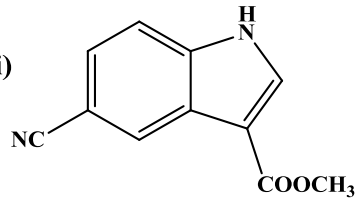
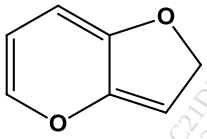
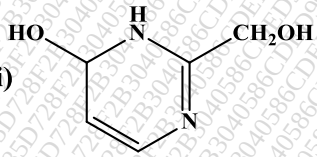
(3 Hours)

N.B.: 1. All Questions are compulsory. **Total Marks: 70**
2. Figures to right indicate full marks.

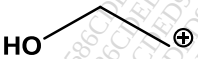
Q1. A. Give IUPAC nomenclature of the following compounds: (**03**)

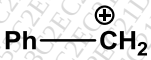
(i) 

(ii) 

(iii) 

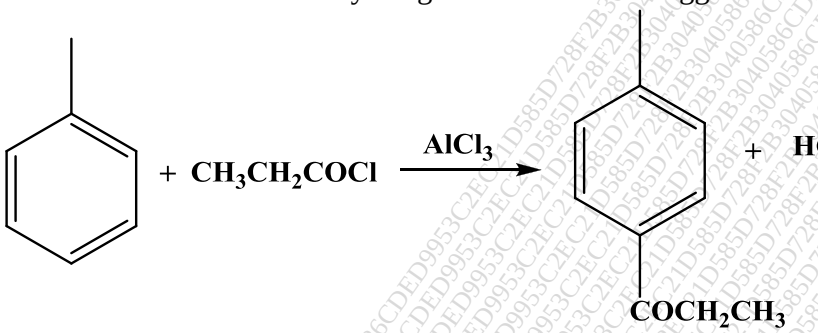
B. Explain why pyrimidine ring is resistant to electrophilic attack under normal conditions. (**02**)

C. Give synthetic equivalent for the synthon: 

and 

(02)

D. Calculate Atom Efficiency for given reaction and suggest alternatives for greener reaction: (**02**)



Atomic wt.: C=12, O=16, Cl= 35.5, H=1

E. Answer the following: (**03**)
(i) Give an example of Cope rearrangement reaction.
(ii) Give names of two solid acid catalysts used in green chemistry.
(iii) Write structure of product formed on hydrohalogenation of Androst-9(11)-ene.

F. Give structures of the following: (**03**)
(i) 5α-Estrane (in chair form). (ii) 2,3-seco-5β-androstan-2,3-dioic acid.
(iii) 5β-cholestane-3β,6β-diol (in chair form).

Q2. A. Write complete mechanism for the following (any two): (**04**)
(i) Knorr pyrrole synthesis. (ii) Madelung synthesis. (iii) Bischler Napieralski

B. Using orbital diagram explain thermal cycloaddition of 1,3-butadiene with 2-propenenitrile is symmetry allowed . (**04**)

C. Compare classical Aldol condensation with greener approach along with its merits. (**03**)

Q3. A. Attempt the following conversions (any four): (**04**)
(i) Benzil to 2,4,5-triphenylimidazole
(ii) 4-bromopyridine to 3,4-pyridyne
(iii) Quinoline to Pyridine-3-carboxylic acid
(iv) Imidazole to 2,4,5-tribromoimidazole
(v) 2,4-dihydroxypyrimidine to 2,4-dihydroxy-5-nitropyrimidine

B. Using synthon approach devise an economical scheme for synthesis of paracetamol. (**04**)

C. Discuss greener alternatives of classical MPV reduction. (**03**)

{TURNOVER

Q4. A. Write structures of products formed for the following reactions: (**03**)

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

(ii) cis-3, 4-dimethyl cyclobutene $\xrightarrow{h\nu}$

(iii) Benzyne + Maleic anhydride $\xrightarrow{\triangle}$

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

(i) Pyrimidine $\xrightarrow{aqNH_2NH_2\ ,\ 130^oC}$

(ii) 2-bromoimidazole $\xrightarrow{NaSH}$

(iii) Pyridine $\xrightarrow{KNO_3,\ conc.\ H_2SO_4\ ,\ 300^oC}$

(iv) Thiophene $\xrightarrow{NBS}$

(v) Furan $\xrightarrow{HCN\ \&\ HCl,\ AlCl_3}$

(vi) Quinoline $\xrightarrow{peracetic\ acid}$

(vii) Pyrrole $\xrightarrow{CO_2\ ,\ CHCl_3\ ,\triangle}$

(viii) Isoquinoline $\xrightarrow{conc.\ H_2SO_4\ ,\ 220^oC}$

(ix) Indole $\xrightarrow{Sn,\ HCl}$

Q5. A. Draw resonating structures of: (i) Pyrrole (ii) Isoquinoline (iii) Pyrimidine (**03**)

B. Answer the following questions with suitable justification **(08)**

(i) Which is the preferred position for nucleophilic substitution in Quinoline?
(ii) Which product is formed on cathylation of cholestan-3β,5α,6β-triol?
(iii) Compare the rate of oxidation of 5α-cholestan-2α-ol with 5α-cholestan-2β-ol.
(iv) Pyrrole is less basic than pyridine.

Q6. A. Write complete mechanism for: (i) Hantzsch pyridine synthesis. (ii) Skraup synthesis. (**04**)

B. (i) Predict the products formed when 5-methyl-1,3-cyclopentadiene undergoes [1,5]-H sigmatropic shift at room temperature. (**02**)

(ii) Using orbital diagram depict the thermal Claisen sigmatropic rearrangement (**02**)

C. Predict the economical retrosynthetic & synthetic pathway for 3-cyclohexenecarboxylic acid. (**03**)

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