

**CORK INSTITUTE OF TECHNOLOGY
INSTITIÚID TEICNEOLAÍOCHTA CHORCAÍ**

Semester 1 Examinations 20010/11

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

**Programme Code: SBIOS_7_Y2
SCHEM_7_Y2
SHERB_8_Y2
SCHQA_8_Y2
SNHSC_8_Y2
SPHBI_8_Y2**

**External Examiner(s): Dr Anne Nelson
Internal Examiner(s): Dr Brendan O’Connell,
Dr Siobhán O’Sullivan**

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

Duration: 2 hours

Sitting: Winter 2010

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 10 parts. (All parts 5 marks)

- (a) Write a short note on structural polysaccharides.
- (b) Draw and name the structure of an amino acid in each of the following groups:
 - Neutral and hydrophobic
 - Sulphur-containing
 - Acidic (negatively charged).
- (c) Draw the structure of maltose. Highlight the significance of the type of bonding present in such a molecule.
- (d) Describe, with the aid of a diagram, the structure of a phospholipid and a neutral lipid.
- (e) Outline the classification of lipids.
- (f) Describe the role of lipids in biological membranes.
- (g) Distinguish using examples, the structural difference between a purine and a pyrimidine.
- (h) Describe, using a diagram, the principle of ion exchange chromatography.
- (i) Briefly outline the steps involved in DNA transcription.
- (j) Describe the preparation of 3 litres of 0.2M acetate buffer pH 5.0 starting from solid sodium acetate hydrate (MW 136) and a 1M solution of acetic acid. The pK_a of acetic acid is 4.77.
- (k) A solution containing 10^{-5} M ATP has a transmission of 70.2% 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 0.222 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) Outline the functions of carbohydrates in living organisms.
(5 marks)
- (b) Describe, using diagrams, the stereoisomers of carbohydrates
(10 marks)
- (c) Describe the biologically important derivatives of monosaccharides
(10 marks)

Q3.

- (a) Outline the different functions of proteins in living organisms.
(5 marks)
- (b) Describe the different levels of protein structure.
(10 marks)
- (c) Outline the steps involved in determining the primary structure of a protein.
(10 marks)

Q4.

- (a) Using illustrations describe DNA replication. Comment on the various proteins involved.
(15 marks)
- (b) Describe the role of restriction enzymes in disease detection.
(10 marks)