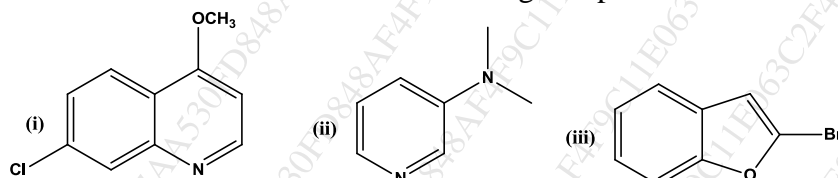


Time: 3 Hours

Total Marks: 80

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

Q1A.I. Give the IUPAC nomenclature of the following compounds (03)



II. Draw the structures for the following: (Any 2) (02)

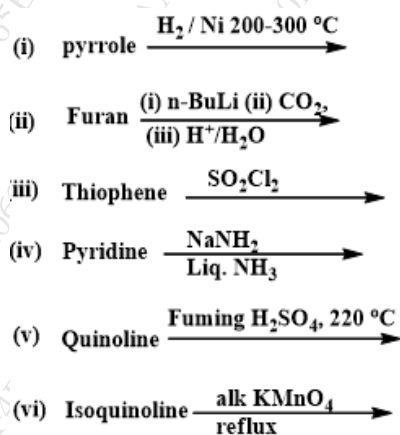
- (i) 5-bromo-indole-3-carboxaldehyde/ 5-bromo-3-formylindole.
(ii) 4-cyano-3-hydroxymethyl-2-nitrothiophene
(iii) 4-bromo-2-methylamino-6-ethylpyrimidine.

Q1B.I. Attempt the following conversions (05)

- (i) Barbituric acid to pyrimidine
(ii) Pyridine to 3-nitropyridine
(iii) Glyoxal to imidazole
(iv) Quinolone to 5- and 8-nitroquinoline
(v) 2,4,6-trichloropyrimidine to pyrimidine

II. Compare the basicity of pyrrole and pyridine. Depict resonance in pyrrole. (05)

Q1C. Give the products of **any five** of the following reactions: (05)



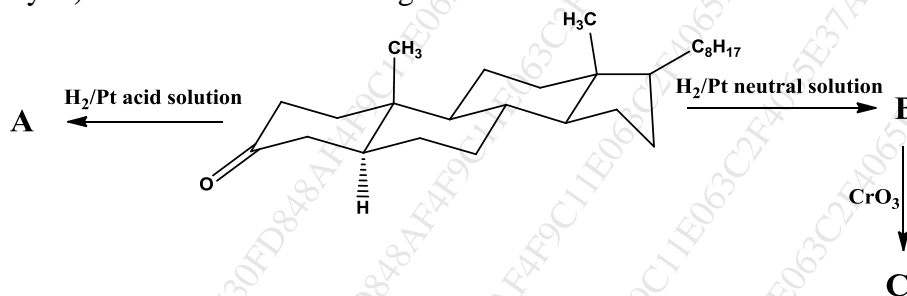
Q2A. Depict the mechanisms for **any three** of the following synthesis: (06)

- (i) Bischler Napieralski synthesis.
(ii) Knorr Pyrrole synthesis.
(iii) Hantzsch Pyridine synthesis.
(iv) Doebner-Miller Synthesis

Q2B. Illustrate the Edman degradation analysis for the peptide Gly-Phe-Met-Lys (03)

25247

Q2C. Identify **A**, **B** and **C** in the following reactions. (03)



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

- Justify: Imidazole is a base while pyrrole is a weak acid.
- Size exclusion chromatography of monodisperse fractions of a linear polymer A and B yield molecular weights of 1,00,000 and 3,00,000 respectively. A mixture is prepared from 2 parts by weight of A and 4 parts by weight of B. Determine weight average molecular weights.
- During DNA synthesis, A, G and C requires protecting group while thymine does not. Justify.
- Calculate the isoelectric point for Aspartic acid given that pKa₁ = 1.88, pKa₂ = 3.65, and pKa₃ = 9.60. Write the structure of the zwitterions.
- 5-cholestene when treated with peracetic acid gives product B which on hydrolysis by acid and water give product C. Give the structure of B and C with proper stereochemistry.
- Discuss the oxidation of quinoline using various oxidizing agents.

Q4a. Explain what are biodegradable and non-biodegradable polymers with suitable examples. (04)

- b. Attempt the following conversions: (08)
- Indole to 3-Dimethylaminomethylindole
 - Pyridine to 4-nitropyridine-N-oxide
 - Pyrrole to 3-Chloropyridine
 - 2-phenylethylamine to 1-methylisoquinoline.

Q5A. Give reasons for the following: (06)

- Acetates of 5 β -cholestan-3 α -ol gets hydrolyzed more rapidly than 5 β -cholestan-3 β -ol.
- Thiophene is more stable towards acids than furan.
- Cholesterol gives cis product upon oxidation with KMnO₄ while with H₂O₂ it gives trans product

Q5B. 5-Cholestene (A) when treated with peracetic acid gives product B, which on treatment with water to give product C. Give the structures of A, B and C with proper stereochemistry. (03)

Q5C. Classify polymers on the basis of their stereochemistry and discuss any one method of synthesis of polymers. **(03)**

Q6A. Briefly discuss the Merrifield solid phase synthesis of DNA **(04)**

Q6B. Give the products of **any eight** of the following reactions: **(08)**

- i) Pyridine $\xrightarrow{\text{PhLi, } 35^{\circ}\text{C}}$
- ii) Imidazole $\xrightarrow{\text{Conc. HNO}_3}$
 $\xrightarrow{\text{H}_2\text{SO}_4}$
- iii) Thiophene $\xrightarrow{\text{CH}_3\text{COCl}}$
 $\xrightarrow{\text{SnCl}_4}$
- iv) Isoquinoline $\xrightarrow{\text{KMnO}_4}$
- v) Pyrrole $\xrightarrow{\text{CHCl}_3}$
 $\xrightarrow{\text{KOH}}$
- vi) Indole + Dimethylformamide + POCl₃ \longrightarrow
- vii) Furan $\xrightarrow{\text{CO, HCl}}$
 $\xrightarrow{\text{AlCl}_3}$
- viii) Quinoline $\xrightarrow{\text{CH}_3\text{COOH}}$
- ix) Furan $\xrightarrow{\text{Ra, Ni, H}_2}$
