CORK INSTITUTE OF TECHNOLOGY
INSTITIÚID TEICNEOLAÍOCHTA CHORCAÍ

Autumn Examinations 2011

Module Title: Introduction to Biotechnology (CA)

Module Code: **BIOT6001**

School: Biological Science

Programme Title:
Bachelor of Science in Applied Biosciences & Biotechnology – Year 1
Bachelor of Science (Honours) in Pharmaceutical Biotechnology – Year 1
Bachelor of Science (Honours) in Nutrition and Health Science – Year 1
Bachelor of Science in Analytical & Pharmaceutical Chemistry – Year 1
Bachelor of Science (Honours) in Analytical Chemistry with Quality Assurance – Year 1

Programme Code: **SBIOS_7_ Y1**
SPBHI_8_Y1
SNHSC_8_Y1
SCHEM_7_ Y1
SACQA_8_ Y1

External Examiner(s): Dr Don Faller
Internal Examiner(s): Dr Helen O Shea, Ms Margaret Lane

Instructions: Answer 4 Questions.
Question 1 is COMPULSORY.

Duration: 2 Hours

Sitting: Autumn 2011

Requirements for this examination:

Note to Candidates: Please check the Programme Title and the Module Title to ensure that you have received the correct examination paper.
If in doubt please contact an Invigilator.

Question 1 is COMPULSORY

Q1. **(ANSWER ALL PARTS)**

(i) An inverted microscope is used to observe which type of cells in a laboratory? What magnification is required to observe these cells? (2 Marks)

(ii) How can turbidity be measured accurately in the laboratory? What does an increase in turbidity in bacterial culture media indicate? (3 Marks)

(iii) Which of the following media would be most suitable for the growth of *E coli* in the laboratory?

(a) Nutrient Broth

(b) Nutrient Broth + Glucose

Why? (2 Marks)

(iv) What does the measurement of lactic acid production tell you about the bacteria growing milk? (2 Marks)

(v) What is a cryoprotectant?

Give one example of a cryoprotectant used for bacteria and 2 other cryoprotectants. (3 Marks)

(vi) How do charged molecules such as DNA move in an agarose gel? (2 Marks)

(vii) What biological tissue is the growth medium for mammalian cells based on? Which pH do you think mammalian cells would grow best in: 7, 1 or 14? Why? (3 Marks)

(viii) State 2 ways to quantify purified DNA in a biotechnology laboratory. (2 Marks)

(ix) What is agarose? (2 Marks)

(x) What is Ethidium Bromide? (2 Marks)

(xi) What is a pallindromic sequence? Draw one. (2 Marks)

Q2. (a) Using a diagram describe the structural differences between a eukaryotic and prokaryotic cell used in biotechnology. (10 Marks)

(b) Write an account of the requirements for optimum cell growth and describe how these requirements are met in an industrial fermenter. (15 Marks)

Q3. (a) Draw a typical fermenter/bioreactor and label the parts. (10 Marks)

(b) Draw a typical bacterial growth curve and label each phase of growth. Explain why the growth curve of cells used in fermentations must be known. (9 Marks)

(c) Explain each of the following terms:
Batch system
Continuous system
Fed batch system (6 Marks)

Q4. Each of the following is required for recombinant DNA technology. Explain the role of each of the following in recombinant experiments.

(a) Isolation of DNA

(b) Identifying genes in DNA

(c) PCR

(d) Restriction enzymes

(e) Vectors (25 Marks)

Q5. Write brief notes on any 5 of the following:

(a) Antibodies (5 Marks)

(b) Scale up (5 Marks)

(c) Glycoproteins (5 Marks)

(d) Use of DNA in forensic analysis (5 Marks)

(e) Protein purification (5 Marks)

(f) Tissue Culture (5 Marks)

(g) PAGE (5 Marks)

Q6. (a) Describe the procedure you would use to isolate a protease enzyme for use in detergents. (10 Marks)

(b) What is protein engineering? (5 Marks)

(c) Describe how protein engineering improved the properties of recombinant insulin. (10 Marks)

OR

Q6. Describe Immunoglobulin: Structure and Function. (25 Marks)