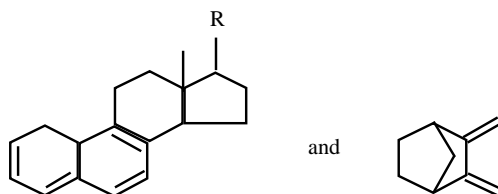




Notes : 1. All questions are compulsory and carry equal marks.

1. a) i) Explain the Fiesher-Woodward rule for the calculation of λ_{\max} in dienes. Calculate the λ_{\max} value for the following compounds. 8



- ii) State and explain principle of Beer-Lambert Law. Give its limitations.

- b) i) Explain basic principle of photoelectron spectroscopy. 8
 ii) Explain Koopman Theorem.

OR

- c) Explain various factor affecting Electronic transition. 4
 d) Explain application of uv-visible spectroscopy in structure determination. 4
 e) Discuss Auger electron spectroscopy. 4
 f) Explain the Frank-Condon principle 4

2. a) Explain basic principle of NMR in detail: with instrumentation. 8
 b) Explain following 8
 i) Shielding and deshielding ii) Factor affecting chemical shift.

OR

- c) Discuss the effect of substituents on ^{13}C -NMR spectra. 4
 d) Explain the effect of deuterium on NMR spectra. 4
 e) Discuss the basic principle of ^{19}F -NMR. 4
 f) How the value of coupling constant use to differential isomers. 4

3. a) i) Explain Nuclear overhauser effect ii) Explain quadrupole nuclei. 8
 b) i) A compound with molecular mass 112 is transparent in the ultraviolet spectrum. In the IR-spectrum, it shows two bands. 2941 cm^{-1} (m) and 1464 cm^{-1} (m). In NMR, it forms a singlet at 8.42τ . Determine its structure. 8
 ii) Molecular weight = 100
 uv : $\lambda_{\max} 274\text{ m}\mu$ $\epsilon_{\max} 2050$.
 IR : 3031 (v) , 2941 (w) , 1725 (s) , 1608 , 1504 (w) , 1060 (s) and $830\text{ cm}^{-1}\text{ (s)}$.
 NMR :- i) Singlet 7.65τ (3H), ii) Singlet 6.18τ (3H) Unsymmetrical pattern $2.15\text{--}2.8\tau$ (4H)

OR

- c) Explain the DEPT technique in detail. 4
- d) Give the application of nuclear quadrupole resonance (NQR) spectroscopy in structural determination. 4
- e) Molecular formula : C_3H_7NO 4
- a) UV : $238m\mu$ ϵ_{max} 10500
- b) IR : 3428(m), 2941 – 2857(w) 1681(s)
and $1452cm^{-1}$ (w)
- c) NMR: i) 1.87 τ singlet (1H)
ii) 7.30 τ singlet (3H)
iii) 8.1 τ singlet (3H)
Find structure.
- f) Give the application of NMR technique in medical diagnosis. 4
4. a) Explain Bragg condition. Discuss Laue method for production and detection of X-ray. 8
- b) Derive the Wierl equation of electron diffraction technique. Explain the technique scattering of neutron by solid and liquids. 8
- OR**
- c) Discuss the low energy electron diffraction. 4
- d) Explain Debye-Scherrer method of X-ray structure analysis. 4
- e) Explain the Ramachandran diagram with example. 4
- f) Give the application of neutron diffraction technique. 4
5. a) How will you differentiate Ketones and α , β unsaturated ketones on the basis of uv-visible spectra. 2
- b) What is photoelectric effect. 2
- c) What is the effect of electronegativity on chemical shift. 2
- d) Compare the ^{13}C and 1H NMR spectroscopy. 2
- e) Differentiate between one dimensional and two dimensional NMR spectroscopy. 2
- f) How will you differential between 2-Pentanone and 3-Pentanone on the basis of spectroscopy. 2
- g) Give the application of LEED. 2
- h) What is miller indices. 2
