

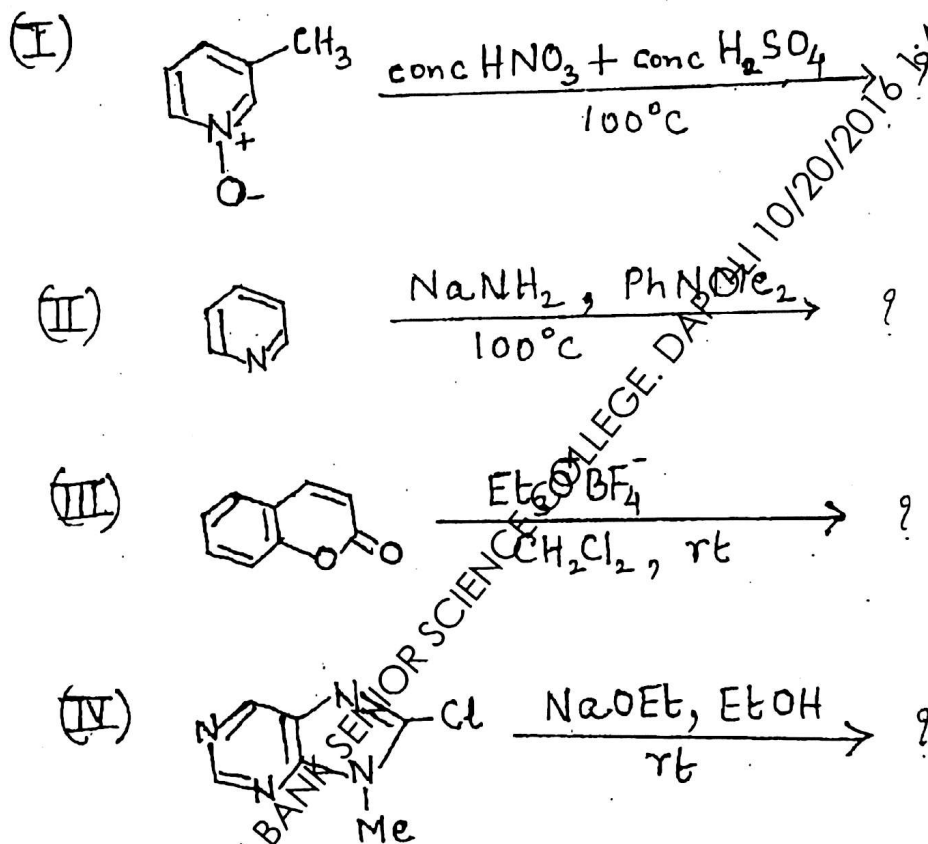
QP Code : 76703

(2½ Hours)

[Total Marks : 60

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

1. (a) Answer any two of the following :-
 (i) Complete the following reactions :-



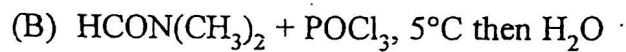
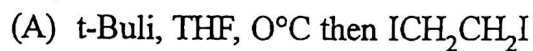
- (ii) Give two methods of synthesis of pyrimidine and discuss its electrophilic substitution reactions.
- (iii) How is quinoline synthesised by
 (I) Doebner-Miller synthesis
 (II) The Friedlander synthesis?
 Also explain, its reactivity towards nucleophiles.
 (I) Give Traube synthesis of purine.
 (II) Explain the following :-
 (A) Electrophilic substitution in indole takes place at 3-position.

