

**CORK INSTITUTE OF TECHNOLOGY**  
**INSTITIÚID TEICNEOLAÍOCHTA CHORCAÍ**

**Autumn Examinations 2011/12**

**Module Title: Biomolecules and Cells (CA)**

**Module Code:** BIOL6007

**School:** Science & Informatics

**Programme Title:** BSc in Analytical & Pharmaceutical Chemistry Y1  
BSc (Hons) in Analytical Chemistry with Quality Assurance Y1  
BSc in Applied Biosciences Y1  
BSc (Hons) in Nutrition & Health Sciences Y1  
BSc (Hons) in Pharmaceutical Biotechnology Y1  
BEng (Hons) in Chemical & Biopharmaceutical Engineering Y1

**Programme Code:** SCHEM\_7\_Y1  
SCHQA\_8\_Y1  
SBIOS\_7\_Y1  
SNHSC\_8\_Y1  
SPHBI\_8\_Y1  
ECPEN\_8\_Y1

**External Examiner(s):** Dr Don Faller

**Internal Examiner(s):** Ms Margaret Lane, Ms Anne Ward, Dr Helen O'Shea

**Instructions:** **Answer 4 Questions.**  
**Question 1 is compulsory.**  
**All questions carry equal marks.**

**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.

**Q1. Answer all parts**

- (a) How is the magnifying power of a compound light microscope calculated? (2 marks)
- (b) Explain how you would test for the presence of reducing sugar in the laboratory. (2marks)
- (c) State the positive and negative controls you would use when testing for protein (2 marks)
- (d) Define what is meant by the isoelectric point of a protein (2 marks)
- (e) Given that the isoelectric point of a particular protein is at pH5.0 plot a rough graph of pH versus turbidity to illustrate this (2 marks)
- (f) Explain why oil is used with the oil immersion objective of microscope. (2 marks)
- (g) (i) A student adds Benedicts solution to a test tube containing onion extract and waits for a colour change. What did the student forget? (1 mark)
- (ii) A student adds iodine to egg white and waits for a colour change. How long will the student have to wait? (1 mark)
- (h) State the purpose of the following parts of the binocular light microscope;
- (i) the ocular lenses
  - (ii) the stage
  - (iii) the 4x objective lens, and
  - (iv) the condenser. (2 marks)

- (i) A colorimetric method to estimate the concentration of glucose was used to generate the following data:

Glucose Concentration (%)	Time (minutes)
1	10
2	7
3	5
4	3
5	2
6	2
7	2

Plot a graph of the data & estimate the concentration of glucose solution which decolourises solution after 6 minutes. (6 marks)

- (j) Express 0.65 millilitres (ml) in micro litres ( $\mu$ l) and indicate which of the following micropipettes would best deliver this volume: P5000, P1000, P100. (3 marks)

**Q2.** (a) Distinguish between prokaryotic and eukaryotic cells (5 marks)

(b) Draw a clearly labelled diagram of a eukaryotic cell (5 marks)

(c) Write brief notes on the structure and functions of the following organelles:

(i) Endoplasmic Reticulum

(ii) Mitochondria

(iii) Nucleus

(15 marks)

- Q3.** (a) Draw a typical amino acid structure (5 marks)  
(b) List six functions of proteins and give one example of each (10 marks)  
(c) Describe the four levels of protein structure (10 marks)

- Q4.** Write a detailed account of the structure and function of carbohydrates. Use diagrams to illustrate your answer. (25 marks)

- Q5.** Write an overview of the structure and function of lipids under the following headings:
- (i) Triglycerides (7 marks)
  - (ii) Phospholipids (7 marks)
  - (iii) Steroids (7 marks)
  - (iv) Waxes. (4 marks)

- Q6.** (a) Write an explanatory account of the cell cycle. (8 marks)  
(b) Explain how the cell cycle is controlled. (7 marks)  
(c) List three differences between normal cells and cancer cells. (6 marks)  
(d) Define what is meant by apoptosis. (4 marks)

**OR**

- (a) Describe, with the aid of a diagram, the structure of Nucleic Acids (15 marks)
- (b) Using a table, compare DNA and RNA (10 marks)