(15)

(*Knowledge for Development*)

KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS
2022/2023 ACADEMIC YEAR

SECOND YEAR SECOND SEMESTER
MAIN EXAMINATIONS

FOR THE DEGREE OF BACHELOR OF SCIENCE IN AGRICULTURE AND BIOTECHNOLOGY

COURSE CODE: ABI 222
COURSE TITLE: MICROBIAL GENETICS
DATE: 17TH APRIL 2023 **TIME:** 2 – 4 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. Outline the difference between retrovirus and virus **(2 Marks)**

b. Explain the following terms

i. Regulatory genes **(2Marks)**

ii. Regulatory elements**(2Marks)**

iii. Inducible operons**(2Marks)**

c. 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

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

ii. Name and describe the type of mutation shown in 1, 2, and 3 **(3 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. List the differences between DNA and RNA **(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 complementary DNA strand? **(2 marks)**

g. Explain the importance of transposons **(2 marks)**

h. State the differences between a nucleotide and a nucleoside **(2 marks)**

i. Outline the main virion components **(3 marks)**

QUESTION TWO

Discuss the advantages of using fungi in genetic studies **(20 marks)**

QUESTION THREE

Write short notes on

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. Discuss the Significance of mutation (**8 marks)**
iii. Explain different mechanisms involved in DNA repair (**10 marks)**

QUESTION FIVE

i. Discuss the applications of recombinant DNA technology**(10 marks)**
ii. Describe using a diagram the five areas of gene control in a cell during protein synthesis. **(10 marks)**