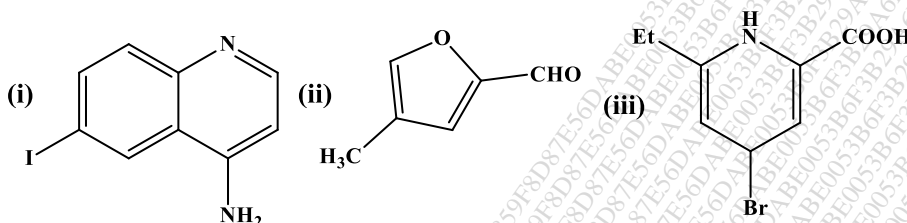


Time: 3hrs

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

Total Marks: 70


Q1. A. Give IUPAC nomenclature of the following compounds: (03)



B. Justify the statement - Pyridine is more basic than pyrrole. (02)

C. Answer the following: (05)

- (i) Give structural requirements for (4+2) cycloaddition reactants.  
(ii) Write strategy for disconnection of pyrrole.

- (iii) Give synthetic equivalent for the synthon   
(iv) Give structure of product formed when HBr reacts with Cholesterol  
(v) E-factor with example.

D. Give structures of the following: (i) Testosterone. (ii) 17 $\beta$ -estradiol. (03)(iii) 5 $\alpha$ -cholestan-3 $\beta$ -ol (in chair form). (03)

E. Write one reaction in green chemistry catalysed by hydrotalcite. (02)

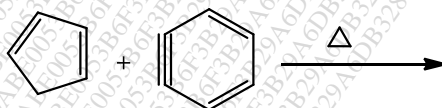
Q2. A. Write complete mechanism for (any two) (04)

(i) Skraup synthesis (ii) Bischler Napieralski synthesis (iii) Fischer indole synthesis

B. Discuss catalytic oxidation reactions with H<sub>2</sub>O<sub>2</sub> under phase transfer conditions. (03)

C. (i) Explain with molecular orbital pictures why thermal [1,3] sigmatropic reaction is symmetry forbidden. (03)

(ii) Complete the following reaction: (01)



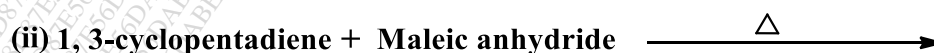
Q3. A. Attempt the following conversions (any four): (04)

- (i) Thiophene to 2-chloromethylthiophene  
(ii) 4-methylpyrimidine to 4-methylpyrimidine-N-oxide.  
(iii) Phenylacetyl bromide to 2,4-diphenylimidazole.  
(iv) Furan to 2-bromofuran  
(v) 2-phenylethylamine to 2-methylisoquinoline.

B. Using synthon approach devise scheme for synthesis of benzocaine. (04)

C. Compare conventional and catalytic process for manufacturing of caprolactam. (03)

Q4. A. Complete the following reactions and predict stereochemistry of the products formed: (03)



**Q4. B.** Write structures of products formed for the following reactions (**any eight**): (08)

- (i) Isoquinoline  $\xrightarrow{\text{NaNH}_2, \text{liq. NH}_3}$
- (ii) 3-methoxyaniline + Glycerol  $\xrightarrow{\text{conc. H}_2\text{SO}_4, \text{Nitrobenzene}}$
- (iii) Quinoline  $\xrightarrow{\text{conc. H}_2\text{SO}_4, 220^\circ\text{C}}$
- (iv) Indole  $\xrightarrow{\text{SO}_2\text{Cl}_2}$
- (v) Thiophene  $\xrightarrow{\text{Cl}_2, -30^\circ\text{C}}$
- (vi) Furan  $\xrightarrow{\text{Ac}_2\text{O}, \text{BF}_3, \text{ether}, 0^\circ\text{C}}$
- (vii) Pyrrole  $\xrightarrow{\text{CO}_2, \text{CHCl}_3, \Delta}$
- (viii) Imidazole  $\xrightarrow{\text{Br}_2, \text{CHCl}_3, -10^\circ\text{C}}$
- (ix) Pyridine  $\xrightarrow{\text{KNO}_3, \text{H}_2\text{SO}_4, 300^\circ\text{C}}$

**Q5. A.** Write complete mechanism for **any two**: (i) Paal-Knorr synthesis for furan. (ii) Hinsberg synthesis (iii) Hantzsch synthesis of Pyridine (04)

**B.** Give reasonable explanation for the following: (05)

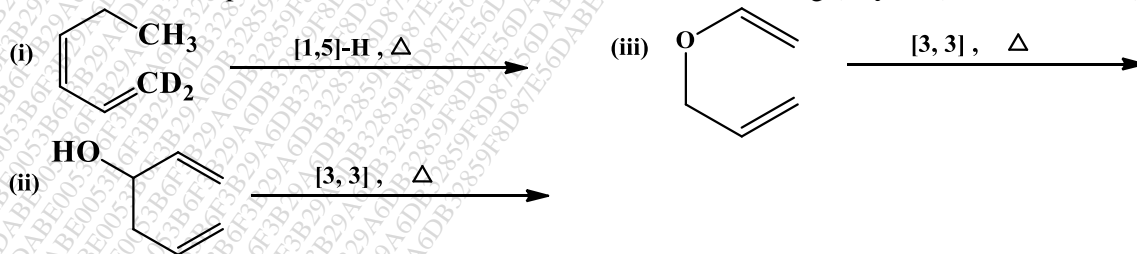
- (i) Electrophilic substitution in indole takes place at 3- position.  
 (ii) Furan, pyrrole and thiophene are heteroaromatics.  
 (iii) Oxidation of 5 $\alpha$ -cholestane-11 $\beta$ -ol is highest.  
 (iv) Hoffmann degradation of 3 $\beta$ -trimethylammonium-5 $\beta$ -cholestane does not form any product.  
 (v) Nucleophilic substitution in pyridine is preferred at 2-position.

**C.** Attempt the following conversions: (02)

- (i) 5 $\alpha$ -cholestan-3 $\beta$ -ol to 5 $\alpha$ -cholestane.  
 (ii) Cholest-5-en-3 $\beta$ -ol to cholestan-3 $\beta$ ,5 $\alpha$ ,6 $\beta$ -triol.

**Q6. A.** Draw resonating structures of: (i) Indole (ii) Furan (iii) Imidazole (iv) Pyridine (04)

**B.** Give structures of products formed with mechanism for the following (**any two**): (04)



**D.** Discuss retrosynthetic analysis and synthetic pathway for p-methoxyacetophenone. (03)

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