NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF APPLIED SCIENCES

BACHELOR OF SCIENCE HONOURS DEGREE EXAMINATIONS

DEPARTMENT OF APPLIED BIOLOGY AND BIOCHEMISTR

THEORY: BIOTECHNOLOGY OF PHARMACEUTICAL PRODUCTS SBB 4208

JUNE 2004

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 labeled diagrams.

1. Write short notes on the following:
   (a) Chemical synthesis of oligonucleotides or genes. Show a schematic representation of a DNA synthesizer. (12.5 marks)
   (b) How would you determine the nucleotide sequence of the molecule synthesized in (a) above, using an automated method. (12.5 marks)

2. (a) Why are promoters essential in expression systems? Illustrate your answer by briefly discussing a typical promoter in an expression vector. (9 marks)
   (b) How are promoters isolated and characterized? Illustrate your answer by highlighting the functional properties of pK01, that make it useful for such a process. (16 marks)

3. Discuss how the production of Interferon-β (IFN-β) can be controlled and optimized in a scaled up fermentation process using limited resources.

4. During infection by the malarial parasite, *Plasmodium falciparum*, the host is exposed to sporozoites, which have a surface coat protein, the circumsporozoite protein. After passing through the liver, merozoites, which also have a surface protein, are released into the blood, which infect red blood cells. Discuss a strategy of developing a vaccine against this infection in a scaled up fermentation process.

5. How would you use PCR to generate a single base change in a codon?

6. Discuss a strategy for the synthesis of novel antibiotics by the genetic manipulation of the *Streptomyces* strain that produces the antibiotic.

END OF EXAMINATION QUESTION PAPER

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