

Total Pages—4

(Set-1)

M.Sc. - 4th(IC)

Natural Product and Spectroscopy - II

Full Marks : 70

Time : 3 hours

Q. No. 1 is compulsory and answer any five from the rest

The figures in the right-hand margin indicate marks

1. Answer the following questions : 2×10

- (a) What is Zeisel's method ?
- (b) How will you know the presence of phenolic group in alkaloid ?
- (c) What is isoprene rule ?
- (d) Explain, acetylenic proton is more shielded than ethylenic proton.
- (e) How will you distinguish inter and intra molecular hydrogen bonding by NMR ?

(Turn Over)

(2)

- (f) Aldehydic proton appears at down field in the NMR spectrum, explain.
- (g) What do you mean by nitrogen rule ?
- (h) What is meant by base peak ?
- (i) Suggest m/z value of base peak of toluene.
- (j) Explain, the molecular ion peak of highly branched compounds is often not visible in mass spectrum.
2. Discuss the synthesis of cholesterol. 10
3. Show with experimental evidences :
(a) Morphine contains cyclic tertiary base system. 3
(b) Morphine contains a phenanthrene unit. 7
4. Elucidate the structure of abietic acid. 10
5. (a) Describe briefly theory of NMR. 7

(3)

- (b) Which of the following do not exhibit NMR ? 3
 ${}^6\text{C}^{12}$, ${}^8\text{O}^{16}$, ${}^7\text{N}^{14}$, ${}^7\text{N}^{15}$, ${}^1\text{H}^2$, ${}^6\text{C}^{13}$, ${}^{15}\text{P}^{31}$
6. (a) What do you mean by chemical shift ? Describe the factors influencing the process. 6
(b) Write a note on Nuclear Overhauser effect. 4
7. (a) Discuss McLafferty rearrangement. 4
(b) Determine the possible structure of the compound which gives signal at m/z values of 74, 43 and 31 (base peak) 4
(c) How will you characterise a primary amine by studying mass spectrum ? 2
8. Deduce the possible structure of an organic compound from the following spectral data : 10
(i) Molecular formula : $\text{C}_8\text{H}_{16}\text{O}$
(ii) UV λ_{max} : 280 nm ($\epsilon_{\text{max}} = 15$)

(4)

(iii) IR : 1715 cm^{-1} .

(iv) NMR δ in PPM : 2.25(2H,t), 2.05 (3H,S)
1-1.60(8H,m) : 0.9 (3H, t)

(v) Mass m/z : 128, 113, 85, 71, 58, 43 (100%)