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

END OF SEMESTER EXAMINATION

SERIES: DECEMBER, 2024

TIME: 2 HOURS

DATE: Dec., 2024

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) State the applications of Klenow fragment (4 marks)

b) Using illustrations, explain the mechanism of ligation by E. coli DNA ligase (4 marks)

c) Calculate the Tm value of a primer sequence, AGCGAATGCGCATGCCGATC. (2 marks)

d) State features of plasmids as cloning vectors (5 marks)

e) Highlight the limitations of E. coli cells as a host for recombinant gene propagation (6 marks)

f) State limitations of PEG-mediated transformation (3 marks)

g) Explain the requirements for a successful DNA sequencing (6 marks)

Question TWO

a) Discuss pUC18 vectors based on;

i) Structure (6 marks)

ii) Selection of recombinant vector DNA (8 marks)

b) Describe mRNA purification by affinity chromatography using oligo-dT cellulose (6 marks)

Question THREE

a) Discuss the following nucleic acid labelling methods;

i) End Labelling (6 marks)

ii) Indirect non-radioactive detection (6 marks)

b) Using illustrations, describe insertional inactivation of LacZ gene as a method of recombinant vector detection in bacterial host cells (8 marks)

Question FOUR

a) Discuss particle bombardment as a means of gene transfer in plants (20 marks)

Question FIVE

a) Using illustrations, describe the methodology of PCR (16 marks)

b) State factors that determine the temperature and duration of each PCR cycles (4 marks)