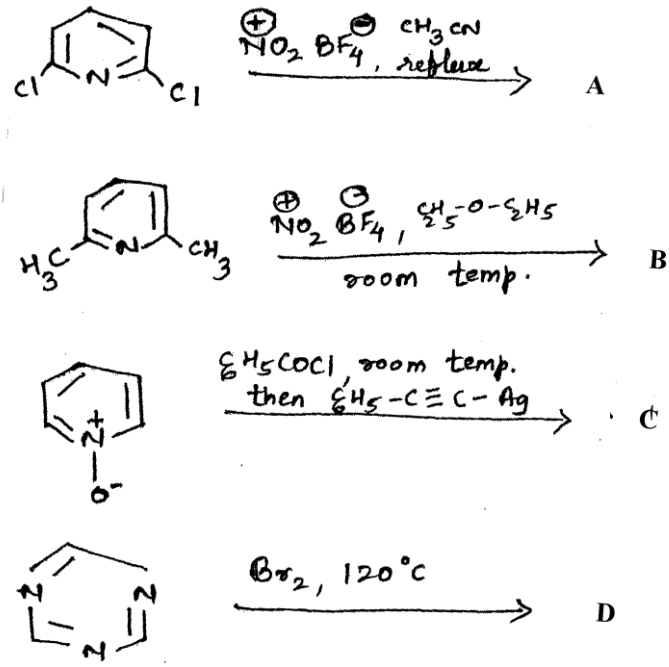
[Time: 3 Hours] **[Marks: 100]**

Please check whether you have got the right question paper.

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

1. (a) Attempt **any two** of the following :- **08**

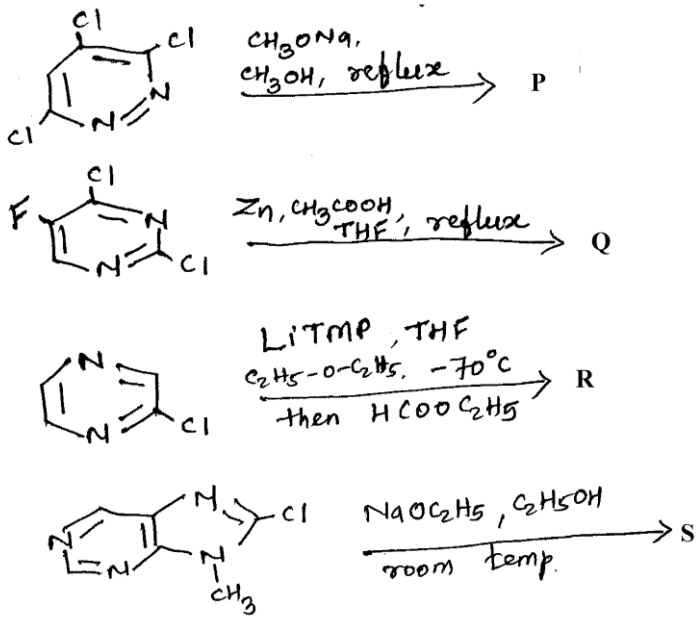
i) Complete the following reactions by identifying A, B, C, D.



ii) (I) Give Bischler Napieralski synthesis of isoquinoline.
(II) Explain : Electrophilic substitution in quinoline and isoquinoline takes place preferentially in the carbocyclic ring usually at positions 5 and 8.

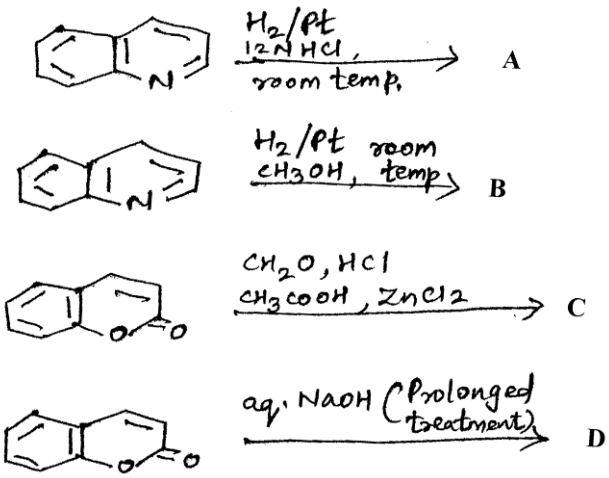
iii) (I) Give synthesis of Indole by Reissert method.
(II) Explain: Pyridine-N-oxide undergoes both electrophilic and nucleophilic substitution reactions.

iv) Complete the following reactions by identifying A, B, C, D.



