Q.P. Code : 09241

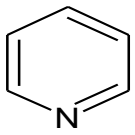
[Time: 2½ Hours] **[Marks: 60**

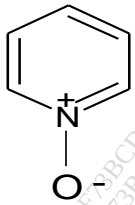
Please check whether you have got the right question paper.

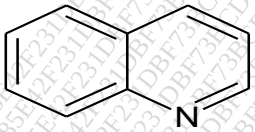
N.B: 1) All questions are compulsory
2) Figures to the right indicate full marks

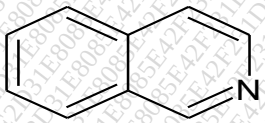
Q. 1 (a) Answer any **two** of the following :- **08**

i) Complete the following reactions:

(I)  H_2O_2 / CH_3COOH, 65 °C

(II)  Br_2 ,Oleum , 70 °C

(III)  H_2 / Pt, 12 M HCl

(IV)  Fuming HNO_3, Conc. H_2SO_4 , 0 °C

ii) (I) How is quinoline synthesized by Skraup method?
(II) Explain electrophilic substitution reactions in pyridine take place preferably at position-3.

iii) (I) Pyridazine does not undergo electrophilic substitution, comment.
(II) Give the synthesis of pyrimidine from 1,3-dicarbonyl compound.

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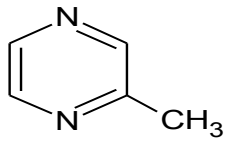
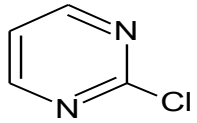
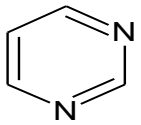
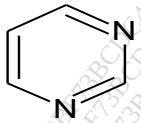
iv) Complete the following reactions :-

(I)  $\xrightarrow{Cl_2 / CCl_4 , 40\ ^\circ C}$

(II)  $\xrightarrow[\text{Benzene , room temp.}]{(CH_3)_3N}$

(III)  $\xrightarrow{\text{aq. } N_2H_4 , 130\ ^\circ C}$

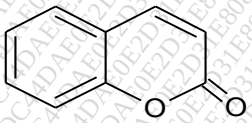
(IV)  $\xrightarrow[\text{room temp.}]{CH_3I , CH_3OH}$

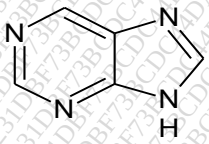
Q. 1 (b) Answer any **one** of the following :- **04**

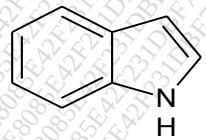
i) (I) Give Fischer synthesis of indole.

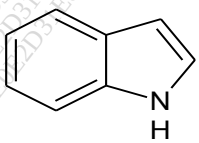
(II) Explain, electrophilic substitution in indole takes place at 2 or 3-position.

ii) Complete the following reactions:

(I)  $\xrightarrow[(C_2H_5)_2O , 0\ ^\circ C]{CH_3MgI}$

(II)  $\xrightarrow{D_2O , 100\ ^\circ C}$

(III)  $\xrightarrow[\text{Heat}]{(CH_3CO)_2O / CH_3COONa}$

(IV)  $\xrightarrow[H_2O, 0\ ^\circ C]{CH_2O / (CH_3)_2NH}$

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

i) What are sterols? How are they classified? Explain the structure and stereochemistry of cholesterol.

ii) Discuss the occurrence, structures and biological function of bile acids.

iii) How is 16-DPA synthesized from cholesterol?

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

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

i) How is testosterone synthesized from 16-DPA?

ii) Give the synthesis of cinerolone. Give the structure of oestriol.

Q. 3 Answer any **two** of the following :- **08**

i) Give the classification of antibiotics on the basis of activity.
Write the synthesis of D-penicillamine.

ii) Write the degradative evidences to establish the structure of penicillin-G.

iii) Give an account of acid hydrolysis of cephalosporin- C under different conditions.

iv) Write the synthesis of vitamin B_1.

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

i) State the biological importance of α-tocopherol and write its synthesis.

ii) Briefly describe the sources and biological importance of (I) folic acid and (II) Biotin.

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

i) An organic compound has the molecular formula C_7H_9N. Identify the compound and justify your answer using the spectroscopic data given below:
IR (cm^{-1}) : 3500-3300 (doublet), 1600 (s), 1575 (s), 1450(s), 1260(s) and 830 (s).
^1H NMR : δ 2.2 (3H), 3.45 (2H) and 6.81 (4H, pair of doublets) ppm.
^{13}C NMR: δ 22, 115.0, 127.7, 130.0 and 143.7 ppm.

ii) What is meant by the off-resonance decoupled spectrum in NMR spectroscopy? Explain it with the reference to (I) Butanone and (II) 2-methyl propan-2-ol

iii) Explain the COSY technique with a suitable example.

iv) 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) Resorcinol (II) 1,4 – diaminobenzene.

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Substituent	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

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

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

ii) Draw a schematic diagram of the HETCOR spectrum of 2-hexanone.

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

a) What is the action of the following on 1,3,5-triazine:

i) CH_3 OOC-C ≡ C-$COOCH_3$ in dioxan, heat.

ii) 1,2 diaminobenzene at 160^0C.

iii) Br_2 at 120^0C?

b) How is coumarin prepared by i) Perkin synthesis ii) Pechmann synthesis?

c) Give the synthesis of exaltone.

d) How is 16-DPA converted to progesterone?

e) Give the synthesis of pyrethrin-I.

f) State the biological properties of vitamin B_6. Draw the structure of rotenone.

g) Explain the NOESY technique.

h) Discuss the applications of Fluorescence spectroscopy.