**Q5. A.** Give reasons for the following: (06)

- (i)  $5\alpha$ -cholestane- $3\alpha$ -ol is oxidized 3 times faster than  $5\alpha$ -cholestane- $3\beta$ -ol.
- (ii) Cholestan- $3\beta,5\alpha,6\alpha$ -triol forms dicathylate.
- (iii)  $3\beta$ -Cholestenyltrimethylammonium hydroxide on heating gives no product but  $3\alpha$ -Cholestenyltrimethylammonium hydroxide gives 2-cholestene.

**Q5. B.** Explain the terms glass transition temperature and polydispersity index. (03)

**Q5. C.** Classify polymers on the basis of their physical properties and discuss any one in detail. (03)

**Q6. A.** Give the products of the following reactions (Any 6) (06)



**Q6. B.** Discuss polymerization reaction of propene using Ziegler Natta catalysis. (03)

**Q6. C.** Briefly discuss the Merrifield solid phase synthesis of DNA (03)

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