RAJARATA UNIVERSITY OF SRI LANKA

FACULTY OF APPLIED SCIENCES

B.Sc. in Applied Sciences

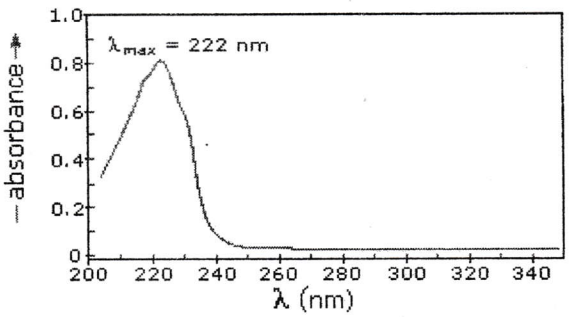
Second Year – Semester II Examination – January / February 2023

CHE 2106 SPECTROSCOPIC METHODS IN ORGANIC CHEMISTRY

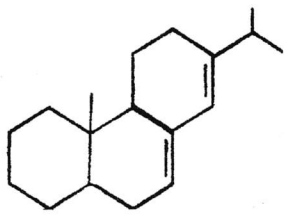
Answer ALL Questions **Time: One (01) hour.**

1. a) Spectroscopic techniques are useful to determine the structural features of molecules. Explain the sentence. (06 marks)

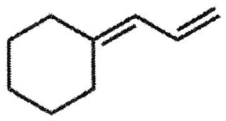
b) The UV spectrum of 2-methyl-1,3-butadiene is given below. Discuss the electronic transitions of the compound. (08 marks)



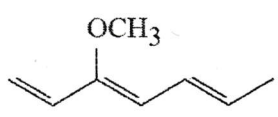
c) Calculate the UV λ_{max} of the following structures using Woodward-Fischer rule. (Basic value for acyclic conjugated enone : 215 nm, heteroannular conjugated system: 214 nm, homoannular conjugated system 253 nm, homodiene component: 39 nm, extended conjugation: 30 nm, Alkyl substitution: 5 nm, Exocyclic double bond: 5 nm, α-substitution: 10 nm, β-substitution: 12 nm, γ -substitution: 18 nm) (16 marks)



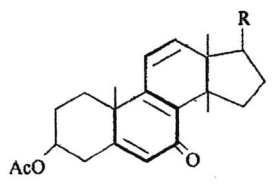
(i)



(ii)



(iii)



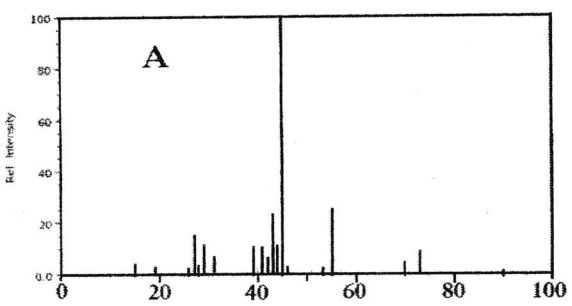
(iv)

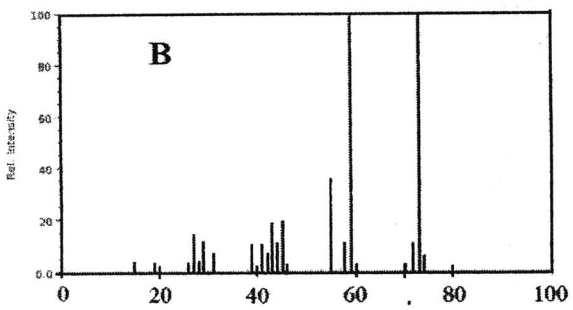
2. a) Write a note on "Quadrupole Mass Analyzer"

(10 marks)

b) Mass spectrums of 2-methyl -2-butanol and 2-pentanol are given below. Discuss the fragmentation and identify the relevant spectra.

(15 marks)



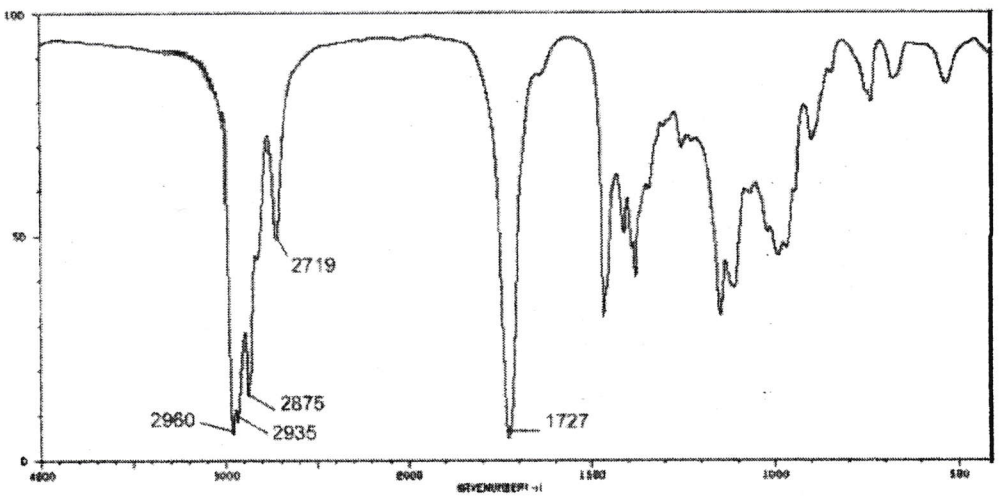


3. (a). Suggest that how infra-red spectroscopy could be used to differentiate 1-hexyne from 3-hexyne. Draw possible IR spectra for both compounds.

(15 marks)

(b). IR spectra of a compound with molecular formular $C_5H_{10}O$ is given below. Draw possible structure/s using IR spectrums.

(10 marks)



(c). Write a short account of H- NMR and draw the ^{13}C- NMR spectrum of ethyl acetate

(20 marks)

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