NATIONAL OPEN UNIVERSITY OF NIGERIA
UNIVERSITY VILLAGE, PLOT 91 CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESS WAY,
JABI - ABUJA.
FACULTY OF SCIENCES
DEPARTMENT OF CHEMISTRY
2024_2 EXAMINATION

COURSE CODE: **CHM 306**
COURSE TITLE: **INSTRUMENTAL METHODS OF ANALYSIS**
COURSE UNIT: **2**
TIME: **2HOURS**
INSTRUCTION: **Answer question one and any other two questions.**

QUESTION ONE

(1ai) What is polarography? (2 marks)

(1aii) Identify three (3) areas where polarography finds application (3 marks)

(1bi) Define coulometry (2 marks)

(1bii) Mention and briefly explain the two common types of coulometric methods of analysis(14 marks)

(1c) Explain the precautionary measures to be considered when conducting conductometric analysis (9 marks)

QUESTION TWO

(2ai) What do you understand by interference in relation to Flame Atomic Emission and Flame Atomic Absorption?(1 mark)
(2aii) How does chemical interference occur and how can it be mitigated?(3 marks)
(2bi) Define Infrared spectroscopy(2 marks)
(2bii) Briefly discuss the application of Infrared spectroscopy(6 marks)
(2c) Mention the name of the instrument used in IR spectroscopy and briefly describe the following components of the instrument: i. Radiation sourceii.Monochromatoriii. Detector(8 marks)

QUESTION THREE

(3a) Enumerate the three essential parts of a polarimeter and briefly describe each and its importance(9 marks).

(3b) With relevant diagrams, describe the various types of molecular vibrations (11 marks)

QUESTION FOUR

(4a) Enumerate the advantages of X – ray Fluorescence Analysis(4 marks)
(4b) With the aid of a well-labelled schematic diagram, briefly describe the working principle of Flame Atomic Absorption Spectrophotometry (FAAS)(10 marks)
(4c) Highlight theprocedural steps you will follow to run the NMR analysis of ethanol (6 marks)

QUESTION FIVE

(5a) Calculate the corresponding energy of a radiation having a wavelength of 5.0 um. (Planck's constant = 6.63×10^{-34}Js, speed of light = 3×10^{8} m/s) (3 marks).

(5b) List and define the different types of optical methods of analysis (10 marks)

(5c) With a relevant diagram, explain the basic concept of molecular fluorescence (7 marks).