

**CORK INSTITUTE OF TECHNOLOGY  
INSTITIÚID TEICNEOLAÍOCHTA CHORCAÍ**

**Autumn Examinations 2011/2012**

**Module Title: Introduction to Biotechnology (CA)**

**Module Code:** BIOT6001

**School:** Science & Informatics

**Programme Title:** BSc in Applied Biosciences & Biotechnology  
BSc (Hons) Pharmaceutical Biotechnology  
BSc (Hons) in Nutrition & Health Science  
BSc Analytical & Pharmaceutical Chemistry  
BSc (Hons) in Analytical Chemistry

**Programme Code:** SBIOS\_7\_ Y1  
SPHBI\_8\_ Y1  
SNHSC\_8\_ Y1  
SCHEM\_7\_ Y1  
SCHQA\_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 2012

**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***

### ***Question 1***

***Answer all parts***

- (a) An inverted microscope is used to observe which type of cells in a laboratory?  
What magnification is required to observe these cells? (2 marks)
- (b) How can turbidity be measured accurately in the laboratory?  
What does an increase in turbidity in bacterial culture media indicate? (3 marks)
- (c) Which of the following media would be most suitable for the growth of *E coli* in the laboratory?  
(i) Nutrient Broth  
(ii) Nutrient Broth + Glucose  
Why? (2 marks)
- (d) What does the measurement of lactic acid production tell you about the bacteria growing in milk? (2 marks)
- (e) Under what circumstances is the fridge used to store bacterial cultures? (2 marks)
- (f) What is a cryoprotectant? Give one example of a cryoprotectant used for bacteria and 2 other cryoprotectants. (3 marks)
- (g) 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)
- (h) What are BHK and CHO cells? (2 marks)
- (i) What is the purpose of the loading dye when running DNA on an electrophoresis gel. (2 marks)
- (j) Using a diagram show the pattern that would occur if you ran a sample of DNA containing fragments of the following size on an agarose gel.  
250bp, 100bp, 80bp, 60bp (4 marks)

### ***Question 2***

List and write a descriptive account of the various cell types used in biotechnology processes.

In your answer mention any relevant advantages and/or disadvantages of using each of the cell types. (25 marks)

### ***Question 3***

(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)

### ***Question 4***

(a) Explain how DNA is responsible for the synthesis of a protein. (10 marks)

(b) Explain how the sequence of amino acids in a protein may be altered to change the properties of the protein. (5 marks)

(c) Give one example you have studied where the amino acid sequence of protein was changed to produce a protein different characteristics. (10 marks)

### ***Question 5***

Write brief notes on **any 5 of the following**:

(a) Antibody; structure and function (5 marks)

(b) Scale up (5 marks)

(c) Glycoproteins (5marks)

(d) Protein purification (5 marks)

(e) Tissue Culture (5 marks)

(f) PAGE (5 marks)

(g) Prokaryotes. Draw a diagram of *E. coli*. (5 marks)

***Question 6***

- (a) Write descriptive notes to explain the role of DNA in
- (i) Biotechnology
  - (ii) Food safety
  - (iii) Medicine
- (12 marks)
- (b) Write a detailed account of how DNA can be used in forensic analysis at a crime scene.
- (13 marks)