CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN BOTANY

BOTA 436: INDUSTRIAL MICROBIOLOGY

STREAMS: BSc. BOTANY **TIME: 2 HOURS**

DAY/DATE: MONDAY 14/04/2025 **8.30 A.M. – 10.30 A.M.**

INSTRUCTIONS

i. **Answer all questions in section A and any two in section B**
ii. **Do not write anything on the question paper**
iii. **Use illustrations where appropriate to enhance your answer.**

Section A (30 marks)

1. a) Explain the role of genetic engineering in enhancing the efficiency of industrial fermentation. (3 marks)

   b) Describe two ways in which industrial microorganisms are selected and maintained. (2 marks)

2. a) Describe the steps involved during anaerobic digestion in methane production. (4 marks)

   b) Give the importance of plasmid stability in industrial microbiology (1 mark)

3. a) Explain microbial inoculants and provide two examples of their industrial applications. (3 marks)

   b) State four advantages of using immobilized cells in bioreactors. (2 marks)

4. List five factors influencing microbial growth in industrial processes. (5 marks)

5. Identify range of services generated by microorganisms. (5 marks)

6. a) Identify four common problems in industrial microbial processes and propose solutions to each. (4 marks)

   b) State one limitation of using organic waste as raw material in microbial fermentation (1 mark)

SECTION B (40 marks)

7. a) Discuss the role of microorganisms in biofuel production, highlighting specific examples. (10 marks)

   b) Explain the industrial applications of single-cell protein (SCP) and its advantages. (10 marks)

8. a) Describe the application of microbial fermentation in the pharmaceutical industry for antibiotic production. (12 marks)

   b) Analyze the impact of industrial microbial processes on environmental sustainability. (8 marks)

9. a) Discuss the principles and applications of bioreactors in industrial microbiology. (10 marks)

   b) Explain how emerging technologies can be used to enhance fermentation efficiency in food and beverage industries. (10 marks)

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