NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF APPLIED SCIENCES

BACHELOR OF SCIENCE HONOURS DEGREE EXAMINATIONS

DEPARTMENT OF APPLIED BIOLOGY AND BIOCHEMISTRY

THEORY: MOLECULAR GENETICS AND BIOTECHNOLOGY SBB 4105

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. The immune response resulting from the introduction of an infectious agent leads to the formation of several highly specific antibodies. It is estimated that a human is capable of synthesizing millions of distinct antibodies. How is this great diversity achieved?

2. (a) Describe the structure of a Ti plasmid and explain the functions associated with its regions. (15 marks)

   (b) Using clearly labeled diagrams, describe the transformation of potato stem explants with *Agrobacterium tumefaciens*. (10 marks)

3. Describe the technique of Southern blotting and explain how the hybridization can be used to locate the position of a cloned gene.

4. Describe features of the plasmid pBR322 that make it suitable for cloning.

5. How was the 'superbug' that degrades crude oil developed?

6. One application of molecular biology that has been proposed and is being currently researched is gene therapy. Discuss strategies for gene therapy.

END OF EXAMINATION

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