

**CORK INSTITUTE OF TECHNOLOGY  
INSTITIÚID TEICNEOLAÍOCHTA CHORCAÍ**

**Autumn Examinations 2010/11**

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

**Module Code:** BIOL6007

**School:** Biological Science

**Programme Title:**

Bachelor of Science in Applied Biosciences & Biotechnology – Year 1

Bachelor of Science (Honours) in Pharmaceutical Biotechnology – Year 1

Bachelor of Science (Honours) in Nutrition and Health Science – Year 1

Bachelor of Science in Analytical & Pharmaceutical Chemistry – Year 1

Bachelor of Science (Honours) in Analytical Chemistry with Quality Assurance – Year 1

Bachelor of Engineering (Honours) in Chemical & Biopharmaceutical Engineering – Year 1

**Programme Code:** SBIOS\_7\_Y1

SPHBI\_8\_Y1

SHNSC\_8\_Y1

SCHEM\_7\_Y1

SCHQA\_8\_Y1

ECPEN\_8\_Y1

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

**Internal Examiner(s):** Ms Margaret Lane, Ms Richenda Kiernan, Ms Anne Ward

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

**Duration:** 2 Hours

**Sitting:** Autumn 2011

**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 (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 protein in the laboratory. (2 Marks)
- (c) State the positive and negative controls you would use when testing for
  - (i) protein and
  - (ii) reducing sugar (2 Marks)
- (d) A length of dialysis tubing containing 5 ml of glucose and 20mls of starch solution is suspended in a large beaker containing water and iodine. What visible results would you see after an hour? Why? (3 Marks)
- (e) Define what is meant by the isoelectric point of a protein. (2 Marks)
- (f) When using a microscope which objective lens should be in place before and after use. (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. (4 Marks)
- (i) On a rough graph of protein conc. (%) versus absorbance at 540nm illustrate how you would estimate the protein concentration of an unknown solution whose absorbance at 540nm you have measured. (3 Marks)
- (j) Express 0.65millilitres (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) Draw a clearly labelled diagram of a eukaryotic cell (5 Marks)
- (b) Write brief notes on the structure and functions of the following organelles:
- (i) Endoplasmic Reticulum
  - (ii) Mitochondria
  - (iii) Nucleus
  - (iv) Ribosomes (20 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 an account of carbohydrates using the following headings:
- (i) Number of carbons
  - (ii) Shape
  - (iii) Size
- Give specific examples for each. (25 Marks)
- Q5. (a) Outline the differences between DNA and RNA (10 Marks)
- (b) Briefly describe the structure of a phospholipid molecule and explain its importance in the structure of the cell membrane (10 Marks)
- (c) Distinguish between saturated and unsaturated fats and describe the structure of a triglyceride molecule. (5 Marks)
- Q6. Write an explanatory account of the cell cycle. In your answer mention how the cycle is controlled. (25 Marks)