



ZIMBABWE

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

**HIGHER EDUCATION EXAMINATIONS COUNCIL
(HEXCO)**

NATIONAL DIPLOMA

IN

APPLIED BIOLOGICAL TECHNOLOGY

MODULE: Instrumental Analysis

PAPER NO: 503/23/M06

DURATION: 3 hours

JUNE 2026 EXAMINATION

REQUIREMENTS

INSTRUCTIONS TO CANDIDATE

- 1. Answer any five (5) questions.**
- 2. Each question carries 20 marks.**
- 3. Do not write your name on the answer sheet.**

This paper consists of 3 printed page.

QUESTION 1

Examine chromatography under the following headings:

- a) Liquid – solid (10 marks)
- b) Liquid – liquid (10 marks)

QUESTION 2

Discuss the following:

- a) Factors that affect electrophoresis techniques in preparation and analysis of samples. (10 marks)
- b) Limitations of the applicability of Beer-Lambert's law in spectroscopy analysis. (10 marks)

QUESTION 3

- a) With the aid of a diagram describe the principle of operation of a Geiger Muller Counter. (10 marks)
- b) Draw the count rate voltage curve of a Geiger Muller Counter. (5 marks)
- c) State any five (5) factors that affect the rate of sedimentation in a centrifuge. (5 marks)

QUESTION 4

With aid of relevant examples explain factors that affect enzymatic assays in sample analysis. (20 marks)

QUESTION 5

Outline the principle, instrumentation and application of high-performance liquid chromatography. (20 marks)

QUESTION 6

- a) Describe radio-immunoassay technique as applied in biotechnology. (10 marks)
- b) Sketch and label the instrumentation of the following:
- i) UV/visible spectrophotometer (5 marks)
 - ii) Gas chromatography (5 marks)

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