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 (BIOLOGY)

SBT 418: MICROBIAL GENETICS

DATE: 15/12/2021 **TIME: 11:00 – 1:00 PM**

INSTRUCTIONS

1. Anwer Question 1 (compulsory) and **any two** questions in Section B.
2. Use clean well labelled diagrams wherever appropriate.

SECTION A (COMPULSORY)

QUESTION ONE (30 MARKS)

a) Briefly describe the replica plating method of testing for successful mutants (3 marks)

b) Explain the antiparallel nature of a DNA double helix (3 marks)

c) Illustrate the synthesis of cDNA from a mRNA template (3 marks)

d) Describe three types of point mutations (3 marks)

e) Explain three ways of making a bacterial cell competent for transformation (3 marks)

f) Briefly explain the role of the F factor plasmid in bacteria (3 marks)

g) One cannot reliably predict the sequence of nucleotides on mRNA or DNA by observing the amino acid sequence of proteins. Justify (3 marks)

h) A bacterial protein is 3,300 amino acids long. State and justify the number of nucleotide pairs in the gene sequence that codes for it. (3 marks)

i) Briefly discuss the structural differences between DNA and RNA (3 marks)

j) Study the following segment of DNA: Show the direction of replication of the new strands and explain what causes lagging and leading strands to show different patterns of replication (3 marks)

5’A T C G G C T A C G T T C A C 3’
3’T A G C C G A T G C A A G T G 5’

SECTION B: ANSWER ANY TWO QUESTIONS

QUESTION TWO (20 MARKS)

a) Discuss the events in translation (10 marks)

b) Contrast the prokaryotic and eukaryotic cells in gene structure and expression (10 marks)

QUESTION THREE (20 MARKS)

Compare beneficial and detrimental effects of mutations

QUESTION FOUR (20 MARKS)

Discuss the regulation of prokaryotic gene expression

QUESTION FIVE

a) Discuss the medical significance of biofilms (10 marks)

b) Discuss the transfer of genetic material through bacteriophages (10 marks)