

**CORK INSTITUTE OF TECHNOLOGY
INSTITIÚID TEICNEOLAÍOCHTA CHORCAÍ**

Autumn Examination 2013

Module Title: Biomolecules and Cells (CA)

Module Code: BIOL6007

School: Science

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

Programme Code: SBIOS_7_Y1
PBHI_8_Y1
SNHSC_8_Y1
SCHQA_8_Y1
SCHEM_7_Y1

External Examiner(s): Dr Gillian Gardiner

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

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.

Q1 is Compulsory

Q1. Answer all parts

(Total 25 marks)

Q1(a) List the methods you would use to determine if the following substances are present in a solution.

- (i) Protein
- (ii) Glucose
- (iii) Starch

(1 mark each)

(iv) Explain the use of controls in the above procedures. (2 marks)

(b)(i) What is the total magnification possible using the compound light microscopes you used during your laboratory sessions. (1 mark)

(ii) Explain why oil is used with the compound light microscope. (3 marks)

(iii) What samples are viewed using oil immersion? (1 mark)

(c)(i) What is a standard graph? (2 marks)

(ii) Give one example of a (straight line) standard graph you have plotted in the laboratory and explain how and when you would use this graph. (3 marks)

(d)(i) What is TLC? (3 marks)

(ii) Explain how you would use TLC to determine the presence of an amino acid in a solution. (2 marks)

(e) The following experiment was set up in the lab to demonstrate Diffusion. Answer the questions asked regarding the outcome of this experiment.

5 ml of 8% glucose solution was placed in a cellulose bag and 8 mls of fresh starch solution was added. The open end of the bag was closed by making a knot. The contents were mixed and the outside surface of the bag was carefully rinsed under tap water. The bag was floated in a 100-ml graduated cylinder two-thirds filled with water. 2 or 3 drops of iodine were added to the water in the graduated cylinder and the entire apparatus was allowed to stand for one hour. The contents of both the cellulose bag and the graduated cylinder were observed.

(i) Explain the observed results of this experiment. (3 marks)

(ii) Did diffusion occur through the cellulose tubing? If so which of the three molecules diffused? (1 mark)

(iii) Have any starch molecules escaped from the bag into the iodine solution? How do you know? (1 mark)

- Q2.** (a) List the functions of Carbohydrates. (4 marks)
(b) Using examples describe the structure of carbohydrates using the following terms.
- (i) The number of carbons they contain. (triose, pentose, hexose) (6 marks)
 - (ii) Their shape (aldose, ketose) (5 marks)
 - (iii) Their size (mono, di, poly saccharides) (10 marks)

- Q3.** (a) Describe the structure of an amino acid (5 marks)
(b) Describe the formation of a peptide bond (5 marks)
(c) The final shape of a protein, in a large measure, determines its function in the cells and body of an organism.
- Describe in detail how the final shape of a protein is determined by the 4 possible levels of structure that can occur. (15 marks)

- Q4.** (a) Explain why many small cells have an advantage over fewer larger cells. (5 marks)
(b) Using a diagram describe the method you would use to isolate ribosomes from cells (6 marks)
(c) State the cell theory. (4 marks)
(d) Write a brief note on the various types of microscopes that can be used to visualise cells and their organelles. (10 marks)

OR

- (i) What are prokaryotes? (5 marks)
- (ii) Draw a diagram of a prokaryotic cell and label at least 5 structures. (15 marks)
- (iii) Describe the appendages found on prokaryotes. (5 marks)

Q5. Write descriptive notes on 5 of the following found in Eukaryotic cells.

Nucleus

Endoplasmic reticulum

Golgi apparatus

Ribosomes

Mitochondria

Cell membrane

Cytoskeleton

Lysosomes & Peroxisomes

(25 marks)

Q6. (a) Define what is meant by Apoptosis. (5 marks)

(b) Describe the three phases that occur during the interphase of the cell cycle. (7 marks)

(c) Explain where and how the cell cycle is controlled. (8 marks)

(d) List the main differences between cancer cells and normal cells. (5 marks)