(2½ Hours) **(Total Marks : 60)**

Please check whether you have got the right question paper.

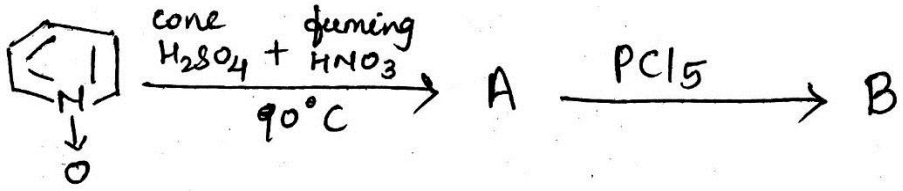
N.B.: **1)** **All** questions are **compulsory**.

2) **Figure** to the **right** indicate **full marks**.

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

i) I) Give Hantzsch synthesis of pyridine.

II) Complete the following reactions by identifying A and B :



ii) Explain :

I) Electrophilic substitution in quinoline and isoquinoline takes place in homo cyclic ring.

II) Pyrazine has zero dipole moment however, pyridazine has very high dipole moment.

iii) Give following conversions :

I) Resorcinol to coumarin.

II) 1, 3, 5-Triazine to pyrimidine.

iv) Give reason :

I) Electrophilic substitution in indole takes place at 3-position.

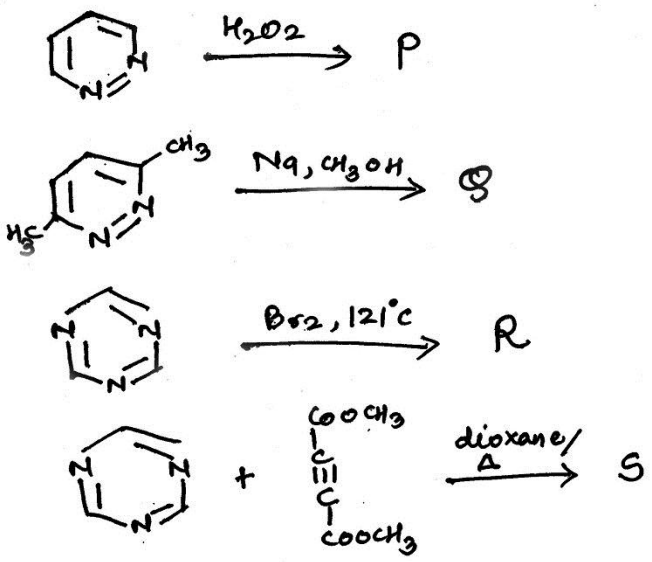
II) Discuss nucleophilic substitution reactions of diazines.

1. (b) Attempt **any one** of the following : **(04)**

i) I) Give Pictet – Spengler synthesis of isoquinoline.

II) Explain : Purines undergo nucleophilic substitution reactions mainly in the six membered ring.

ii) Complete the following reactions by identifying P, Q, R and S :



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

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

ii) Write a note on steroidal alkaloids.

iii) How is 16-DPA synthesized from cholesterol?

iv) How is androsterone synthesized from 16-DPA?

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

i) How is 16-DPA converted to oestrone?

ii) Give the occurrence of sterols. How is cinerolone synthesized?

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

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

II) Give the synthesis of Vitamin B_2 from 3, 4-dimethylaniline and D (-) ribose.

ii) I) Explain the biological importance of Vitamin B_6.

II) How will you prepare Vitamin B_6 by using ethyl ester of N-formyl-DL-alanine?

iii) I) How are the antibiotics classified based on their activity?

II) Outline the steps involved in the synthesis of phenoxymethyl penicillin.

iv) I) State the sources and biological importance of (A) Biotin (B) Vitamin K_1.

II) Give the synthesis of α-tocopherol.

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

i) Describe the degradation products of penicillin-G.

ii) Give the synthesis of Vitamin B_1.

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

i) What is DEPT? Illustrate the utility of DEPT experiments to deduce the structure of 2-methylpent-2-ene-1-oic acid.

ii) Calculate 13 C-NMR chemical shift for all the aromatic carbons using the incremental shifts of the aromatic carbon atoms in the table given below for the following compounds :

I) *m*-nitro acetophenone

II) *p*-nitro benzaldehyde.

Substitute	**Increments in ppm**			
	ipso	***ortho***	***meta***	***para***
- $COCH_3$	+7.8	-0.4	-0.4	+2.8
- CHO	+8.2	+1.2	+0.6	+5.8
- NO_2	+19.6	-5.3	+0.9	+6.0

iii) Draw a schematic diagram of COSY spectrum of n-propyl acetate.

iv) Deduce the structure of the compound having molecular formula C_9H_8O from the following spectral data :

UV	=	248 nm (E = 15000)
IR (cm^{-1})	=	3600, 3020, 2820, 1675, 1625, 1450
^{1}HNMR (δ ppm)	=	6.7 (dd), 7.45 (m), 9.7 (d)
^{13}CNMR (δ ppm) (off resonance decoupling constants)	=	128.2 (d), 128.5 (d), 129.0 (d), 131.1 (d), 134.1 (s), 152.5 (d), 193.5 (d)

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

i) Explain HETCOR technique with suitable example.

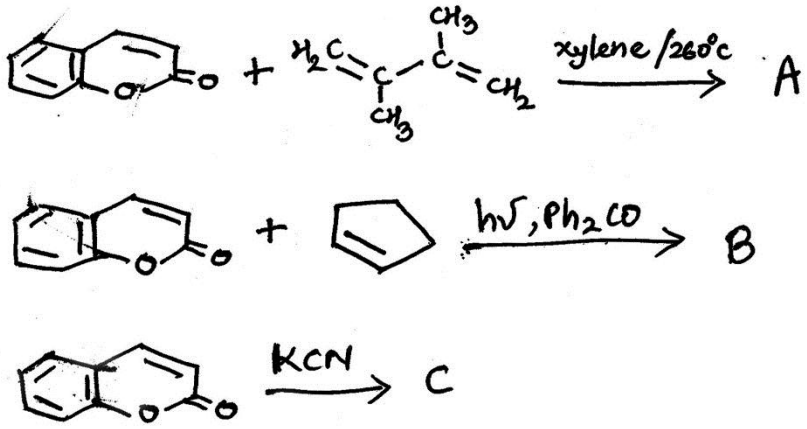
ii) I) Explain the principle of Fluorescence spectroscopy.

II) Discuss the applications of ESR spectroscopy.

5. Attempt **any four** of the following : **(12)**

a) Explain : 2-and 4-methyl pyridines are more acidic than 3-methyl pyridine.

b) Complete the following reactions :



c) Write the synthesis of muscone.

d) Outline the synthesis of progesterone from 16-DPA.

e) i) State the sources and biological importance of pyrethrum.

ii) Draw the structure of pyrethrin-1.

f) Give the biological properties of Estrogens i) How is oestrone is converted to oestriol.

g) Explain NOESY technique with suitable example.

h) How will you distinguish between the three isomers of dichlorobenzene on the basis of their proton decoupled ^{13}C NMR spectra?

———————