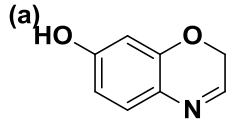
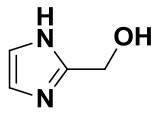
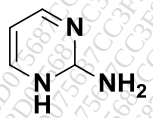
Time: 3 hours **Marks: 80**

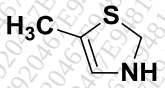
N.B.: 1. All Questions are compulsory
2. Figures to right indicate full marks

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

(a) 

(b) 

(c) 

(d) 

(ii) Draw the structures for the following: (**Any Two**) **(02)**
(a) 4-methoxy-7-ethylisoquinoline **(b)** 4,5-dihydrofuran-2-carbaldehyde
(c) 5-methylindole-4-carboxylic acid

B. Answer the following in brief: **(10)**

(i) 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.

(ii) Give examples of protecting groups used for acidic and basic functional groups of amino acids.

(iii) Calculate the isoelectric point of histidine, which has pK1= 1.77, pK2= 6.10, pK3= 9.18. Provide the structure of the zwitterion.

(iv) Give the structure/s of reduction product of Pyridine.

(v) At which position does electrophilic aromatic substitution occur in furan? Why?

C. Answer the following:
(i) Draw all resonating structures for pyrrole. **(02)**
(ii) Compare the basicity of pyridine and pyrimidine. **(02)**
(iii) Draw the structure of 5α-pregnan-3β-ol (in chair conformation) **(01)**

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

(i) Furan $\xrightarrow[CH_3COOH]{dil.HNO_3}$

(ii) Pyridine $\xrightarrow{C_6H_5Li}$

(iii) Thiophene $\xrightarrow{Cl_2,\ 50^oC}$

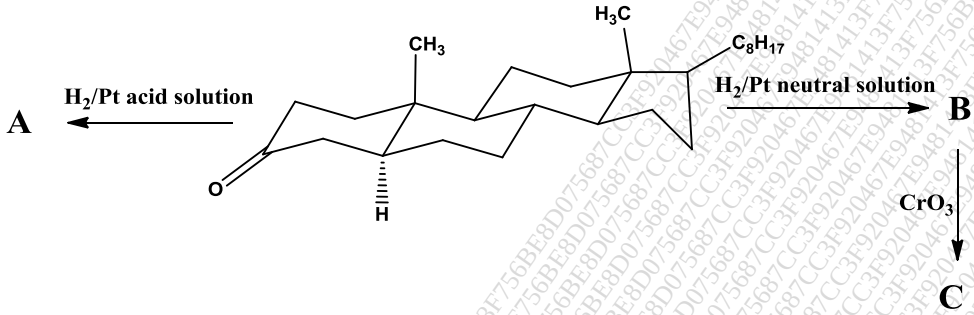
(iv) Imidazole $\xrightarrow[100^0C]{Oleum}$

(v) Quinoline $\xrightarrow[Liq.\ NH_3]{NaNH_2}$

(vi) Oxazole $\xrightarrow{Na,\ C_2H_5OH}$

(vii) Indole $\xrightarrow[Dimethylamine]{HCHO}$

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



C. Illustrate the Edman degradation analysis of the tripeptide Lys-Phe-Glu. **(03)**

Q.3. A. Write the following synthesis with mechanisms **(Any Three)** **(06)**

(i) Skraup synthesis
(ii) Hantzsh synthesis for thiazole
(iii) Fischer Indole synthesis
(iv) Paal Knorr Synthesis for thiophene

B. Write all the steps required for synthesis of Ile-Lys dipeptide. **(03)**

C. Give the polymerisation reaction of ethane using Zieglar Natta catalyst. **(03)**

Q.4. A. Give reasons for the following: **(Any Three)**: **(06)**

(i) 3β-Cholestenyltrimethylammonium hydroxide on heating gives no product but 3α-Cholestenyltrimethylammonium hydroxide gives 2-cholestene
(ii) Electrophilic substitution in indole takes place at 3- position.
(iii) Cholestan-3β,5α,6α-triol forms dicathylate
(iv) Furan, Pyrrole and Thiophene are aromatics.

B. 5-Cholestene when treated with peracetic acid gives product B, which is hydrolysed by acid and water to give product C. Give the structures of B and C with proper stereochemistry. **(03)**

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

Q.5. A. Answer the following questions: **(03)**

(i) Write the tautomeric forms of imidazole.
(ii) Write method of synthesis of morpholine from oxirane.
(iii) Draw resonating structures for Quinoline.

B.Attempt the following conversions **(Any Five)** **(05)**

(i) Thiophene to 2-chloromethylthiophene
(ii) 4-methylpyrimidine to 4-methylpyrimidine-N-oxide.
(iii) Phenylacetylbromide to 2,4-diphenylimidazole.
(iv) Furan to 2-bromofuran
(v) 2-phenylethylamine to 1-methylisoquinoline.
(vi) Glyoxal to imidazole-4,5-dicarboxylic acid

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

Q.6. A. Answer the following questions. **(06)**

(i) Give the reactions of quinoline with mild and strong oxidising agents.

(ii) Explain the effect of various reducing isoquinoline.

(iii) Explain what happens when pyrimidine reacts with hydrazine.

B. Attempt the following conversions: (**03**)

(i) Coprostanone to epicoprostanol

(ii) Cholest-5-en-3β-ol to cholestan-3β,5α,6β-triol.

(iii) Pregnelolone to progesterone

C. Write a short note on free radical polymerization. **(03)**
