

CORK INSTITUTE OF TECHNOLOGY
INSTITIÚID TEICNEOLAÍOCHTA CHORCAÍ

Semester 1 Examinations 2011/12

Module Title: Structural Biochemistry

Module Code: BIOL6024

School: Science

Programme Title: Bachelor of Science in Applied Biosciences
 Bachelor of Science (Honours) in Herbal Science
 Bachelor of Science (Honours) in Pharmaceutical Biotechnology
 Bachelor of Science (Honours) in Nutrition & Health Science
 Bachelor of Science (Honours) in Analytical Chemistry with Quality Assurance
 Bachelor of Science Analytical/Pharmaceutical Chemistry

Programme Code: SBIOS_7_Y2
 SHERB_8_Y2
 SPHBI_8_Y2
 SNHSC_8_Y2
 SCHQA_8_Y2
 SCHEM_7_Y2

External Examiner(s): Dr. Anne Nelson
Internal Examiner(s): Dr. Heloise Tarrant
 Ms. Susan Bullman

Instructions: Answer Section A (compulsory) and TWO questions from
 Section B.

Duration: 2 hours

Sitting: Winter 2011

Requirements for this examination: Scientific Calculator

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.

Section A (50 marks)

Q1. (*compulsory*) Answer all parts

- (a) Draw and name the structure of one amino acid in each of the following groups:
 - a. neutral and hydrophobic
 - b. sulphur-containing
 - c. acidic (negatively charged)
- (b) Name two structural features that will affect the melting point of a fatty acid.
- (c) With reference to membrane proteins; define the terms **passive** and **active** transport, and distinguish between **symport** and **antiport** mechanisms.
- (d) What are the four major classes of macromolecule present in living cells?
- (e) Name and draw five different functional groups that can be found on biomolecules.
- (f) Draw a diagram illustrating the condensation of two amino acids to form a dipeptide
- (g) Define the terms **pH**, **pKa**, and **pI**.
- (h) Draw a diagram illustrating how DNA is packaged to fit within the nucleus.
- (i) Draw the structure of ATP.
- (j) What is the T_m of a piece of DNA? How would you determine this in the lab? Why is it useful?

Section B (50 marks)

Answer any two questions.

- Q2.** (a) List the main roles of proteins in biological systems. [5 marks]
- (b) Define protein denaturation. List four ways in which proteins may be denatured. Are any of these likely to be reversible? [10 marks]
- (c) Name the four levels of protein architecture, and write brief notes on each [10 marks]

- Q3** (a) Write a note on two common sources of damage to the DNA double helix. [5 marks]
- (b) Write a short essay on replication in bacteria, using diagrams to illustrate your answer. [20 marks]

- Q4** (a) Outline the functions of carbohydrates in living organisms [5 marks]
- (b) Using glucose as an example, describe how monosaccharides can exist as different stereoisomers (i.e. D and L stereoisomers, α and β stereoisomers). [10 marks]
- (c) Explain the structural difference that allows humans to use starch and glycogen as energy sources, but makes cellulose indigestible to us. [10 marks]