CORK INSTITUTE OF TECHNOLOGY
INSTITIÚID TEICNEOLAÍOCHTA CHORCAÍ

Autumn Examinations 2016

Module Title: Biomolecules and Cells

Module Code: **BIOL6007**

School: **Science and Informatics**

Programme Title(s):
BSc. Applied Biosciences – Year 1
BSc. (Hons.) Common Entry Biological Sciences – 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 and Sustainable Technology – Year 1
BEng. (Hons.) Chemical and Biopharmaceutical Engineering – Year 1
BSc. Applied Physics and Instrumentation – Year 1
BSc. (Hons.) Instrument Engineering – Year 1
Diploma Biopharmaceutical Manufacturing Operations – Year 1
Certificate Biopharmaceutical Manufacturing Operations – Year 1
Higher Certificate in Science – Good Manufacturing Practice – Year 1

Programmes Code(s): **SBIOS_7_Y1, SCEBS_8_Y1, PBHI_8_Y1, SNHS1_8_Y1, SCHQA_8_Y1, SCHEM_7_Y1, SESST_8_Y1, ECPEN_8_Y1 SPHYS_7_Y1, SINEN_8_Y1, EBPMO_7_Y1, EBIMO_6_Y1, SGMPR_6_Y1**

External Examiner(s): **Dr Brendan O'Donnell**

Internal Examiner(s): **Ms. Margaret Lane, Ms. Anne Ward, Ms. Richenda Kiernan, Dr Aoife McCarthy, Dr Eamonn Culligan**

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

Duration: 2 hours

Sitting: Autumn 2016

Requirements for this examination: Calculator

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) Muscle cells were examined under the 10x objective lens using a compound light microscope. What was the total magnification of the image formed? (3 marks)

(b) Complete the following table. (9 marks)

	Reagent	Colour **change** expected in positive sample	Positive control
Protein			
Reducing Sugars			
Starch			

(c) A colorimetric method to estimate the concentration of protein in a solution was used to generate the following data:

Protein Concentration (%)	**Absorbance at 540nm**
0	0
0.2	0.09
0.4	0.19
0.6	0.26
0.8	0.34
1.0	0.43

Draw a labelled graph of the data (on graph paper) and estimate the protein concentration (%) of a solution with an absorbance reading at 540nm of 0.25.
(10 marks)

(d) In a demonstration of osmosis, 10ml of 40% glucose solution was pipetted into a dialysis tube, which was placed into a beaker of 10% glucose solution. 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) Carbohydrates can be classified by their complexity, size and functional groups. Describe these classifications, making use of examples throughout. (18 marks)

(b) Describe with the use of a labelled diagram how two glucose molecules can join to become a disaccharide. (7 marks)

Q3.

(a) List and describe four functions of proteins and give examples of each. (12 marks)

(b) Describe the four levels of protein structure. (13 marks)

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

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

(25 marks)

Q5.

(a) Draw a clearly labelled diagram of a prokaryotic cell, showing at least 5 structures. (7 marks)

(b) List 4 common features and 4 differences between prokaryotic and eukaryotic cells. (8 marks)

(c) What two features are unique to plant cells? (2 marks)

(d) Describe the surface area to volume ratio in relation to cell size. In your answer include a description of whether prokaryotic or eukaryotic cells have a greater surface area to volume ratio and what this means for the cell. (8 marks)

Q6.

(a) Write a detailed description of the phases of the cell cycle. Use a labelled diagram to illustrate your answer. (14 marks)

(b) State 4 differences between cancer cells and normal cells. (8 marks)

(c) Outline the role of proteins in the control of the cell cycle. (3 marks)