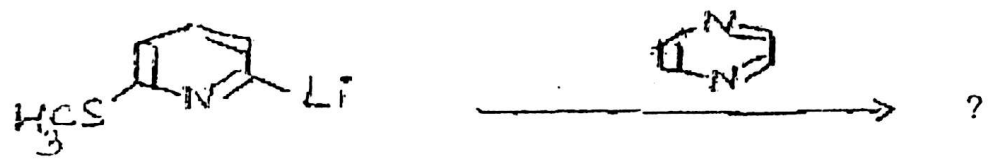
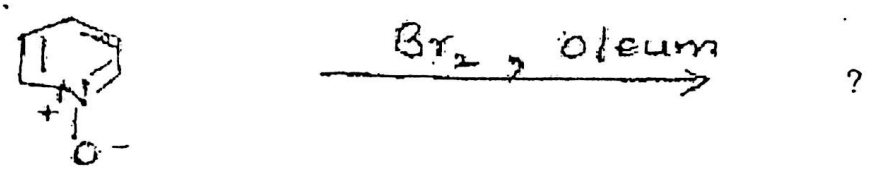
(2½ Hours) [Total Marks : 60

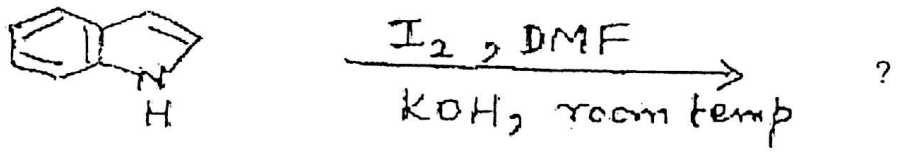
N.B. : (1) All questions are **compulsory**.
(2) **Figures** to the **right** indicate **full** marks.

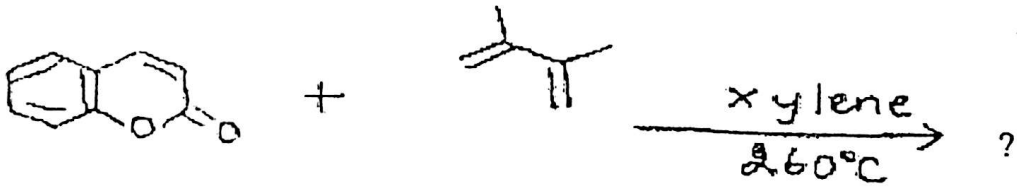
Q.1 Answer any two of the following :— **8**

(i) Complete the following reactions :—

(I) 

(II) 

(III) 

(IV) 

(ii) (I) Give the synthesis of pyrimidines from
(A) 1, 3 – dicarbonyl compound
(B) 1, 3, 5 – triazine

(II) Give reason : The diazines show more resistance to electrophilic substitution than pyridine.

(iii) Give two methods of synthesis of isoquinoline.

(iv) (I) Give Traube synthesis of purines.

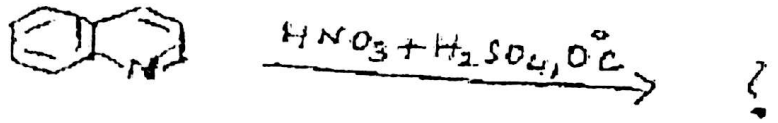
(II) What is the action of the following reagents –

(A) CH_3I, CH_3OH, 100°C on purine,

(B) H_2N-NH_2, room temp. on 6 – chloropurine ?

(c) Answer any **one** of the following :— **4**

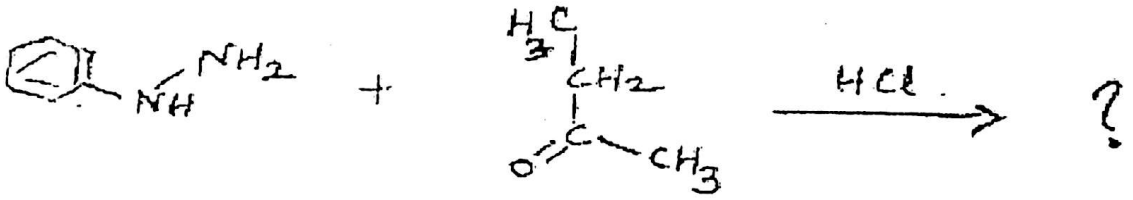
(i) Complete the reaction given below :—



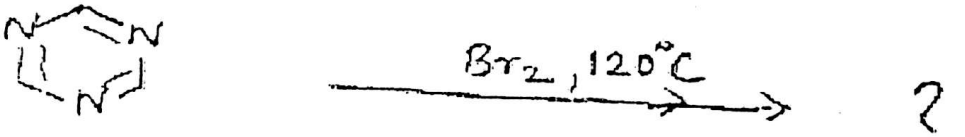
Give the mechanism and explain the regioselectivity.

(ii) Complete the following reactions.

