UNIVERSITY EXAMINATIONS
2022/2023 ACADEMIC YEAR

SECOND YEAR SECOND SEMESTER
SPECIAL/SUPPLEMENTARY EXAMINATIONS

FOR THE DEGREE OF BACHELOR OF SCIENCE IN AGRICULTURE AND BIOTECHNOLOGY

COURSE CODE: ABI 222
COURSE TITLE: MICROBIAL GENETICS
DATE: 8TH AUGUST 2023 **TIME:** 11 – 1 PM

INSTRUCTIONS TO CANDIDATES

Answer Question ONE and any other TWO Questions.

TIME: 2 Hours

This paper consists of 3 printed pages. Please Turn Over

QUESTION ONE

a. Briefly describe the restriction enzyme nomenclature. **(3 Marks)**

b. State three uses of plasmids in microorganisms. **(2Marks)**

c. Outline the Significance of mutation **(5 marks)**

d. The protein 'globin' of hemoglobin contains two polypeptide chain types. In sickle-cell anemia sufferers, one polypeptide chain contains an amino acid that differs from normal. This is due to a DNA mutation in which the product has base sequence CAT instead of CTT.

i. Name two factors that may increase the mutation frequency **(2 marks)**.

ii. What type of gene mutation produced sickle-cell anemia **(2 marks)**.

e. After the generation of DNA fragments, describe the other three steps a genetic engineer follows to obtain a specific DNA sequence. **(4 marks)**

f. If this is the base sequence of a strand of DNA (A T G C C), what would be the base sequence of the complimentary DNA strand? **(2 marks)**

g. List the nucleotide bases found in a molecule of RNA **(2 marks)**

h. Describe the use of PCR in genetic engineering and forensic sciences. **(3 marks)**

i. Explain the location and role of a promoter in a gene. **(3 marks)**

j. Outline the difference between retrovirus and virus **(2 Marks)**

QUESTION TWO

i. Distinguish a lytic from a lysogenic cycle in viral replication. **(10 marks)**

ii. Describe using a diagram the five areas of gene control in a cell during protein synthesis. **(10 marks)**

QUESTION THREE

Briefly describe the following terms as used in microbial genetics

i. Conjugation **(4 marks)**

ii. Transformation **(4 marks)**

iii. Transduction **(4 marks)**

iv. Transposition **(4 marks)**

v. Recombination **(4 marks)**

QUESTION FOUR

i. Define mutation (**2 marks)**

ii. The information below shows the base sequence of a sense strand from a DNA length and three possible gene mutation types.

Normal DNA: A C T GA G C T A

Mutation 1: A C T G GA G C T A

Mutation 2: A C T A G C T A

Mutation 3: A C T T A G C T A

What do the letters A, C, T, and G represent? (2 marks)

Name and describe the type of mutation shown in 1, 2, and 3 **(6 marks)**

iii. Discuss different types of gene mutation (**12 marks)**

QUESTION FIVE

Discuss why scientists will prefer using fungi in genetic studies (**20 marks)**