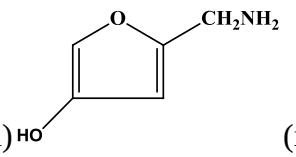
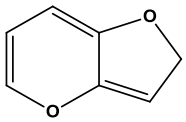
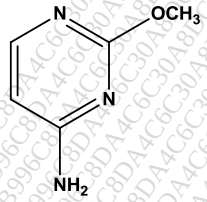
(3 Hours) **(Total Marks : 70)**

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

Q**1**.**(a)** Give the IUPAC nomenclature of the following: (**03**)

(i) 

(ii) 

(iii) 

(b) Compare and comment on basicity of imidazole and pyridine. (**02**)
(c) Define the following terms: (i) Pericyclic reaction (ii) Synthon (iii) Sterol
(iv) Atom efficiency (v) Disconnection (**05**)
(d) Give structures of the following: (i) Estradiol
(ii) 17α,11,21-trihydroxy-4-pregnene-3,20-dione
(iii) 5β-cholestane-3β,6β-diol (in chair form). (**03**)
(e) Give two examples of solid acid catalyst used for green reactions. (**02**)

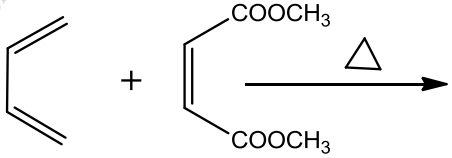
Q2. (a) Give mechanism for the following (**any two**) : **(04)**
i) Friedlander synthesis
ii) Bischler Napieralski synthesis
iii) Paal Knorr synthesis for furan
(b) Using orbital diagram, explain whether (2π + 2π) cycloaddition photochemical reaction would be suprafacial or antarafacial by giving suitable example. **(04)**
(c) Cholestan-3β,5α,6β-triol forms monocathylate. Give the explanation for the statement with structures. **(03)**

Q3. (a) Attempt the following conversions : **(04)**
(i) Tartaric acid to imidazole-4,5-dicarboxylic acid **(ii)** Pyridine to 3-nitropyridine
(iii) Benzoyl styrene to 2,4,6-triphenyl pyrimidine **(iv)** Indole to 3-Formylindole
(b) Using synthon approach devise scheme for synthesis of Ibuprofen. **(04)**
(c) Explain advantages of "Biocatalysis" in green chemistry and give one suitable example of biocatalyst used in the green reaction. **(03)**

Q4. (a) Draw structures of products formed in the following reactions: **(03)**

(i) (2E,4Z,6E)-2,4,6-octatriene $\xrightarrow{h\nu}$

(ii) (2E, 4E) -2,4-hexadiene $\xrightarrow{\triangle}$

(iii) 

(b) Draw structures of products formed for the following reactions **(any eight)** : **(08)**

i. Thiophene $\xrightarrow{conc.HNO_3}$

ii. Furan + Maleic anhydride $\xrightarrow{\triangle}$

iii. Pyrrole $\xrightarrow{EtOK,\ CHCl_3}$

iv. Pyridine $\xrightarrow{peracetic\ acid}$

v. 6-Hydroxymethylquinoline $\xrightarrow{Vapour\ phase\ bromination}$

vi. 8-bromoisoquinoline $\xrightarrow{NaNH_2,\ \triangle}$

vii. Indole $\xrightarrow{HCN,\ HCl}$

viii. Imidazole $\xrightarrow{oleum,\ 100^oC}$

ix. Pyrimidine $\xrightarrow{PhMgBr,\ Ether}$

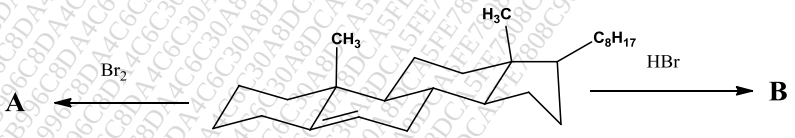
Q5.(a) Write the following reactions with mechanism (**any two**): **(04)**

i) Hantzsch synthesis
ii) Skraup synthesis
iii) Hinsberg synthesis for thiophene

(b) Give reasonable explanation for the following (**any five**) : **(05)**

i) Pyrimidine (pKa: 1.30) is much less basic than pyridine (pKa: 5.2).
ii) Pyrrole is a weak base
iii) Indole undergoes electrophilic substitution at 3-position.
iv) Cholestan-3β,5α,6α-triol forms dicathylate
v) Furan and pyrrole are aromatic
vi) Nucleophilic substitution in pyridine takes place at 2 and 4 position

(c) Identify A and B from the following reaction **(02)**

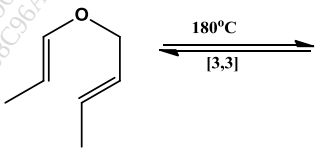


Q6. (a) Draw resonating structures for the following : **(04)**

(i) Furan (ii) Quinoline (iii) Pyrimidine (iv) Indole

(b) (i) In sigmatropic reactions 5-methylcyclopentadiene rearranges to 1- methyl cyclopentadiene and not 2-methylcyclopentadiene. Justify with mechanism. **(03)**

(ii) Complete the following reaction **(01)**



(c) Suggest the retrosynthetic pathway, synthons and synthetic equivalents for the following target molecule. **(03)**