ZIMBABWE

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

HIGHER EDUCATION EXAMINATIONS COUNCIL (HEXCO)

NATIONAL DIPLOMA

IN

APPLIED BIOTECHNOLOGY

MODULE: Microscopy and Microbial Cultivation PAPER NO: 503/23/M03

DURATION: 3 Hours

NOVEMBER/DECEMBER 2025 EXAMINATION

REQUIREMENTS

INSTRUCTIONS TO CANDIDATE

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

This paper consists of 3 printed pages.

PAPER NO: 503/23/M03 – MICROSCOPY AND MICROBIAL CULTIVATION

QUESTION 1

(a) State three steps involved in maintaining a microscope. (3 marks)

(b) State any five components of a light microscope and their functions. (10 marks)

(c) Outline the steps in the preparation of a slide for electron microscope. (7 marks)

QUESTION 2

(a) Compare and contrast the structures of prokaryotic cells and eukaryotic cells. (10 marks)

(b) Outline how an eye piece graticule is calibrated. (10 marks)

QUESTION 3

Define the following terms: -

(a) (i) Aseptic techniques (2 marks)

(ii) Pure culture (2 marks)

(iii) Mixed culture (2 marks)

(b) Explain the following enumeration, method used in measurements of bacteria growth.

(i) plate counts (4 marks)

(ii) the MPN (4 marks)

(iii) microscopic counts (3 marks)

(iv) flow cytometry (3 marks)

QUESTION 4

(a) Discuss factors that influence microbial growth. (15 marks)

(b) Explain the difference between batch and continuous fermentation. (5 marks)

QUESTION 5

(a) Write short notes on: -

(i) non selective media (3 marks)

(ii) differential media (3 marks)

(iii) selective media (4 marks)

(b) Describe the procedure for the gram stain (10 marks)

QUESTION 6

Discuss the importance of cell culture. (20 marks)

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