CORK INSTITUTE OF TECHNOLOGY
INSTITIÚID TEICNEOLAÍOCHTA CHORCAÍ

Autumn Examinations 2012/2013

Introduction to Biotechnology: Continuous Assessment (Semester 2)

Module Code: BIOT6001

School: **Science**

Programme Title: **BSc in Applied Biosciences& Biotechnology**
BSc Hons Pharmaceutical Biotechnology
BSc Hons in Nutition and Health science
BSc Analytical & Pharmaceutical Chemistry
BSc Hons in Analytical Chemistry

Programme Code: **SBIOS_7_ Y1**
SPBHI_8_Y1
SNHSC_8_Y1
SCHQA_8_ Y1
SCHEM_7_ Y1

External Examiner(s): **Dr Gillian Gardner**
Internal Examiner(s): **Dr Helen O' Shea**
Ms Margaret Lane

Instructions: Answer 4 Questions.
Question 1 is compulsory.

Duration:2 hours

Sitting: **Autumn 2013**

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

Answer all parts. (Total: 25 marks)

Q.1 (a) Explain how a lactic acid fermentation can be monitored in the laboratory using an acid /base titration. (2 marks)
Explain how lactic acid is produced in a flask of milk inoculated with lactococcus and give a practical example of the use of this fermentation. (4 marks)

(b) The table below indicates the final absorbance reading for *E coli* growing in three different media. Which of these media provided the optimum nutrients for *E coli*. (2 marks)

Explain how absorbance is used to measure bacterial growth. (2 marks)
Briefly discuss why the growth of *E coli* differed in these media (2 marks)
Suggest the possible differences in the composition of each of the media. (2 marks)

Abs 600nm Flask A	1.0
Abs 600nm Flask B	0.5
Abs 600nm Flask C	0.01

(c) Using a diagram show the position of the following fragments of DNA in an agarose gel following electrophoresis. (2 marks)

1. 128bp
2. 24bp
3. 85bp
4. 38bp
5. 62bp

Explain why your fragments are in these positions. (4 marks)

(d) What is a cryoprotectant?
Give one example of a cryoprotectant used for bacteria. (2 marks)

(e) State the type of microscope and magnification required when viewing
(i) Prokaryotic cells
(ii) Tissue culture in T flasks (3 marks)

Q. 2 (a) Describe the structure of DNA. (5 marks)

(b) Describe how DNA is transcribed and translated to produce a specific protein. (10 marks)

(c) Describe how DNA can be used in Forensic Analysis (10 marks)

Q. 3 (a) Using a diagram of both cell types explain the differences between Eukaryotic and Prokaryotic cells used in Biotechnology. (12 marks)

(b)List the important Prokaryotes and Eukaryotes used in Biotechnology. (6 marks)

(c)Explain the advantages of using bacterial and fungal cells in Biotechnology. (7 marks)

Q. 4 (a) Describe with the aid of a diagram a typical fermenter. (5 marks)

(b) Explain how each of the following is controlled in a fermenter. Temperature, oxygen, pH, mixing, sterility (10 marks)

(c) Describe the production of Penicillin in an industrial fermenter (10 marks)

Q. 5. Write a detailed account of how a bacterium is genetically engineered to produce human insulin.
In your answer mention; Human insulin gene, Host cell, Vector (plasmid), Restriction enzymes, DNA ligase (25 marks)

Q. 6. Write explanatory notes on **5** of the following.

(a) Batch, Continuous and Fed batch fermentation
(b) Antibody structure
(c) Polyacrylamide gel electrophoresis
(d) Biopharmaceuticals and their classification
(e) Methods of DNA isolation
(f) Steps involved in protein purification (5 marks each)