

**CORK INSTITUTE OF TECHNOLOGY**  
**INSTITIÚID TEICNEOLAÍOCHTA CHORCAÍ**

**Semester 2 Examinations 2009/2010**

**Module Title: Bioanalytical Science IV**

**Module Code: BIOT6002**

**School: Science**

**Programme Title: Bachelor of Science in Applied Biosciences**

**Programme Code: SBIOS\_7\_Y2**

**External Examiner(s): Prof. Gary Walsh**  
**Internal Examiner(s): Ms. Anne Ward**

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

**Duration: 2 Hours**

**Sitting: Summer 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. (a) Describe with the aid of a diagram the principle of Gel Filtration Chromatography. (12 marks)

(b) Write a brief note on:

(i) Gel Filtration media

(ii) Gel Filtration experimental technique (5 marks)

(c) Define each of the following:

(i) Elution Volume ( $V_e$ )

(ii) Void Volume ( $V_o$ )

(iii) Partition Coefficient ( $K_{av}$ )

(iv) Total Bed Volume ( $V_t$ ) (8 marks)

Q2. In relation to Affinity Chromatography:

(a) Briefly describe the principle of the separation technique. (10 marks)

(b) Outline, **TWO** important applications. (8 marks)

(c) Describe the experimental method under the following headings:

(i) Preparation Phase

(ii) Adsorption Phase

(iii) Elution Phase (7 marks)

- Q3. (a) Describe the principle of **TWO** of the following electrophoretic techniques:
- (i) SDS – Polyacrylamide Gel Electrophoresis
  - (ii) Rocket Immuno-electrophoresis
  - (iii) Iso-electric Focusing (10 marks)
- (b) Outline, the main methods of identification and quantitation of proteins and nucleic acids post electrophoresis. (15 marks)
- Q4. (a) Illustrate and explain the principle of a heterogeneous reagent limited competitive immunoassay. (15 marks)
- (b) Define each of the following:
- (i) Monoclonal antibody
  - (ii) Polyclonal antibody (10 marks)
- Q5. (a) Write a short overview of the principle of TWO quantitative immuno-precipitation assays. Include diagrams to illustrate your answer. (16 marks)
- (b) Explain the importance of the host animal immune response in polyclonal antibody production. (9 marks)
- Q6. (a) Outline the main performance characteristics required to achieve a reliable assay in bioanalytical testing. (12 marks)
- (b) Write a short note on the use of control charts in internal quality control assessment. (13 marks)