NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF APPLIED SCIENCES

BACHELOR OF SCIENCE HONOURS DEGREE EXAMINATIONS

DEPARTMENT OF APPLIED BIOLOGY AND BIOCHEMISTRY

THEORY: BIOTECHNOLOGY OF PHARMACEUTICAL PRODUCTS SBB 4208

MAY 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.(a) Describe the synthesis of recombinant insulin from artificial A and B Chain genes. (18 marks)

(b) Briefly describe the structure of the insulin molecule giving a summary of its synthesis from preproinsulin. (7 marks)

2. Write short notes on the following:
   (i) Phosphoramidite method of chemical DNA synthesis. (12 marks)
   (ii) Cloning of DNA sequences that encode for eukaryotic proteins. (13 marks)

3.(a) PBR322 plasmid is routinely used in cloning experiments, describe the essential features of this plasmid that make it suitable for cloning purposes. (17 marks)

(b) Define and describe insertional inactivation giving examples where appropriate. (8 marks)

4.(a) Discuss the important factors considered when choosing promoters for gene expression in prokaryotes. (16 marks)

(b) Sometimes the strategy for the expression of a target protein in a host organism involves synthesizing the protein as part of a fusion protein.
   (i) How is a fusion protein created? (4 marks)
   (ii) Why is this approach useful? (5 marks)

5.(a) Outline any method of cloning antibiotic biosynthesis genes. (10 marks)

(b) Discuss strategies for synthesizing novel antibiotics with unique properties and specifications, using engineering of genes involved in the biosynthesis of existing antibiotics. (15 marks)

6.(a) Describe and discuss in short notes the Maxam-Gilbert method of DNA sequencing. (18 marks)

(b) Discuss briefly the features that make λ phage a useful vector for cloning purposes. (7 marks)

END OF EXAMINATION

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