

**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 2005

3 HOURS (100 marks)

**INSTRUCTIONS**

Answer Four (4) Questions. 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.

1. With the aid of a clearly labelled diagram, describe the essential components for the operation and control of a fermenter for aerobic processes.
2. Give an account of media used as fermentation substrates on an industrial scale. Your answer should include the criteria that should be met by the media.
3. Outline and discuss the methods available for:
  - (a) genetic improvement of industrial microbes. (17 marks)
  - (b) preservation of fermentation cultures. (8 marks)
4. Give an outline of the methods that are available for the separation, extraction and concentration of extracellular fermentation products. Your answer should include factors that are taken into account in selecting the methods.
5. Discuss the use of surface and submerged culture methods in a named fermentation process, giving full details of production parameters and cultures used. Your answer should include a comparison of the fermentation methods with respect to requirements to space, labour, process control and contamination problems.
6. Give a detailed account of the methods used in the production of benzyl penicillin highlighting the biosynthetic pathways involved.

**END OF EXAMINATION**