CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATIONS

THIRD YEAR EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN BIOCHEMISTRY

BIOC 241: INTEGRATED LABORATORY TECHNIQUES 1

STREAMS: **TIME: 2 HOURS**

DAY/DATE: FRIDAY 12/4/2024 **2.30 P.M. –4.30 P.M.**

INSTRUCTIONS:

- **Answer question ONE (COMPULSORY)and any other TWO questions**
- **Sketch diagrams may be used whenever they may help to illustrate your answer**
- **Do not write anything on the question paper**
- **This is a closed book exam. No reference materials are allowed in the examination room**
- **There will be No use of mobile phones or any other unauthorized materials**
- **Write your answers legibly and use your time wisely**

QUESTION ONE (30 MARKS)

1. Discuss the intracellular and extracellular fluid buffer systems. (8 marks)
2. Define homeostasis (2 marks)
3. Discuss the carbonic acid-bicarbonate pair as an essential biological buffering system. (8 marks)
4. Briefly explain the principle of gas liquid chromatography. (4 marks)
5. Define high performance liquid chromatography (HPLC) and briefly explain the SEVEN HPLC separation modes. (8 marks)

QUESTION TWO (20 MARKS)

(a) Discuss ion-exchange chromatography as a purification method for a contaminated milk sample. (10 marks)

(b) Discuss how radio isotopes are used to study metabolic pathways in cells. (10 marks)

QUESTION THREE (20 MARKS)

(a) Discuss the role of kidney in the acid-base buffering balance. (10 marks)

(b) Describe how immobilized metal affinity chromatography (IMAC) can be used to purify a 6x His-tagged recombinant protein. (10 marks)

QUESTION FOUR (20 MARKS)

(a) Describe how one would assay for the enzymatic activity of lactate dehydrogenase from the liver biopsy of a hepatitis B-infected patient using UV-V is spectrophotometry. (10 marks)

(b) Describe how one can assay for calcium levels from a rickets –symptomatic child using fluorimetry. (10 marks)

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