CORK INSTITUTE OF TECHNOLOGY
INSTITIÚID TEICNEOLAÍOCHTA CHORCAÍ

Autumn Examinations 2009/10

Biomolecules and Cells: CA

Module Code: BIOL6007

School: Science

Programme Title: **Bachelor of Science (Chemistry and Biology)**

Programme Code: **CR_SCHQA_8_Y1**
CR_SCHEM_7_Y1
CR_SBIOS_7_Y1
CR_SPHBI_8_Y1
CR_SHNSC_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 2010

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 the microscope calculated? (2 marks)

(b) Explain how you would test for the presence of protein in the laboratory. (2marks)

(c) Explain how you would test for the presence of a reducing sugar in the laboratory. (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) Given that the isoelectric point of a particular protein is at pH 5.0 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 a microscope. (2 marks)

(g) What will result if a dialysis bag containing 60% sucrose solution is placed in a beaker of distilled water? Explain the reason for your answer. (2 marks)

(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 0.35millilitres (ml) in micro litres (µl) and indicate which of the following micropipettes would best deliver this volume: P5000, P1000, P100. (3 marks)

Q2. (a) List the important macromolecules in Biological systems (3 marks)

(b) Give an example of each. (3 marks)

(c) State the subunit/monomer of each. (3 marks)

(d) Explain how all monomers are combined to form polymers. (8 marks)

(e) List the functions of proteins. (5 marks)

(f) Draw a typical Amino acid structure (3 marks)

Q3. (a) List the functions of carbohydrates (5 marks)

(b) Explain using specific examples and diagrams how carbohydrates are divided into specific groups based on (i) number of carbons (ii) shape (iii) size. (20 marks)

Q4. Write a detailed account of lipids . In your answer mention structures and functions of each lipid discussed. (25 marks)

Q5. (a) Explain why cells are small. (8 marks)

(b) Explain how cell fractionation and differential centrifugation can be used to isolate a cell organelle. (8 marks)

(c) Write a brief note on the structure and function of the plasma membrane. (9 marks)

OR

(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) Lysosomes

(iv) Nucleus (20 marks)

Q6. Write an explanatory account of the cell cycle. In your answer mention how the cycle is controlled.

(25 marks)