ZIMBABWE

MINISTRY OF HIGHER AND TERTIARY EDUCATION, INNOVATION, SCIENCE AND TECHNOLOGY DEVELOPMENT

HIGHER EDUCATION EXAMINATIONS COUNCIL (HEXCO)

NATIONAL DIPLOMA

IN

APPLIED BIOTECH

SUBJECT: Genetic Engineering **PAPER NO: 503/23/M04**

DURATION: 3 hours

NOVEMBER/DECEMBER 2025 EXAMINATION

REQUIREMENTS

INSTRUCTIONS TO CANDIDATE

1) This question paper contains six (6) questions.
2) Answer any five (5) questions.
3) Do not write your name on the answer script.

This paper consists of 3 printed pages.

QUESTION 1

a) Outline the components making up the following:

i) Nucleoside (2 marks)

ii) Nucleotide (3 marks)

b) Draw a simplified structure of or chromosome. (3 marks)

c) With the aid of a diagram, describe the detailed structure of DNA. (12 marks)

QUESTION 2

a) Define the following terms:

i) Gene isolation (2 marks)

ii) DNA sequencing (2 marks)

b) i) Outline any five (5) types of PCR. (5 marks)

ii) State any four (4) application of PCR testing. (4 marks)

c) Discuss in detail the steps involved in PCR testing. (7 marks)

QUESTION 3

a) Define the term "genetic engineering". (2 marks)

b) With the aid of well labelled diagrams, describe in detail the use of bacteria in the synthesis of insuling. (18 marks)

QUESTION 4

a) Discuss in detail how the following methods are you used to insert recombinant DNA into host cells:

i) Electroporation (4 marks)

ii) Microinjection (4 marks)

b) Discuss the benefits and hazards of genetic engineering. (12 marks)

QUESTION 6

a) Describe in detail the following methods of DNA sequencing:

i) New generation sequencing (NGS). (8 marks)

ii) Sanger method (8 marks)

b) Discuss the importance of gene isolation in genetic engineering. (4 marks)

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