TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF APPLIED AND HEALTH SCIENCES

DEPARTMENT OF PURE AND APPLIED SCIENCES

UNIVERSITY EXAMINATION FOR:

BACHELOR OF SCIENCE IN BIOCHEMISTRY

ABC 43O3: MOLECULAR BIOLOGY II

SPECIAL/SUPPLEMENTARY EXAM

SERIES: JULY, 2025

TIME: 2 HOURS

DATE: JUL., 2025

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **FIVE** questions. Attempt question ONE (Compulsory) and any other TWO questions.

Do not write on the question paper.

Question ONE

a) Describe detection of recombinant lambda phage vector detection using cI repressor system (4 marks)

b) Contrast T4 DNA and E. coli DNA ligases used in gene cloning (4 marks)

c) Discuss the importance of MobA gene in relation to vector containment (6 marks)

d) State FOUR applications of DNA fingerprinting (4 marks)

e) Feature of transgene integration from Direct DNA delivery in plant cell genome (6 marks)

f) State the advantages of cosmids over plasmids (4 marks)

g) State the advantages of restriction endonuclease in the construction of genomic libraries (2 marks)

Question TWO

a) Discuss the features of cleavage by Type II restriction endonucleases (15 marks)

b) Explain the need for polyhistidine sequence addition in a cloning vector (5 marks)

Question THREE

Using illustrations, describe the following methods of recombinant vector detection in bacterial host cells

a) complementation in tryptophan biosynthetic pathway (12 marks)

b) Describe the procedure for restriction digestion *in vitro* (8 marks)

Question FOUR

Using illustrations, describe Sanger-Coulson dideoxy chain termination method of DNA sequencing (20 marks)

Question FIVE

a) Explain the FOUR reporter genes used in gene expression investigations in transgenic plants (12 marks)

b) Describe the DNA modifying enzymes used in gene cloning (8 marks)