NATIONAL OPEN UNIVERSITY OF NIGERIA

DEPARTMENT OF PURE AND APPLIED SCIENCES

2020_2 EXAMINATIONS

COURSE CODE: CHM 309 **CREDIT UNIT:** 3
COURSE TITLE: Applied Spectroscopy **TIME:** 3 HRS
INSTRUCTION: ***Answer question 1 and any other 4 questions***

QUESTION 1

(a)Discuss the following factors that affect the absorption of radiation in the UV/visible region

(i) Solvent Effects **(4 marks)**

(ii)Substituent Effects **(4 marks)**

(b) Explain the concept of molecular ion in mass spectroscopy **(4 marks)**

(c) Explain three (3) factors that determin the intensity and energy level of absorption in IR spectroscopy **(3 marks)**

(d) Discuss the concept of chemical ionization in mass spectrometry **(4 marks)**

(e)Explain the term chemical shift in Nuclear magnetic Resonance (NMR) spectroscopy **(3 marks)**

Question 2

(a) Discuss the theoretical basis of Nuclear Magnetic Resonance **(7 marks)**

(b) Explain the spinning Nuclear of hydrogen atom **(3 marks)**

(c) State the universally accepted reference used in the chemical shift measurement. **(2 marks).**

Question 3

(a) Discuss the kinds of transitions exhibited by electrons in a molecule in the UV – visible spectra. **(7 marks)**

(b) Explain the anti-bonding orbitals in a molecule in the UV – visible spectra. **(5 marks)**

Question 4

(a) Show the relationship between absorbance and concentration of the sample as stated in Beer – Lambert law. **(9 marks)**

(b) Explain the relationship between energy of photon and the wavelength. **(3 marks)**

Question 5

(a) Explain positive ion chemical ionization (PICI) as one of the ionization techniques used in GC-MS. **(4.5Marks).**

(b) State the application of LC-MS in drug metabolic studies. **(5 marks)**

(c) state the relationship between the magnetic moment, energy, and frequency. **(2.5 marks)**

Question 6

(a) State the five main components of a typical NMR spectrometer **(7.5 marks)**

(b) Explain the principles behind thermospray as one of the interfaces used in LC-MS **(4.5 marks)**