

CORK INSTITUTE OF TECHNOLOGY
INSTITIÚID TEICNEOLAÍOCHTA CHORCAÍ

Semester 2 Examinations 2014/2015

Module Title: Bioanalytical Techniques

Module Code: BIOT7002

School: Science

Programme Title: Bachelor of Science Applied Biosciences – Year 2
 Bachelor of Science (Honours) Pharmaceutical Biotechnology – Year 2
 Bachelor of Science (Honours) Nutrition & Health Science – Year 2
 Bachelor of Science (Honours) Herbal Science - Year 2

Programme Code: **SBIOS_7_Y2**
 SPHBI_8_Y2
 SNHSC_8_Y2
 SHERB_8_Y2

External Examiner(s): Dr. Tom O Connor

Internal Examiner(s): Ms Anne Ward

Instructions: Answer FOUR questions only. All questions carry equal marks

Duration: 2 Hours

Sitting: Summer 2015

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. (a) List the main types of cell disruption techniques used for protein purification (5 marks)

(b) Outline each of the following types of centrifugal separation technique:

(i) Differential Centrifugation (7 marks)

(ii) Density Gradient Centrifugation (7 marks)

Use diagrams where relevant to illustrate your answer

(c) List three applications of isopycnic density gradient centrifugation (3 marks)

(d) List the three categories into which centrifugation rotors can be classified (3 marks)

Q2. (a) Write a short overview of the principle of separation in each of the following techniques:

(i) Agarose gel electrophoresis (5 marks)

(ii) SDS- PAGE (5 marks)

(b) In the design of a Polyacrylamide Gel Electrophoresis system what are the important experimental considerations? (12 marks)

(c) List three methods of analysis post-electrophoresis (3 marks)

Q3. (a) Illustrate and explain the principle of separation in gel filtration chromatography (10 marks)

(b) How would you determine the K_{av} of a gel filtration gel? (5 marks)

(c) List two examples of gel filtration media (5 marks)

(d) Briefly describe the principle and application of dialysis (5 marks)

Q4. (a) Outline the principle of separation in gas chromatography (8 marks)

(b) List the main types of stationary phase used in gas chromatography (5 marks)

(c) What type of detector systems are commonly used in gas chromatography? (5 marks)

(d) What is the principle of analysis in Infra-Red Spectroscopy? (7 marks)

Q5. (a) Describe with the aid of a diagram the principle of ion exchange chromatography. (10 marks)

(b) Outline the method of HPLC under the following headings:

- (i) Principle of Reverse-Phase Chromatography (5 marks)
- (ii) Stationary and Liquid Phases (5 marks)
- (iii) HPLC detection systems (5 marks)

Q6. (a) Describe the principle of Affinity chromatography under the following headings:

- (i) Mechanism of separation (7 marks)
- (ii) Preparation of Affinity matrix (5 marks)
- (iii) Adsorption and elution of biomolecules (5 marks)

(b) Draw a diagram to illustrate the principle (5 marks)

(c) List three applications of Affinity chromatography (3 marks)