KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS
2019/2020 ACADEMIC YEAR

FOURTH YEAR SECOND SEMESTER
SUPPLEMENTARY EXAMINATIONS

FOR THE DEGREE OF BACHELOR OF SCIENCE

COURSE CODE: SCH 431

COURSE TITLE: NATURAL PRODUCTS CHEMISTRY

DATE: 8/02/21 **TIME:** 11 – 1 Pm

INSTRUCTIONS TO CANDIDATES:

TIME: 2 Hours

Answer **question ONE** and **any TWO** of the remaining

1(a) Describe the molecular ion peak in mass spectrometry [2mks]

(b) Explain the principle behind UV absorption in UV spectroscopy [4mks]

(c) Compare bend and stretch vibrations IR spectroscopy [4mks]

(d) With a specific example, explain the concept of chemical shielding in NMR spectroscopy [4mks]

(e) Describe charge transfer transitions in UV spectroscopy [4mks]

(f)Describe the matrix assisted laser desorption ionization (MALDI) [4mks]

(g) Describe the concept of ring currents in NMR spectroscopy [4mks]

(h) [4mks]

QUESTION TWO (20 Marks)

2(a)Explain the field ionization techniques in mass spectrometry [6mks]

(b) Illustrate retro Diels-Alder fragmentation in mass spectrometry [2mks]

(c) Below is a mass spectrum of an organic compound whose structure is indicated on the spectrum.

simplified mass spectrum of 2-methylbutane - $CH_3CHCH_2CH_3$ with CH_3
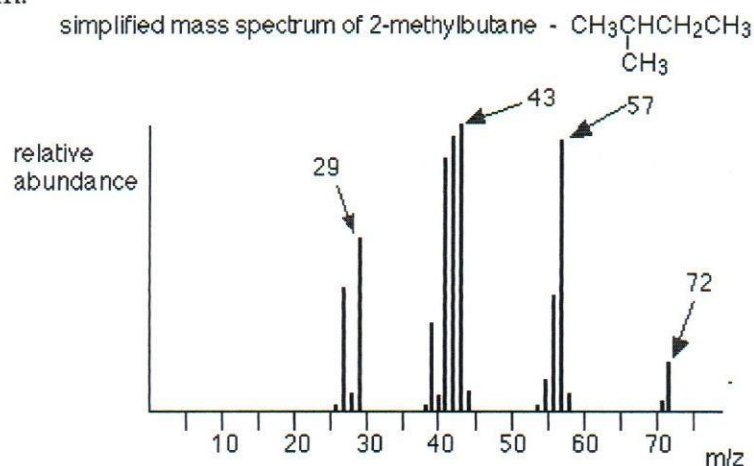
(c) Give structures of fragment ions associated with M/Z values, 29, 43, 57, 72 [6mks]

(d) Explain the nitrogen rule in mass spectrometry [6mks]

QUESTION THREE (20 Marks)

3(a) Explain the principles behind the following spectroscopic techniques [4mks]
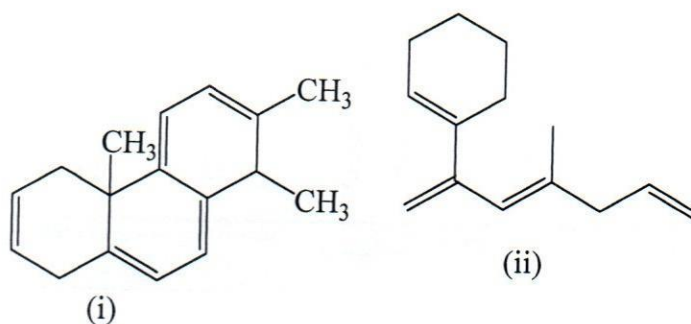(i) UV spectroscopy
(ii) IR spectroscopy

(b) Explain a "forbidden" transition in UV spectroscopy   [2mks]

(c) Explain the working principle of a UV detector   [4mks]

(d) Using woodward-Fieser rules for dienes, determine the maximum absorption wavelength (λ_{max}) of the following compounds   [8mks]

(i)

(ii)

(f) State any two solvents suitable in UV spectroscopy   [2mks]

QUESTION FOUR (20 Marks)

4(a) Discuss the effect of solvent polarity in IR spectroscopy   [6mks]
(b) List any two solvents suitable in IR spectroscopy   [2mks]

(c) The IR spectrum of hexanoic acid is shown below. Identify the functional groups associated with given peaks in the compound   [12mks]