

Sem-IV - Oct - 2015

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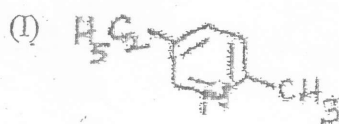
QP Code: 15839

(2½ Hours)

[Total Marks : 60

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

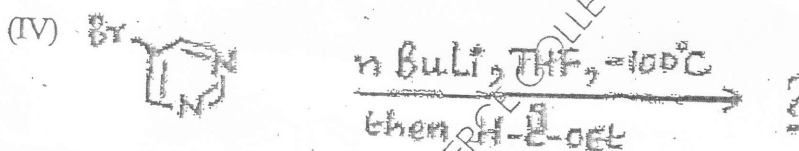
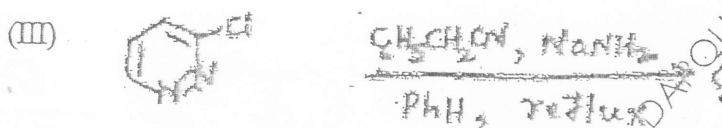
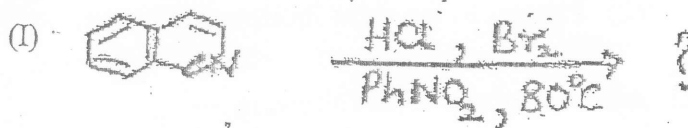
1. (a) Answer any two of the following :—
(i) Complete the following reactions :—



- (ii) (I) Discuss nucleophilic substitution reactions of diazines.
(II) Explain : 2-and 4-halopyrimidines are very reactive in nucleophilic substitution reactions.
(iii) Give any two methods of synthesis of quinoline.

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(iv) Complete the following reactions :



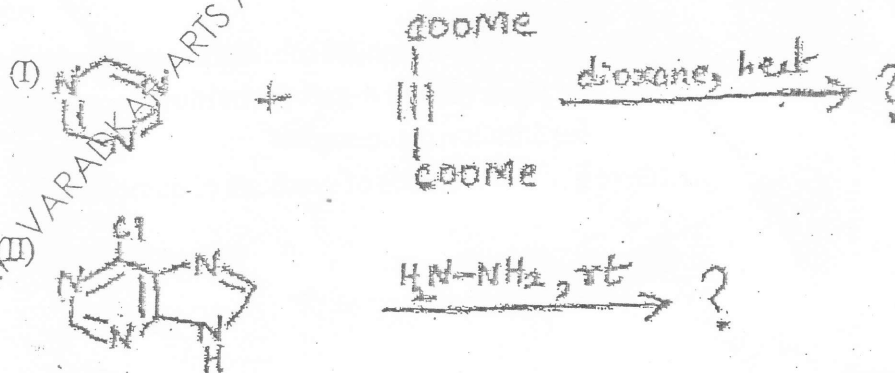
(b) Answer any one of the following :—

(i) How is indole synthesised by —

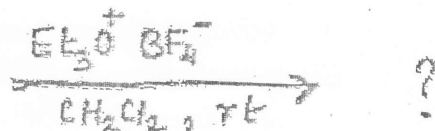
(I) Fischer-Indole synthesis

(II) Reissert synthesis

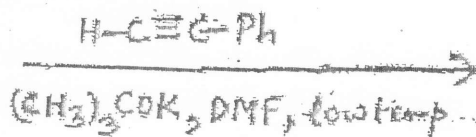
(ii) Complete the following reactions :



(III)



(IV)



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

- (i) Give classification and biological role of sex hormones. What are the structural features of androgens?
- (ii) Write a note on steroidal alkaloids.
- (iii) How is 16-DPA synthesised from cholesterol?
- (iv) Give the synthesis of testosterone from 16-DPA.

(b) Answer any one of the following :—

- (i) How will you bring about the conversion of 16-DPA to oestradiol?
- (ii) Give the occurrence of corticosteroids. How is cinnarone synthesized?

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

- (i) (I) State the sources and biological importance of folic acid.
(II) Give the synthesis of Vitamin B₁.
- (ii) (I) Explain the biological importance of Vitamin B₆.
(II) Using ethoxyacetylacetone and cyano acetamide as starting materials how will you prepare Vitamin B₆?
- (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) Vitamin C
(B) Vitamin D.
(II) Give the synthesis of α-tocopherol.

(b) Answer any one of the following :—

- (i) Describe the degradation products of penicillin.
- (ii) Give the synthesis of Vitamin B₂ from 3, 4-dimethylaniline and D(–) ribose.

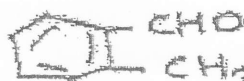
4. (a) Answer any two of the following :—

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- (i) Explain the principle of DEPT experiment. List its applications.
- (ii) Indicate the number of ^{13}C -NMR signals in the proton decoupled spectrum and assign the multiplicity for each signal in the off-resonance decoupled spectrum for the following compounds :
 - (I) 1, 2, 2-trichloro propane
 - (II) 2-butanone.
- (iii) Explain COSY technique with a suitable example.
- (iv) The ^{13}C -NMR spectrum of 3-octanone in C_6D_6 at 298K exhibits the following signals :
 δ ppm : 7.8, 14.0, 22.7, 23.7, 31.7, 35.4, 42.1 and 209.0.
 and the ^1H NMR spectrum of 3-octanone in C_6D_6 at 298K exhibits the following signals :
 δ ppm : 0.80(t), 0.92(t), 1.11(m), 1.19(m), 1.47(m), 1.92 and 1.94 (partly overlapped)
 Sketch the HETCOR spectrum of the above compound using the data given.

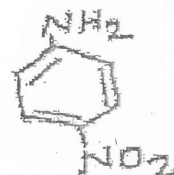
(b) Answer any one of the following :—

- (i) Explain the principle of fluorescence spectroscopy. Give the application of NMR spectroscopy in medicine.
- (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 -
-CHO	8.2	1.2	0.6	5.8
-NO ₂	19.6	-5.3	0.9	6.0
-NH ₂	19.2	-12.4	1.3	-9.5
-CH ₃	9.3	0.7	-0.1	-2.9

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5. Answer any **four** of the following :—

- (a) How is coumarin synthesised using —
(i) Pechmann's synthesis
(ii) o-hydroxybenzaldehyde and acetic anhydride.
- (b) What is the action of the following reagents on quinoline ?
(i) H_2 | Pt, CH_3OH , room temp. and pressure.
(ii) H_2 | Pt, 12N HCl, room temp. and pressure.
(iii) Same as (ii) but longer reaction time.
- (c) Write the synthesis of exaltone.
- (d) Outline the synthesis of progesterone from 16-DPA.
- (e) (i) Draw the structure of cephalosporin C.
(ii) Give the sources and biological importance of (I) Biotin
(II) Vitamin K₁.
- (f) (i) State the sources and biological properties of pyrethrums.
(ii) Draw the structure of pyrethrin -I
- (g) Predict the structure for a compound having molecular formula $C_6H_{12}O_2$ which gives a strong peak in its IR spectrum at 1740 cm^{-1} . The 1H NMR spectrum shows only two singlets including one at $\delta\ 3.5\text{ ppm}$. The ^{13}C -NMR spectrum shows signals at $\delta\ 27, 37, 52$ and 179 ppm .
- (h) Give applications of ESR spectroscopy.