



**ELIZADE UNIVERSITY,
ILARA-MOKIN, NIGERIA**

FACULTY: BASIC & APPLIED SCIENCES

DEPARTMENT: BIOLOGICAL SCIENCES

FIRST SEMESTER EXAMINATION

2017/2018 ACADEMIC SESSION

COURSE CODE: EMT 303

COURSE TITLE: METHODS IN ENVIRONMENTAL ANALYSIS II

DURATION: 2 HOURS

HOD's SIGNATURE

NAME:.....

MAT. No:.....

INSTRUCTIONS Attempt any four questions in all

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1. (a) Briefly describe the preparation of a liquid sample for infra-red spectroscopy
(b) In which region of the infrared spectrum is the finger print region and what is the importance of this region?
(c) What are the light sources employed in Atomic Absorption Spectrophotometry?
(d) What are the applications of Infra-red spectroscopy?
(e) A sample in 1 cm cell is determined with a spectrophotometer to transmit 55% light at a wavelength of 450 nm. If the molar absorptivity at this wavelength is $2.00 \text{ L mol}^{-1} \text{ cm}^{-1}$, calculate the absorbance and concentration of the sample.
2. (a) What do you understand by the terms Electromagnetic Radiation (EMR) and Electromagnetic Spectrum (EMS)
(b) Explain the principle of absorption spectroscopy
(c) List the three types of energy changes accompanying absorption of EMR and explain any one.
(d) Draw a schematic diagram of a double beam UV/ visible spectrophotometer.
(e) Mention the light sources for a UV/ visible spectrophotometer and three applications of UV/ visible spectrophotometry
3. (a) Define Beer-Lambert's law and list the deviations from Beer-Lambert's law.
(b) What are Chromophores and Auxochromes. Give two examples in each case
(c) List three limitations and two applications of Flame Atomic Emission Spectrophotometry
(d) What are Bathochromic and Hypochromic shifts?
(e) A compound has a molar absorptivity value of $8.40 \text{ L mol}^{-1} \text{ cm}^{-1}$, when path length is 1 cm and Absorbance 0.70. What is the concentration of the compound?
4. (a) Infra-red region of the EMS is divided into three regions. List the regions (with their ranges) and which of the regions is the most analytically useful.
(b) Calculate the number of possible theoretical vibrational modes for a linear Ethyl methyl ketone ($\text{CH}_3\text{-CH}_2\text{-CO-CH}_3$) and a non-linear carbon dioxide molecule

- (c) What are the light sources and types of detector used in infrared spectroscopy?
- (d) Mention the most common instruments used in IR spectroscopy
- (e) What are the two modes (types) of molecular vibrations in molecules that are infra-red active and list the different types of this modes.
5. (a) Describe the techniques involved in photometric titration
- (b) Differentiate between circular dichroism and optical rotatory dispersion
6. (a) Explain the principles, uses and limitations of flame photometry
- (b) Describe the principle of polarimetry.