



# UNIVERSITY EXAMINATIONS

**SECOND SEMESTER 2023/2024 ACADEMIC YEAR**

**FOURTH YEAR EXAMINATION FOR THE DEGREES OF  
BACHELOR OF EDUCATION (SCIENCE) AND BACHELOR  
OF SCIENCE (GENERAL)**

**BOTA 422: INDUSTRIAL MICROBIOLOGY**

***STREAM: BEd (Science), BSc (General)***

***TIME: 2 HRS***

***DAY: THURSDAY [8.30A.M – 10.30A.M] DATE: 18/04/2024***

**THIS QUESTION PAPER CONSISTS OF TWO (2) PAGES**

**PLEASE DO NOT OPEN UNTIL THE INVIGILATOR SAYS SO.**

**INSTRUCTIONS****ANSWER ALL QUESTIONS IN SECTION A AND ANY TWO QUESTIONS IN SECTION B****SECTION A (40 MARKS)****QUESTION ONE**

Describe the direct methods for estimating cell number density (5 Marks)

**QUESTION TWO**

Distinguish mixed-growth-associated product from non-growth-associated product (5 Marks)

**QUESTION THREE**

State five advantages of perfusion systems (5 Marks)

**QUESTION FOUR**

Outline specific examples of cell immobilization by surface attachment (5 Marks)

**QUESTION FIVE**

Explain the utility of flocculation technique in the separation of microbial products (5 Marks)

**QUESTION SIX**

Describe the major types of driers used for drying fermentation products (5 Marks)

**QUESTION SEVEN**

Differentiate between aqueous two-phase extraction and liquid-liquid extraction (5 Marks)

**QUESTION EIGHT**

Outline five non-mechanical methods for disruption of microbial cells (5 Marks)

**SECTION B (30 MARKS)****QUESTION NINE**

Describe the basic and monitoring parts of an industrial fermentor (15 Marks)

**QUESTION TEN**

Give an account of five industrially important microbial products (15 Marks)

**QUESTION ELEVEN**

Discuss the methods for preparation of polymer beads for cell immobilization (15 Marks)

