

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

**Semester 2 Examinations 2010/2011**

**Module Title: Bioanalytical Science IV**

**Module Code: BIOT6002**

**School: Science**

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

**Programme Code:** SBIOS\_7\_Y2  
SPHBI\_8\_Y2  
SNHSC\_8\_Y2

**External Examiner(s): Dr. J. Bird, Dr. A. Gallagher, Dr. A. Nelson**

**Internal Examiner(s): Ms. Anne Ward**

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

**Duration: 2 Hours**

**Sitting: Summer 2011**

**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 and illustrate each of the following immunoprecipitation techniques:
- (i) Immunodiffusion (Ouchterlony Assay) (8 Marks)
  - (ii) Single Radial Immunodiffusion (SRID) (7 Marks)
- (b) Outline the principle of any immunoelectrophoretic separation technique (10 Marks)
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- Q2. (a) Define each of the following:
- (i) Primary immune response (4 Marks)
  - (ii) Secondary immune response (4 Marks)
  - (iii) Monoclonal antibody (4 Marks)
  - (iv) Polyclonal antibody (4 Marks)
- (b) Write a brief overview of the assessment of both precision and accuracy for quality assurance in a bioanalytical laboratory. (9 Marks)
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- Q3. (a) Describe the principle of each of the following:
- (i) SDS Polyacrylamide Gel Electrophoresis (8 Marks)
  - (ii) Isoelectric Focusing (7 Marks)
- (b) Write a brief overview of detection & quantitation methods used for both proteins and nucleic acids after electrophoresis. (10 Marks)
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- Q4. (a) Define what is meant by a heterogeneous immunoassay. (10 Marks)
- (b) Illustrate the principle of a heterogeneous reagent excess non-competitive immunoassay (15 Marks)

- Q5. (a) Describe with the aid of a diagram the principle of
- (i) Ion exchange chromatography (8 Marks)
  - (ii) Affinity chromatography (9 Marks)
- (b) Outline, TWO important applications of Affinity Chromatography (8 Marks)
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- Q6. (a) Describe 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)