TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF APPLIED AND HEALTH SCIENCES

DEPARTMENT OF PURE & APPLIED SCIENCES

UNIVERSITY EXAMINATION FOR:

BACHELOR OF TECHNOLOGY IN APPLIED CHEMISTRY (BTAC) BTAC 2024S

ACH4205: METHODS OF CHEMICAL SEPERATION

ORDINARY EXAMINATION

SERIES: DECEMBER 2024

TIME: 2HOURS

DATE: 20**Dec2024**

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **FIVE**Question(s).Attemptquestion ONE (Compulsory) and any other TWO questions.

Do not write on the question paper.

QUESTION ONE

a) **With the help of a labelled diagram illustrate reverse osmosis process. (4 marks)**

b) **Explain the facilitated diffusional transport mechanism in liquid membranes. (2marks)**

c) **Draw a schematic diagram for all the components of gas chromatography. (6 marks)**

d) **Differentiate between the following terms as used in separations techniques,**

i. **Microfiltration and ultrafiltration (2 marks)**

ii. **Homogenous barrier and microporous barriers (2 marks)**

iii. **Observed retention and real retention. (2 Marks)**

iv. **Hollow fiber module and spiral wound module. (2 marks)**

v. **Free electrophoresis and zone electrophoresis. (2 marks)**

e) **Define the following terms as used in chromatography**

i. **Capacity factor** **(2 marks)**

ii. **Peak height** **(2 marks)**

f) **Explain the basic principle in separation of proteins using immobilized metal ion affinity chromatography.** **(4marks)**

QUESTION TWO

a) **Outline the step by step procedure of using column chromatography and Thin Layer chromatography separation of bio active compounds.** **(10 marks)**

b) **Outline four applications of HPLC in analytical chemistry** **(4 marks)**

c) **Discuss three major steps of the extractor used during liquid-liquid extraction procedure.** **(6 marks)**

QUESTION THREE

a) **Discus the theory of electrophoresis as a method of separation.** **(8 marks)**

b) **Describe the principles of traditional methods for sample preparation of solid sample given below and comment on each of them**

i. **Solid-liquid extraction** **(4marks)**

ii. **Soxhlet extraction** **(4 marks)**

c) **Outline two advantages of solid phase extraction (SPE) over liquid-liquid extraction (LLE).** **(4 marks)**

QUESTION FOUR

a) **Discuss the principle of isotropic and anisotropic membranes in various membrane processes.** **(12 marks)**

b) **Discuss the factors that influence resolution in size exclusion chromatography.**

(8 marks)

QUESTION FIVE

a) **Explain the terms applicable to the graphical representation of elution profile of a typical two component mixture separation by chromatography. (10 Marks)**

b) **Draw a schematic diagram for all the components of high performance liquid chromatography. (10 marks)**