

Cork Institute of Technology

Bachelor of Science in (Honours) in Applied Biosciences – Award

(NFQ – Level 8)

Spring 2006

BIOANALYTICAL SCIENCE

(Time: 3 Hours)

Answer one question from each of Section A, B, C and D. Each question carries equal marks.

Use separate answer books for each section and mark the question attempted

Examiners: Ms. A. Ward

Dr. H. Tarrant

Dr. Tom Beresford

Section A

Q1. Describe the methods commonly used for protein modification. (12.5 marks)

Consider the applications of this methodology, selecting at least two examples of protein/enzyme engineering to illustrate your answer. (12.5 marks)

Q2. Give an account of the principles of enzyme assay design, under the headings:

(i) measurement of enzyme activity, and (12.5 marks)

(ii) enzymes as analytical reagents. (12.5 marks)

Use graphs and practical examples, wherever possible, to illustrate your answer.

Section B

Q3. Discuss the strengths and limitations of receptor binding studies, cell proliferation assays and reporter gene-based assays with reference to the detection and quantification of environmental estrogens. (25 marks)

Q4. Give an account of the design and application of biosensors in the measurement of biologically important molecules. Comment on how this technology may develop in the future. (25 marks)

Section C

- Q5. Write an essay on the four main classifications of immunoassays. Illustrate your answer with relevant diagrams of the assay principle and format of either a homogeneous or heterogeneous immunoassay system. (25 marks)
- Q6. Discuss the main issues of automation in immunoassay under the following headings:
- (a) Analytical factors in automation (10 marks)
 - (b) Dedicated versus routine analysers (5 marks)
 - (c) Specific example of an automated system in current use. (10 marks)

Section D

- Q7. Write an overview of ONE of the following:
- (a) Method validation of a bioanalytical assay
 - (b) Standardisation and quality assurance in immunoassay (25 marks)
- Q8. (a) Write a short account of the use of non-isotopic labels in immunoassay (10 marks)
- (b) Discuss the important considerations in the design and optimisation of a Polyacrylamide Gel Electrophoresis (PAGE) system for the analysis of proteins. (15 marks)