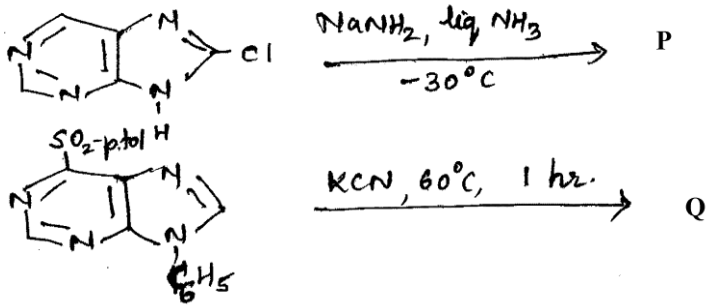
(b) Answer **any one** of the following :- **04**

i) (I) Complete the following reactions by identifying A, B, C, D.



ii) I) Give Traube synthesis of Purines.

(II) identify P & Q in the following reaction.



2. (a) Answer **any two** of the following :- **08**

i) Give the occurrence, biological role and structural features of sterol.

ii) Write a note on steroidal alkaloids.

iii) Draw the structure of progesterone. How is 15-DPA synthesized from a plant sapogenin?

iv) Give the synthesis of testosterone from 16-DPA.

(b) Answer **any two** of the following :- **04**

i) How is 16-DPA converted to Oestriol?

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

3. (a) Answer **any two** of the following :- **08**

i) How are vitamins classified? Give the synthesis of Vitamin B_1?

ii) State the biological importance and give the synthesis of Vitamin K and α-tocopherol

iii) State the sources and biological importance of Vitamin B_{12}. How will you prepare Vitamin B_2 by using 3,4-dimethyl aniline and D(-) ribose?

iv) Give the synthesis of *teri*-butyl phthalimidemalonaldehyde. How is penicillin-G synthesized from D-penicillamine?

(b) Answer **any one** of the following:- **04**

i) How wil you establish the nature of side chain, position of double bond and presence of acetoxy group in cephalosporin-C?

ii) Briefly describe the sources, biological importance and the synthesis of Vitamin B_6 by using ethoxuacetylacetone and cynoacetamide.

4. (a) Answer **any two** of the following :- **08**

i) Calculate the ^{13}C NMR chemical shifts for all the aromatic carbons using incremental shifts of the aromatic carbon atoms from the table given below for the following compounds.

(I) 4-chloroaniline (II) 3-bromophenol

Substitute	**Increments in ppm**			
	Ipso	*Ortho*	*Meta*	*Para*
OH	+26·6	-12·7	+1·6	-7·3
NH_2	+19·2	-12·4	+1·3	-9·5
Cl	+6·4	+0·2	+1·0	-2·0
Br	-5·4	+3·4	+2·2	-1·0

ii) Explain COSY technique with a suitable example.

iii) Draw a schematic diagram of the HFTCOR spectrum of 2-pentanone.

iv) The following chemical shifts were observed in the ^{13}C NMR spectrum of toluene.
δppm : 137·83, 129·99, 128·28, 125·38, 21·41
Match the chemical shifts with the appropriate carbons and justify your answer.

(b) Answer **any one** of the following :- **04**

i) Explain the principle of fluorescence spectroscopy. Give the application of NMR in medicine.

ii) Complete the following table by using notation up, down & O

DEPT	-C-	1(CH)	2 (CH_2)	3 (CH_3)
135				
90				
45				

Illustrate utility of DEPT experiments to deduce structure of iso amyl acetate.

5. Answer **any four** of the following :- **12**

(a) What is the action of Zn/HCl, Li/NH_3 and Pt/CH_3COOH on indole?

(b) Explain : 2-and 4-halopyridines are very reactive in nucleophilic substitution reactions.

(c) Discuss the applications of ESR spectroscopy.

(d) Match the columns

A	**B**
I. COSY	(a) Coupling constant
II. HETCOR	(b) Reference standard
III. ESR	(c) 'H-'H correlation
	(d) ^{13}C-'H correlation
	(e) absorption of microwave radiation by unpaired electron

(e) How is exaltone synthesized?

(f) State the sources and biological properties of rotenoids. Draw the structures of rotenone.

(g) Give the synthesis of Pyrethrin-I.

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