

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF APPLIED SCIENCES

BACHELOR OF SCIENCE HONOURS DEGREE EXAMINATIONS

DEPARTMENT OF APPLIED BIOLOGY AND BIOCHEMISTRY

THEORY: PRINCIPLES OF FERMENTATION TECHNOLOGY SBB 2109

DECEMBER 2002

2 ½ HOURS (100 marks)

INSTRUCTIONS

Answer Four (4) questions, two from each section. Each question carries 25 marks. Where a question contains subdivisions, the mark value for each subdivision is given in brackets. Illustrate your answer where appropriate with large, clearly labelled diagrams.

SECTION A

1. Describe in detail the essential components for the operation and control of a fermenter for aerobic processes. (25 marks)

2. (a) What are the ideal properties of fermentation substrates? (7 marks)
(b) Give an account of media used as fermentation substrates in industry. (18 marks)

3. Write brief notes on the following:
 - (a) batch culture (5 marks)
 - (b) continuous culture (5 marks)
 - (c) Fed-batch culture (4 marks)
 - (d) Preservation of fermentation inocula (7 marks)
 - (e) Genetic improvement of industrial microbes by mutagenesis with non-ionizing radiation. (4 marks)

SECTION B

4. (a) List and explain briefly, the criteria on which the choice of recovery processes is based on. (10 marks)
(b) Describe the recovery and purification techniques employed in the production of citric acid. (15 marks)

5. Give a detailed account of the methods and biosynthetic pathways involved in the production of benzyl-penicillin. (25 marks)

6. Explain the importance of the pre-treatment of industrial wastes before disposal and outline the fermentative methods available for effluent treatment. (25 marks)

END OF QUESTION PAPER