Q.P. Code : 09243

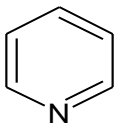
[Time: 2½ Hours] **[Marks: 60**

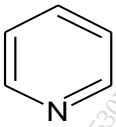
Please check whether you have got the right question paper.

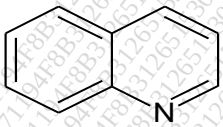
N.B: 1) All questions are compulsory
2) Figures to the right indicate full marks

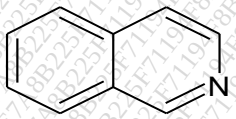
Q. 1 (a) Answer any two of the following :- **08**

i) Complete the following reactions:

(I)  $\xrightarrow[300\ °C\ /\ 24\ Hours]{conc.\ HNO_3\ /\ conc.\ H_2SO_4}$

(II)  $\xrightarrow{Hg(OOCCH_3)_2}$

(III)  $\xrightarrow{30\%Oleum\ ,\ 90\ °C}$

(IV)  $\xrightarrow{KMnO_4\ /\ NaOH}$

ii) (I) Give reason : Pyridine N-oxide is more reactive in electrophilic substitution than pyridine.
(II) Give the Pomeranz-Fritsch synthesis of isoquinoline.

iii) (I) Explain : Pyridazine doesnot undergo electrophilic substitution.
(II) Give the synthesis of pyridazine from 1,4-dicarbonyl compound.

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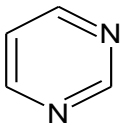
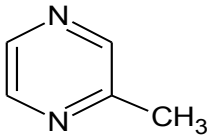
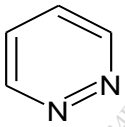
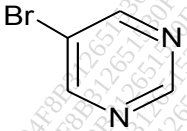
iv) Complete the following reactions :-

(I)  aq. N_2H_4 , 130 °C →

(II)  1) $Hg(Si\ Me_3)_2$ → 2) CO_2

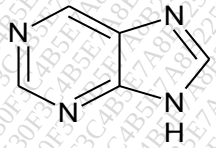
(III)  C_6H_5CHO → LDA, $(C_2H_5)_2O$ / -10 °C

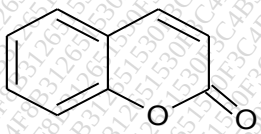
(IV)  1) n-BuLi / $(C_2H_5)_2O$ → 2) $KMnO_4$ / $(CH_3)_2CO$

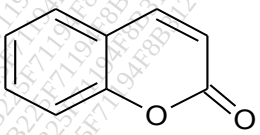
(b) Answer any **one** of the following :- **04**

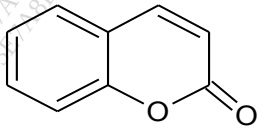
i) How is purine synthesized by I) Traube synthesis II) 4,5- diaminopyrimidine

ii) Complete the following reactions.

(I)  CH_3I / CH_3OH, 100 °C →

(II)  hν / Benzophenone → Cyclopentene

(III)  $LiAlH_4$, $(C_2H_5)_2O$ →

(IV)  1) CH_2O / HCl → 2) CH_3COOH , $ZnCl_2$

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

i) Write a note on corticosteroids.

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

iii) How is 16-DPA synthesized from plant sapogenin. Give the structure of allocholanic acid.

iv) How is testosterone synthesized from 16-DPA?

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

i) How is 16-DPA converted to oestradiol?

ii) Give the synthesis of jasmolone. Explain the stereochemistry of oestriol.

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

i) Give the synthesis of *tert*-butyl phthalimide malonaldehyde. How is penicillin-G synthesized from D-penicillamine and *tert*-butyl phthdimide malonaldehyde?

ii) Write the degradative evidences to establish the structure of DL-penicillamine and *tert*-butyl phthalimide malonate.

iii) Write the degradative evidences to establish the structure of cephalosporin-C.

iv) How are vitamins classified? Give the synthesis of vitamin B_2.

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

i) State the biological importance of vitamin K_1 and write its synthesis.

ii) Briefly describe the sources and biological importance of (I) Vitamin C and (II) Vitajmin B_{12}.

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

i) An organic compound has the molecular formula $C_8H_8O_3$. Identify the compound and justify your answer using the spectroscopic data given below:
IR (cm^{-1}) : 2980 (d,s), 1675 (s), 1600 (s), 1450(s), 1320 (m) , 1250 (s), 1040 (m) and 835 (m).
^1H NMR : δ 3.85 (s), 6 to 8.5 (Shows pair of doublets) and 11.52 ppm.
^{13}C NMR: δ 56.0, 114.0, 122.9, 131.0, 167.2 and 172.0 ppm.

ii) Discuss the applications of ESR spectroscopy. Give the application of NMR in medicine.

iii) 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) 4-Nitrophenol (II) 2 – Bromo aniline

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Substituent	Increments in ppm			
	ipso	*ortho*	*meta*	*para*
NO_2	19.6	-5.3	0.9	6.0
OH	26.6	-12.7	1.6	-7.3
Br	-5.4	3.4	2.2	-1.0
NH_2	19.2	-12.4	1.3	- 9.5

iv) Explain the HETCOR technique with a suitable example.

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

i) What is DEPT? Illustrate utility of DEPT experiments to deduce the structure of *trans*—methyl cyclopentanol.

ii) Draw a schematic diagram of the COSY spectrum of 3-heptanone.

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

a) How is coumarin prepared by i) Perkin synthesis ii) Pechmann synthesis.

b) (i) Explain : Electrophilic substitution in indole takes place at 2-or 3-position.

(ii) Explain : 1-position in isoquinoline is strongly activated than 3-position for a nucleophile attack.

c) Give the synthesis of muscone.

d) How is 16-DPA converted to progesterone?

e) Give the sources and biological importance of folic acid. Write the biological properties of rotenoids.

f) Give the synthesis of pyrethrin – I.

g) Explain ROESY technique.

h) Discuss Principle of fluorescence spectroscopy.

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