

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

**Autumn Examinations 2015**

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

**Module Code:** BIOL6007

**School:** Science and Informatics

**Programme Title(s):** BSc Applied Biosciences – Year 1  
BSc (Hons) Pharmaceutical Biotechnology – Year 1  
BSc (Hons) Nutrition and Health Science – Year 1  
BSc Analytical and Pharmaceutical Chemistry – Year 1  
BSc (Hons) Analytical Chemistry – Year 1  
BSc (Hons) Environmental Science & Sustainable Technology – Yr 1  
BEng (Hons) Chemical & Biopharmaceutical Engineering – Yr 1  
BSc Applied Physics and Instrumentation – Year 1  
BSc (Hons) Instrument Engineering – Year 1

**Programmes Code(s):** SBIOS\_7\_Y1  
SPHBI\_8\_Y1  
SNHSC\_8\_Y1  
SCHQA\_8\_Y1  
SCHEM\_7\_Y1  
SESST\_8\_Y1  
ECPEN\_8\_Y1  
SPHYS\_7\_Y1  
SINEN\_8\_Y1

**External Examiner(s):** Dr Gillian Gardiner

**Internal Examiner(s):** Ms Margaret Lane, Ms Anne Ward, Ms Richenda Kiernan  
Dr Aoife McCarthy, Joanna Stanicka

**Instructions:** Answer question one and three other questions.  
All questions carry equal marks.

**Duration:** 2 hours

**Sitting:** Autumn 2015

**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.  
If in doubt please contact an Invigilator.

**Question 1 is compulsory.**

**Q1. Answer all parts.**

- (a) How is the total magnification of an image calculated when using a compound light microscope? (2 marks)
- (b) When testing for protein, reducing sugars and starch, negative and positive controls are used. What is the purpose of both positive and negative controls? (2 marks)
- (c) Give one example of a positive control and one example of a negative control that could be used when testing for protein. (2 marks)
- (d) In the table below are the results of laboratory experiments to test for the presence of macromolecules in two food samples. Study the table below and answer the following questions.

	<b>Sample 1</b>	<b>Sample 2</b>
<b>Benedict's test</b>	Red	Blue
<b>Iodine test</b>	Orange	Blue-black

- (i) What macromolecules do the Benedict's test and Iodine test identify? (2 marks)
- (ii) Are these experiments quantitative or qualitative? Give a reason for your answer. (2 marks)
- (iii) The two food samples tested were potato and orange juice. Using the results above, identify which food was labelled sample 1 and which was food was labelled sample 2. (2 marks)
- (e) A colorimetric method to estimate the concentration of glucose in a solution was used to generate the following data:

<b>Glucose Concentration (%)</b>	<b>Time (minutes)</b>
1	11
2	8
3	6
4	4
5	3
6	3
7	3

Draw a labelled graph of the data (on graph paper) and estimate the glucose concentration that decolourises the standardised solution after 5 minutes. (10 marks)

- (f) In a demonstration of osmosis, 10ml of 80% glucose solution was pipetted into a dialysis tube, which was placed into a beaker of tap water. The bag was weighed every 10 minutes for 1 hour.

Would you expect the weight of the dialysis tube to increase or decrease over time?  
Give a reason for your answer. (3 marks)

**Q2.**

- (a) List and describe the three components of a nucleotide. Use a labelled diagram to illustrate your answer. (14 marks)
- (b) State the function of both DNA and RNA. (5 marks)
- (c) Compare the components and structure of DNA and RNA. (6 marks)

**Q3.**

- (a) List 3 common features and 3 differences between prokaryotic and eukaryotic cells. (6 marks)
- (b) What two features are unique to plant cells? (2 marks)
- (c) Draw a clearly labelled diagram of a prokaryotic cell and a eukaryotic cell. (17 marks)

**Q4.** Write descriptive notes on 5 of the following organelles.

- (i) Nucleus
- (ii) Ribosomes
- (iii) Endoplasmic Reticulum
- (iv) Golgi Apparatus
- (v) Lysosomes
- (vi) Peroxisomes
- (vii) Mitochondria
- (viii) Plasma Membrane

(25 marks)

**Q5.**

- (a) Write a detailed description of the cell cycle. (10 marks)
- (b) State 3 differences between cancer cells and normal cells. (6 marks)
- (c) Write a short note on the three stages at which cell cycle control takes place. (6 marks)
- (d) What is apoptosis? (3 marks)

**Q6.**

- (a) Describe with the aid of a labelled diagram how a triglyceride is synthesised from its subunits and describe the reaction that takes place. (10 marks)
- (b) Distinguish between saturated and unsaturated lipids, in terms of their structure and characteristics. (5 marks)
- (c) Write a short note on the structure and function of each of the following:
  - (i) steroids
  - (ii) phospholipids(10 marks)