MACHAKOS UNIVERSITY

University Examinations for 2021/2022 Academic Year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF BIOLOGICAL SCIENCES

FOURTH YEAR FIRST SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE(ANALYTICAL CHEMISTRY)

SAN 403: BIOANALYTICAL TECHNIQUES AND INSTRUMENTATION

DATE: 31/8/2022 **TIME: 8.30- 10.30 AM**

INSTRUCTIONS

1. Answer all questions in SECTION A (compulsory) and **any two** questions in Section B.
2. Use clean well labelled diagrams wherever appropriate.

SECTION A
QUESTION ONE (COMPULSORY) (30 MARKS)

a) i. Explain 2-D-gel electrophoresis (2 marks)

ii. Describe advantages of 2-Dgel electrophoresis over the conventional electrophoresis (2 marks)

b) Describe the principle of ion exchange chromatography (3 marks)

c) Explain the principle of paper chromatography (3 marks)

d) Explain the effect pH on the charge of a protein during electrophoresis (3 marks)

e) Describe three types of rotors used in centrifugation (3 marks)

f) Define difference spectrum and its application in spectroscopy (4 marks)

g) Explain the principle behind polymerase chain reaction (PCR) (4 marks)

h) Describe the use of microarrays in measuring gene expression levels (3 marks)

i) Describe three main components of mass spectrometers (3 marks)

SECTION B

QUESTION TWO (20 MARKS)

Discuss the steps involved in Sanger's dideoxy DNA sequencing method.

QUESTION THREE (20 MARKS)

Discuss the principle and instrumentation of HPLC

QUESTION FOUR (20 MARKS)

a) Differentiate between qualitative and quantitative ELISA (4 marks)

b) Discuss the techniques and applications of ELISA (16 marks)

QUESTION FIVE (20 MARKS)

a) Discuss the principle and steps in pulse field gel electrophoresis (8 marks)

b) Discuss the limitations, advantages and applications of pulse field gel electrophoresis (12 marks)