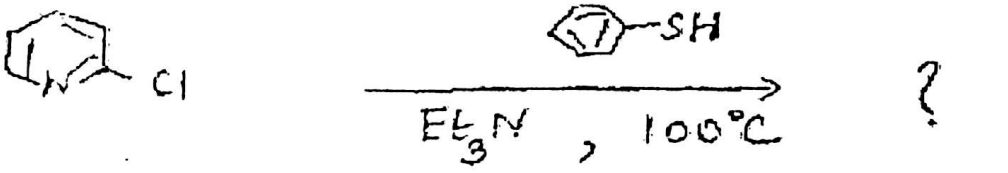
(I)



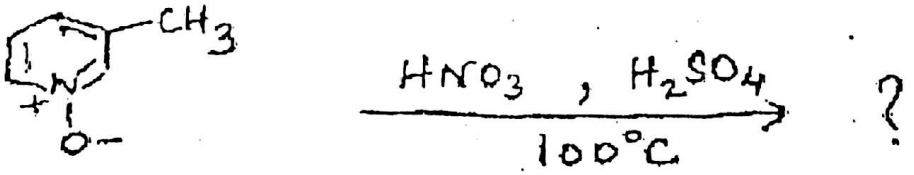
(II)



(III)



(IV)



(a) Answer any two of the following :— 8

(i) Discuss the occurrence, biological role and structural features of corticosteroids.

(ii) Write a note on steroidal alkaloids.

(iii) Draw the structure of testosterone. How is 16-DPA synthesised from a plant sapogenin ?

(iv) Give the synthesis of androsterone from 16-DPA.

(b) Answer any one of the following :— 4

(i) How is 16-DPA converted to oestrone ?

(ii) Give the structure of 5α - cholanic acid. How will you synthesise jasmolone ?

4. Answer any two of the following :— 8

(i) (I) How are vitamins classified ?

(II) Give the synthesis of Vitamin B_2 from 3, 4 – dimethylaniline and D (–) ribose as starting materials.

(ii) (I) State the sources and biological importance of Vitamin B_{12}.

(II) Outline the synthesis of Vitamin B_1.

(iii) State the biological importance and give the synthesis of–

(I) α – tocopherol

(II) Vitamin K.

(iv) Give the synthesis of penicillin – G from D – penicillamine.

(b) Answer any one of the following :— 4

(i) Discuss the structure of Cephalosporin C based on its degradation studies.

(ii) Briefly describe the sources, biological importance and the synthesis of Vitamin B_6.

5. Answer any two of the following :— 8

(i) Discuss off-resonance decoupling in ^{13}C–NMR spectra of any two compounds.

(ii) Sketch the proton decoupled spectrum, DEPT - 135, DEPT - 90 and DEPT - 45 of the compound (2 – methyl – 1 – propanol) using ^{13}C–NMR value δ ppm: 69·3, 30·7 and 18·7.

(iii) Explain HETCOR technique with a suitable example.

(iv) Sketch the COSY spectrum of ethyl acetate.

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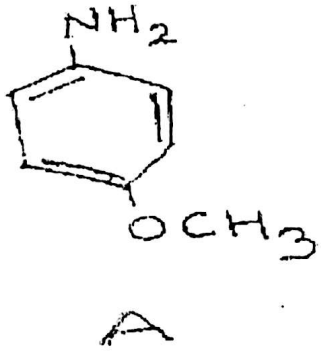
(c) Answer any one of the following :— 4

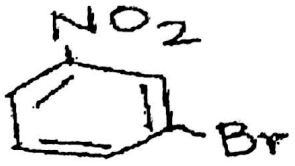
(i) What is ESR spectroscopy ? Discuss its principle. State the applications of NMR spectroscopy in the field of medical science.

(ii) Assign ^{13}C-NMR Chemical shift to all the aromatic carbons using the chemical shift correlation table given below, for the compounds A and B.



A

and

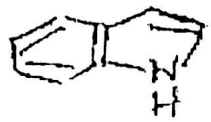


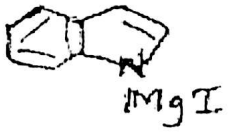
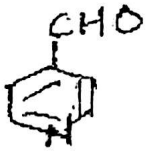
B

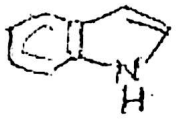
Substituent	Increments in ppm			
	ipso	ortho-	meta-	para
NH_2	19·2	−12·4	1·3	−9·5
OCH_3	31·4	−14·4	1·0	−7·7
$-NO_2$	19·6	−5·3	0·9	6·0
Br	−5·4	3·4	2·2	−1·0

5 Answer any four of the following :—

(a) Complete the following reations :—

(i)  1) CH_2O, $(CH_3)_2NH$, H_2O, 0°C ; 2) H_2O, Δ → ?

(ii)  +  → ?

(iii)  1) n.BuLi, THF, −70°C ; 2) CO_2 → ?

(b) Give any two methods of synthesis of coumarin.

(c) Give the synthesis of muscone.

(d) How is 16-DPA converted to progesterone ?

(e) State the sources and biological properties of rotenoids. Draw the structure of rotenone.

(f) Give the synthesis of Pyrethrin – I

(g) The following chemical shifts were observed in the ^{13}C-NMR of p-methyl anisole, δ 20, 55 and 157 ppm. Match the chemical shifts with the appropriate carbons. Justify your answer.

(h) Discuss the applications of fluorescence spectroscopy.
