NATIONAL OPEN UNIVERSITY OF NIGERIA

DEPARTMENT OF PURE AND APPLIED SCIENCES

2021_1 EXAMINATIONS 1234

COURSE CODE: CHM309 **CREDIT UNIT:** 3
COURSE TITLE: Applied Spectroscopy **TIME:** 3 HRS
INSTRUCTION: ***Answer question 1 and any other 4 questions***

Question 1

(a) Explain the [3] types of internal energy that are quantized:(7marks)

(b) Explain the absorption by conjugated chromophores in UV- Visible spectra (4marks)

(c) Explain the principles behind infrared absorption and molecular structure. (3 Marks)

(d) Make a schematic diagram of an atomic absorption instrument. (3.5 Marks)

(e) Explain the relationship between the applied magnetic field and the frequency in Nuclear magnetic resonance (4 .5marks)

Question 2

(a)(i)Explain the spin-spin coupling (or splitting) of dichloroethanal in H-NMR (5 marks)

(ii) Show the proton that will indicate a dublet in dichloroethanal(5 marks)

(b) Predict the signal and relative in lenities of methylene group in CH3CH2Br. (2marks)

Question 3

(a) Sketch a schematic diagram of a UV/Visible spectrophotometer. (4marks)

(b) Discuss the instrumentation in UV/Visible spectrophotometry. (8marks)

Question 4

(a) Discuss the application of IR in Quantitative Analysis (5 marks).

(b) Explain the instrumentation of IR spectroscopy. (7marks)

Question 5

(a) Sketch a schematic diagram of mass spectrometer. (4 marks)

(b) Explain the detection and recording of sample ions in mass spectrometry (8 marks)

Question 6

(a) Discuss the general approach that can be adopted in the interpretation of ^{13}C-NMR spectra.(9 marks)

(b) State three (3) deuterated solvents used in ^{1}H-NMR (3 marks)