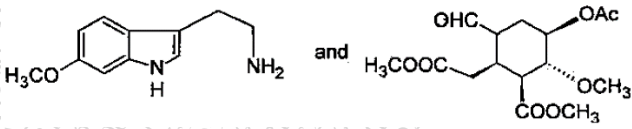


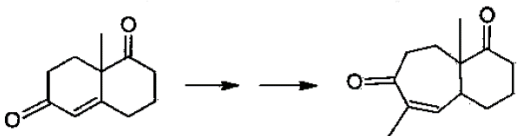
[2½ Hours]

[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

1. A. Attempt **any two** of the following : 8
 - i) Explain structural features and applications of Starch and Chitin.
 - ii) Give structural features and biological importance of
 - i) Porphyrin
 - ii) Anthocyanin
 - iii) I. Give analytical evidence to prove presence of n-propyl side chain in coniine
II. Give physiological importance and structure of Morphine
 - iv) Give the synthesis of grandisol from 2-methyl-1, 3-butadiene
 - B. Attempt **any one** of the following : 4
 - i) Write a note on
Deoxy sugars
Branched sugars
 - ii) Draw the structure of β -carotene. How will you prove the following in the structure of β -carotene?
the presence of conjugated double bonds
the presence of two β -ionone units and
the presence of bicyclic structure.
 2. A. Attempt **any two** of the following : 8
 - i) How is reserpine synthesized from the following compounds?
- 

The image shows two chemical structures. On the left is 5-methoxytryptamine, consisting of an indole ring with a methoxy group at the 5-position and a 2-aminoethyl side chain. To its right is the word 'and'. On the right is a substituted cyclohexane ring. It has a formyl group (CHO) at position 1, an acetoxy group (OAc) at position 2, a methoxycarbonyl group (COOCH3) at position 3, and a methoxycarbonylmethyl group (CH2COOCH3) at position 4.
- ii) Outline the steps involved in the following conversion as a part of Longifoline synthesis.
- 

The image shows a chemical reaction. The starting material is a bicyclic ketone, specifically 2-methyl-2,3,4,5-tetrahydronaphthalen-1-one. It has a six-membered ring fused to a five-membered ring, with a ketone group at position 1 and a methyl group at position 2. An arrow points to the product, which is a tricyclic ketone, specifically 2-methyl-2,3,4,5,6,7-hexahydro-1H-benzofuro[3,2-b]pyridine-1-one. It has a benzene ring fused to a five-membered ring, which is further fused to a six-membered ring, with a ketone group at position 1 and a methyl group at position 2.
- iii) Give Gilbert-stork synthesis of Griseofulvin from phloroglucinol.
 - iv) Give analytical evidence for the structure elucidation of PGE₁.
- B. Attempt **any one** of the following : 4
 - i) (I) Write structure of Taxol
(II) Give the synthetic strategy for synthesis of Caryophyllene.
 - ii) Give a brief account gibberellic acids as plant growth regulators and give its applications.

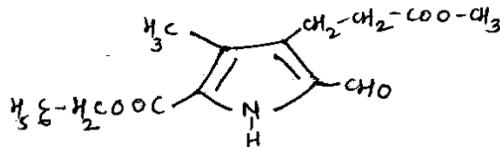
3. A. Attempt **any two** of the following :

8

- Using spin system notations designate the type of spin system in the following compounds:
 1,1,2,2-tetrachloro ethane 1,2,4-tetrachlorobenzene
 1,1,2,3,3-pentachloropropane 2,5-dichloronitrobenzene
- What are chemical shift reagents? Explain the use of shift reagents in NMR spectroscopy.
- Calculate ^{13}C NMR chemical shifts for all the aromatic carbons using incremental shifts of the aromatic carbon atoms from the table given below for the following compounds
 1-bromo-3-nitrobenzene and 1-chloro-3-iodobenzene

Substitute	Increments in ppm			
	<i>ipso</i>	<i>ortho</i>	<i>meta</i>	<i>para</i>
NO_2	19.6	-4.9	0.9	6.0
Cl	5.3	0.4	1.4	-1.9
Br	-5.4	3.4	2.2	-1.0
I	-31.2	8.9	1.6	-1.1

- assign the various peaks seen in the ^1H NMR spectrum of the following compounds.



δppm : 2.15 (s, 3H), 2.31 (t, 2H), 2.78 (t, 2H), 3.38 (s, 3H), 5.18 (5, 2H), 7.18 (s, 5H), 9.58 (s, 1H)

B. Answer **any one** of the following :

4

- Explain the term double resonance in NMR spectroscopy. Discuss its use in simplifying complex NMR spectra.
- Explain ^{13}C proton decoupled spectrum of
 (I) CFBr_3 (II) $\text{CH}_3\text{PO}(\text{OCH}_3)_2$ on the basis of hetero nuclear coupling of ^{13}C to ^{19}F and ^{13}C to ^{31}P respectively.

4. A. Attempt **any two** of the following :

8

- Explain HETCOR technique with suitable example.
- Sketch the proton decoupled ^{13}C NMR spectrum and DEPT-45, DEPT-90, DEPT-135 spectra of the following compounds.
 (I) Ethyl propionate (II) 1-methyl butyl acetate
- Explain NOESY technique with suitable example.
- An organic compound with molecular formula $\text{C}_4\text{H}_{10}\text{O}$
 IR (cm^{-1}) 3500 (broad), 3000
 ^1H NMR (δppm): 3.28 (2H, d) 1.68 (1H, m) 0.83 (6H, d) 2.95 (1H, s)
 Deduce the structure of the compound and draw its COSY spectrum.

B. Answer **any one** of the following:

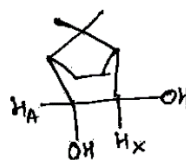
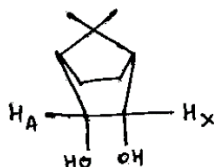
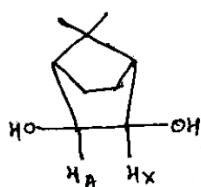
4

- What is NOE? What is its significance? Explain with suitable examples.
- An organic compound shows following spectral data
M.F. $C_6H_{12}O$
IR (cm^{-1}) : 1739, 1230
 1H NMR (δ ppm) 2.1, 2.4, 1.6, 1.3, 0.9
 ^{13}C NMR (δ ppm) 208.93, 43, 30, 26, 22, 14
Deduce the structure and draw its HETCOR spectrum.

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

12

- Write the structures of Starch and cellulose and Bombykol
- Give the synthesis of ubiquinone from 3, 4, 5-trimethoxyacetophenone
- What are the Insect Growth Regulators? Give structure of JH₃.
- What are lipids? Discuss their classification.
- How will you distinguish amongst the following compounds on the basis of NMR spectroscopy?



- State whether the following statements are true or false and justify your answer.
 - Cyclohexanone exhibits only 4 peaks in its ^{13}C NMR spectrum.
 - A shift reagent leads to simplification of the spectra.
 - At room temp 1H NMR spectrum of cyclohexane shows only a single peak
- Sketch and explain HETCOR spectrum of propyl acetate
- Match the columns and justify your answer.

A	B
HETCOR	Determination of stereochemistry
COSY	^{13}C - 1H correlation
DEPT	1H - 1H correlation
	Identification of CH, CH ₂ , CH ₃ protons