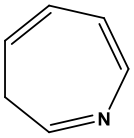
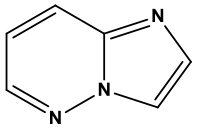
Q. P. Code: 20759

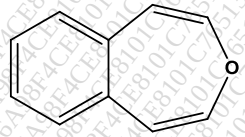
N.B.: 1. All Questions are compulsory **Time: 3 Hours** **Total Marks: 70**

2. Figures to right indicate full marks

Q. 1 A) Nomenclate the following heterocycles as per IUPAC rules **(03)**

(i) 

(ii) 

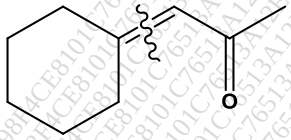
(iii) 

B) Explain Conrotatory motion with a molecular orbital diagram. **(02)**

C) Justify the statement, Imidazole is more basic than pyridine **(02)**

D) Draw the structure of 5α-progestane. Depict its ring numbering and chiral centers. **(02)**

E) Illustrate two strategies for disconnection of the following target molecule. **(02)**



F) Define Atom economy and calculate the Atom economy for the following reaction. **(02)**

G) Write any one reaction catalyzed by solid acids like zeolite **(01)**

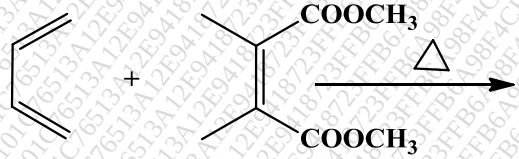
H) Write bromination reaction of 5β-cholestane-3-one **(01)**

Q2. A. Explain the mechanism for **(Any 2)** (i) Radziszewski imidazole synthesis (ii) Bischler-Napieralski Reaction (iii) Fischer Indole Synthesis **(04)**

B. Complete the following reactions and predict the products formed stereochemically **(Any 2)** **(04)**

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

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

(iii) 

C. Discuss the advantages of green catalytic hydrogenation reactions using two examples. **(03)**

Q3. A. Attempt the following chemical conversions. **(04)**

(i) Furan to furfural (ii) Pyridine to 2-aminopyridine

(iii) 2,4,6-trichloropyrimidine to pyrimidine (iv) Pyrrole to pyrrolidine

B. Design the scheme for retrosynthesis and synthesis of ibuprofen or sulfadiazine. **(04)**

C. Discuss advantages of "Biocatalysis" in green chemistry and give suitable examples **(03)**

Q4. A. Complete the following reactions **(08)**

(i) Indole $\xrightarrow{HCHO,\ Me_2NH,\ H_2O,\ 0°C}$

(ii) Furan $\xrightarrow{C_4H_9Li}$

(iii) Pyridine $\xrightarrow{Oleum,\ HgSO_4,\ 230°C}$

(iv) Pyrimidine $\xrightarrow{NH_2NH_2}$

(v) Thiophene $\xrightarrow{Ac_2O,\ H_3PO_4}$

(vi) Quinoline $\xrightarrow{alk\ KMnO_4}$

(vii) Isoquinoline $\xrightarrow{Br_2,\ AlBr_3}$

(viii) Imidazole $\xrightarrow{H_2SO_4,\ SO_3,\ 100°C}$

B. What is the difference between suprafacial and antarafacial cycloaddition in orbital symmetry. Support your answer by giving (4+2) and (2+2) thermal cycloaddition reactions. **(03)**

Q5.A. Answer the following **(Any 3)**: (**06**)

i) Write the oxidation products of isoquinoline

ii) Why thiophene is more aromatic than pyrrole and furan?

iii) Compare and justify rate of oxidation of 5α-cholestane-3α-ol and 5α-cholestane-2β-ol.

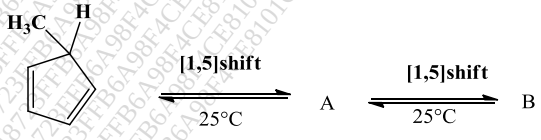
iv) Explain why 5α-cholestane-3β-ol gets rapidly hydrolyzed than 5α-cholestane-3α-ol

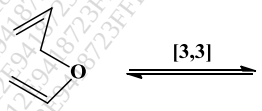
B. Write complete mechanism for **(Any 2)**: (i) Hantzsch synthesis (ii) Knorr pyrrole synthesis (iii) Paal Knorr Synthesis for thiophene (**04**)

C. Write the oxidation product of pyridine **(01)**

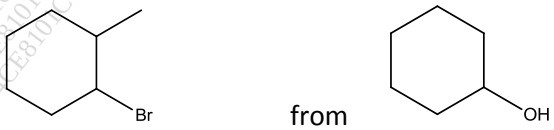
Q.6.A. Draw suitable resonating structures for (i) Imidazole (ii) Pyridine iii) Thiophene iv) Pyrrole **(04)**

B. Complete the following reactions with mechanisms **(04)**

(i) 

(ii) 

D. Predict the economical retrosynthetic and synthetic pathway for the following target molecule **(03)**



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