



JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY
SCHOOL OF BIOLOGICAL AND PHYSICAL SCIENCES
UNIVERSITY EXAMINATION
BIOLOGICAL SCIENCES
4th YEAR 2ND SEMESTER 2019/2020 ACADEMIC YEAR
REGULAR

COURSE CODE:

SCH: 410

COURSE TITLE: TECHNIQUES IN ORGANIC CHEMISTRY LABORATORY

EXAM VENUE:

STREAM: (BSc BIO)

DATE:

EXAM SESSION:

TIME:

2.00 HOURS

Instructions:

- 1. Answer question 1 (Compulsory) in Section A and ANY other 2 questions in Section B.**
- 2. Candidates are advised not to write on the question paper.**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room.**

SECTION A

QUESTION ONE (Compulsory) (30 marks)

- a) Name two levels by which substances interact with light (2 marks)
- b) How can individual components in a sample be identified using the AES technique? (4 marks)
- c) Briefly describe what you understand by the following terms as applied in chromatography:
- i. Stationary phase,
 - ii. mobile phase,
 - iii. analyte,
 - iv. flow rate (5 marks)
- d) Differentiate between Size-Exclusion and Ion-Exchange chromatography in relation to: their applications, stationary phases and their separating principles. (6 marks)
- e) Explain the importance and give three methods of calibration. (8 marks)
- f) Name two methods of separation (chromatography) under high performance chromatography and explain their differences and their advantages. (6 marks)
- g) Define the term hyphenated techniques in the analysis of chemical samples and name two methods and give their advantages over the traditional method of analysis (4 marks)

QUESTION TWO (20 marks)

- a) Name the three broad categories into which chemical analysis can be subdivided and a brief description of their applications. (6 marks)
- b) Under the three broad categories there are techniques that are applied for analysis depending on different interactions of the analyte. Name four of them (4 marks)
- c) Name and give brief description of three techniques applied in the microscopic analysis and state their advantages. (5 marks)
- d) Name four methods of calibration and state why it is an important process in the analysis of samples. (5 marks)

QUESTION THREE (20 marks)

- a) With an aid of a simple diagram explain “Electro-magnetic Spectrum”. Give a short comparison between Ultra Violet (UV), Visible (Vis) and Infra Red (IR) ranges for energy, frequency and wavelength (8 marks)
- b) Name six types of detectors used in Gas Chromatography (6 marks)
- c) Both Ion-Exchange and Size-Exclusion chromatography are analytical methods in which substances interact with light at molecular level. State their differences in relation to: their applications and their separating principles. (6 marks)

QUESTION FOUR (20 marks)

- a) Define the following terms as applied in instrumental methods of analysis (8 marks)
- i. Detectors
 - ii. Transducers
 - iii. Sensors
 - iv. Chemical sensor
- b) Name four Thermal analytical techniques and give a brief explanation of what they are used to measure. (8 marks)
- c) Define primary X-rays and explain how X-rays are generated. (4 marks)

QUESTION FIVE (20 marks)

- a) The principle of operation of both Microwave and Infrared spectroscopy are almost the same with some small variations. Give a brief explanation of they operate and explain their difference; showing when/where Microwave spectrometry is most suitable. (8 marks)
- b) Briefly state the uses of the following parts found in various analytical instruments: Detectors, Transducers and Sensors (6 marks)
- c) List three techniques applied under analysis using X-rays. (6 marks)