



NATIONAL OPEN UNIVERSITY OF NIGERIA
UNIVERSITY VILLAGE, PLOT 91 CADASTRAL ZONE, NNAMDI AZIKIWE
EXPRESS WAY, JABI - ABUJA.
FACULTY OF SCIENCES
DEPARTMENT OF PURE AND APPLIED SCIENCES
FEBRUARY/MARCH 2018 EXAMINATION

COURSE CODE: CHM 306
COURSE TITLE: INSTRUMENTAL METHODS OF ANALYSIS
TIME: 2 HOURS
INSTRUCTION: Question one is compulsory. Answer question one and any other three questions.

QUESTION ONE

1a) Calculate the concentration of a sample solution whose absorbance and molar absorptivity at 270nm is 1.92 and 19400 respectively. 4 marks

1b) What happens when radiation and matter interact? 6 marks

1ci) Discuss the basic concept of X-ray diffraction method. 7 marks

1cii) Explain briefly Polarography. 4 marks

1dii) State one use of each of the following

- I. Infrared spectroscopy
- II. X-ray diffraction method
- III. Flame Emission and Flame Atomic Absorption Spectroscopy
- IV. Nuclear Magnetic Resonance Spectroscopy 4 marks

QUESTION TWO

2ai Describe briefly the basic principle of Nuclear Magnetic Resonance (NMR) spectroscopy. 7 marks.

2aii) What factor accounts for the difference, in the pattern of NMR spectrum of hydrogens in different organic molecules. 4 marks

2b) Enumerate on the function of the parts of a spectrophotometer. 4 marks

QUESTION THREE

Explain how the concentration of a coloured sample can be estimated by colorimetry.
15 marks

QUESTION FOUR

4ai) What is infrared spectroscopy? 1½ marks

4aii) How would you determine the functional groups present in an organic molecule using infrared spectroscopy? 8 marks

4b) Distinguish between Infrared spectrometer and Fourier Transformer Infrared spectrometer.

4½ marks

QUESTION FIVE

5a) With the aid of a well labelled schematic diagram, expatiate on the working principle of Flame Atomic Absorption Spectroscopy. 10½ marks.

5b Distinguish between the following terms used in Flame Atomic Absorption Spectroscopy

- i. Interference
- ii. Sensitivity
- iii. Detection Limit 4½ marks