JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF BIOLOGICAL & PHYSICAL SCIENCES

DEPARTMENT OF BIOLOGICAL SCIENCES

UNIVERSITY EXAMINATION FOR DEGREE OF BACHELOR SCIENCE IN BIOLOGICAL SCIENCES

3RD YEAR 1ST SEMESTER 2016/2017 ACADEMIC YEAR

REGULAR

COURSE CODE: SBI: 3423

COURSE TITLE: PHYSICAL METHODS OF ANALYSIS

EXAM VENUE: BIO LAB **STREAM: BSC. BIO)**

DATE: 19/12/16 **EXAM SESSION: 2.00 – 4.00 PM**

TIME: 2 HOURS

Instructions:

1. **Answer ALL questions in Section A and Any two questions in Section B**
2. **Candidates are advised not to write on question paper**
3. **Candidates must hand in their answer booklets to the invigilator while in the examination room**

SECCTION A: SHORT ANSWER QUESTIONS (30 MARKS)

1. 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)
2. Name two levels by which substances interact with light (2 marks)
3. Define the term chromatography (2 marks)
4. State the advantages of hyphenated techniques in the analysis of chemical samples? (2 marks)
5. State three disadvantages of Atomic Absorption Spectroscopy. (3 marks)
6. Gas chromatography columns may be classified as analytical or preparative columns. Name two types of analytical columns. (2 marks)
7. State the main applications of FT-IR technique. (3 marks)
8. Explain what you understand by the term Thermal Analysis (3 marks)
9. Explain how individual components can be identified using the AES technique.(3 marks)

SECTION B: ESSAY QUESTIONS (40 MARKS)

Q2.

a) Briefly describe the principle by which Atomic Emission Spectroscopy operates in the analysis of chemical samples and state two of its disadvantages. (5 marks)
b) Briefly describe what you understand by the following terms: Stationary phase, mobile phase, analyte, flow rate. (4 marks)
c) Differentiate between Ion-Exchange and Size-Exclusion chromatography in relation to: their applications, stationary phases and their separating principles. (6 marks)
d) List three disadvantages of Gas Chromatography techniques. (3 marks)
e) How can an instrument for chemical analysis be defined (2 marks)

Q2:

a) List three techniques applied under analysis using X-rays. (6 marks)
b) Column chromatography is mainly a preparative method. With a diagram explain how sample a prepared by this method for further analysis. (6 marks)
c) What are the main applications and disadvantages of Ultraviolet-Visible techniques in spectroscopy (8 marks)

Q3:

a) Name three techniques applied in the Microscopic analysis. (6marks)
b) Explain three methods of calibration (6 marks)

Q4:

Define the following terms as applied in instrumental methods of analysis (8 marks)

a. Detectors
b. Transducers
c. Sensors
d. Chemical sensor

Q5:

a) Name two methods of separation (chromatography) under high performance chromatography and explain their differences (4 marks)
b) What is the importance of calibration in the use of instrumental methods of analysis and how is it carried out (3 marks)
c) In selecting an analytical method which important factors should one consider? Name four of them. (4 marks)
d) Name and describe three methods that can be used to homogenize biological samples to be analyzed (6 marks)
e) Explain how X-rays are generated (3 marks)