



(Knowledge for Development)

KIBABII UNIVERSITY

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



KIBU observes ZERO tolerance to examination cheating

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 G A G C T A

Mutation 1: A C T G G A 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**)