

**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 + GlucoseWhy? (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)