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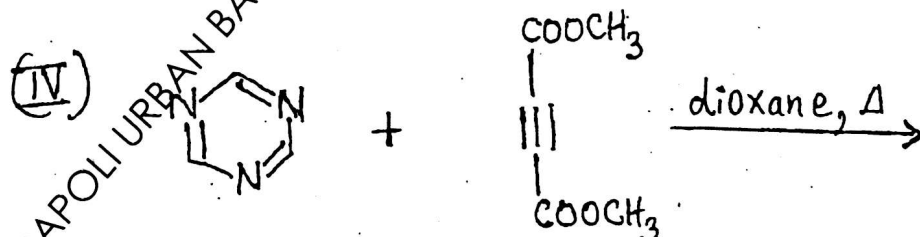
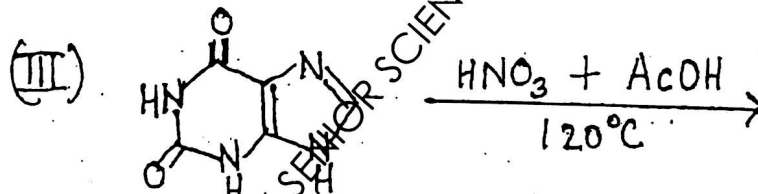
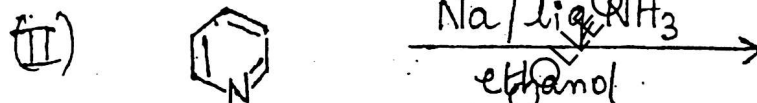
- (B) The diazines are weaker bases than pyridine
 (C) The 1-position in isoquinoline is strongly activated than 3-position for a nucleophilic attack.

(b) Answer any one of the following :-

- (i) (I) Give any two methods of synthesis of indole.
 (II) What is the action of the following reagents on N-methylindole?



(ii) Complete the following reactions :-



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

(i) Give the occurrence, biological role and structural features of steroidal hormones.

(ii) Discuss the general structure of steroids. Give the occurrence and biological functions of bile acid.

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- (iii) How is 16-DPA synthesised from cholesterol?
 (iv) Give the synthesis of androsterone from 16-DPA.

(b) Answer any one of the following :-

- (i) How is 16-DPA converted to oestadiol?
 (ii) Write the synthesis of jasmolone. Give the structure of solasodine.

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

- (i) Write the degradative evidences to establish the structure of penicillin.
 (ii) State the biological importance of folic acid and give the synthesis of vitamin B₂.
 (iii) State the sources and biological importance of (I) vitamin K₁ (II) vitamin D and give the synthesis of vitamin K₁ from 2-methyl-1, 4-naphthaquinone and phytol.
 (iv) Give the synthesis of vitamin B₆ from ethoxyacetylacetone and cyanoacetamide.

(b) Answer any one of the following :-

- (i) Give the synthesis of (I) D-penicillamine and (II) tert-butylphthalimide malonaldehyde. How is penicillin synthesised from these compounds?
 (ii) Give the synthesis of vitamin B₁ along with the preparation of one intermediate used in the synthesis.

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

- (i) Explain the COSY technique with a suitable example.
 (ii) Sketch the proton decoupled ¹³C NMR spectrum and DEPT spectra of the following compounds:
 (I) 2-chloroethanol
 (II) diethyl phthalate
 (iii) Draw a schematic diagram of the HETCOR spectrum of iodobutane.

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

- (I) 2-bromoanisole
 (II) 1,3-dinitrobenzene

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Substituent	Increments in ppm			
	<i>ipso</i>	<i>ortho</i>	<i>meta</i>	<i>para</i>
Br	-5.4	3.4	2.2	-1.0
OCH ₃	31.4	-14.4	1.0	-7.7
NO ₂	19.6	-5.3	0.9	6.0

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

(i) An organic compound has the molecular formula C₉H₁₆O. Identify the compound and justify your answer using the spectroscopic data given below :

IR : 1740 cm⁻¹

¹H NMR : δ 0.75 (t, 3H), 0.85 (t, 6H), 1.8 (m, 2H), 3.15 (t, 1H) and 4.1 (q, 4H) ppm.

¹³C NMR : δ 11, 13, 21, 53, 61 and 170 ppm.

(ii) Explain the principle of fluorescence. Give the application of NMR in medicine.

5. Answer any four of the following :-

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(a) Give two methods of preparation of coumarin. What is the action of CH₃MgBr on coumarin?

(b) How will you prepare pyridazine from a 1,4-dicarbonyl compound? Explain giving an example its reactivity towards nucleophiles.

(c) How is exaltone synthesised?

(d) Write the synthesis of progesterone.

(e) Give the synthesis of pyrethrin-I.

(f) Give the sources and biological importance of tocopherols and give the synthesis of α-tocopherol

(g) The following chemical shifts were observed in the ¹³C NMR of butylethyl ether, δ 13.5, 15.0, 19.4, 32.1, 66.0 and 70.1 ppm.

Match the chemical shifts with the appropriate carbons and justify your answer.

(h) Discuss the applications of ESR spectroscopy.