

**CORK INSTITUTE OF TECHNOLOGY  
INSTITIÚID TEICNEOLAÍOCHTA CHORCAÍ**

**Semester 1 Examinations 2010/11**

**Module Title: Structural Biochemistry**

**Module Code: BIOL6024**

**School: Science**

**Programme Title: Bachelor of Science in Applied Biosciences – Stage-2  
Bachelor of Science in Analytical and Pharmaceutical Chemistry – Stage 2  
Bachelor of Science in Analytical Chemistry with Quality Assurance-**

**Stage2**

**Bachelor of Science (Honours) in Herbal Science – Stage 2**

**Programme Code: SBIOS\_7\_Y2  
SCHEM\_7\_Y2  
SCHQA\_8\_Y2  
SHERB\_8\_Y2**

**External Examiner(s): Dr Anne Nelson  
Internal Examiner(s): Dr Brendan O’Connell  
Dr Heloise Tarrant**

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

**Duration: 2 hours**

**Sitting: Autumn 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) Outline the different levels of protein structure.
- (b) Draw a diagram illustrating the condensation of two amino acids to form a dipeptide.
- (c) Define protein denaturation. List five ways in which proteins may be denatured.
- (d) Draw the structure of sucrose
- (e) Write a short note on storage polysaccharides.
- (f) List the functions of carbohydrates in living organisms.
- (g) Describe the role of lipids in biological membranes.
- (h) Distinguish using examples, the structural difference between a purine and a pyrimidine.
- (i) Outline how you would assess the accuracy and precision of a pipetting procedure, and comment on the statistical parameters you would use.
- (j) Briefly outline the steps involved in DNA transcription.
- (k) A solution containing  $10^{-5}\text{M}$  ATP has a transmission of 73.2% at 260nm in a 1 cm cuvette. Calculate the transmission of the solution in a 3 cm cuvette with  $l = 3$  cm.
- (l) A 3mg% of tyrosine solution (MW=181) in a 0.1M solution of HCl has an absorbance of 0.272 at 274 nm in a 1 cm quartz cuvette. Calculate the molar extinction coefficient of tyrosine.

**Section B (50 marks)**

**Answer any two questions**

**Q2.**

- (a) Describe the classification of amino acids. Draw and name an example in each case.  
(5 marks)
- (b) Discuss the acid base properties of amino acids.  
(10 marks)
- (c) Use the Henderson-Hasselbach equation to prepare 100ml of a 0.05M phosphate buffer, pH 7.2.  
(Given  $pK_a = 7.2$ , MW  $Na_2HPO_4 \cdot 7H_2O = 268g/mol$ , MW  $NaH_2PO_4 \cdot 2H_2O = 156g/mol$ )  
(10 marks)

**Q3.**

- (a) List the main biological roles of lipids.  
(5 marks)
- (b) Describe the structure and properties of fatty acids.  
(10 marks)
- (c) Write brief notes on each of the different classes of lipids, using diagrams to illustrate your points.  
(10 marks)

**Q4.**

- Describe the process of replication in bacteria, use diagrams to illustrate your points.  
(25 marks)