

**W1-2-60-1-6**

**JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY**

**UNIVERSITY EXAMINATIONS 2018/2019**

**YEAR II EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN NUTRACEUTICAL SCIENCE AND TECHNOLOGY**

**AFS 2215: SPECTROPHOTOMETRIC METHODS IN NUTRACEUTICAL CHEMISTRY**

**DATE: APRIL 2019 TIME: 2 HOURS**

**INSTRUCTIONS:** Answer all questions in section A and any two in section B.

SECTION A (30 MARKS)

1. a. Differentiate between Nutraceutical and Functional foods, giving examples in each. (4 marks)

 b. Define spectroscopy and list the major regions of the electromagnetic spectrum, indicating their respective energy transitions. (5 marks)

 c. Distinguish between absorption and emission of radiation. (2 marks)

 d. Discuss the absorption band shifts in Ultraviolet-visible spectroscopy.

 (3 marks)

 e. List the major components of a Mass spectrometer. (5 marks)

 f. Distinguish between electronic and chemical ionization in Mass spectroscopy.

 (4 marks)

 g. Explain the characteristics of a good solvent for sample analysis in the UV-visible spectroscopy. (2 marks)

 h. Define auxochromes and illustrate their effect on absorption bands.(5 marks)

SECTION B ANSWER ANY TWO QUESTIONS

2. a. Discuss the four electronic transitions in molecules that can occur with absorption of ultraviolet visible radiation. (8 marks)

 b. Explain the effect of conjugation on electronic transition of molecules in the UV- visible radiation. (3 marks)

 c. Describe the principles of UV-Visible spectroscopy including the major components of a UV-Visible spectrophotometer. (9 marks)

3. a. Define wavenumber and explain why its preferred in the vibrational infrared region. (2 marks)

 b. Using Methylene group (CH2) and compare their frequencies of vibration.

 (5 marks)

 c. Explain the different regions of an Infrared spectrum (3 marks)

 d. Describe the main components of a Fourier transform (FT) infrared spectrometer and their functions. (10 marks)

4. a. Discuss the components of the Nuclear Magnetic Resonance spectrometer and their function. (10 marks)

 b. Explain the principles of NMR spectroscopy, including the concept shielding and deshielding and their correspondence spectrum. (10 marks)