

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

**Semester 1 Examinations 2013/2014**

**Module Title: Immunoanalysis**

**Module Code: BIOT6002**

**School:** Science & Informatics

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

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

**External Examiner(s):** Dr Gillian Gardiner  
**Internal Examiner(s):** Ms Anne Ward

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

**Duration:** 2 Hours

**Sitting:** Winter 2013

**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) Draw a labelled diagram to represent the structure of the IgG molecule. (5 marks)
- (b) Explain what occurs during the primary and secondary immune responses. Draw a graph which shows how the levels of IgG vary over time for both the primary & secondary immune responses. (12 marks)
- (c) Define each of the following:
- (i) polyclonal antibody (4 marks)
  - (ii) monoclonal antibody (4 marks)
- Q2. (a) Give a brief overview of the method of polyclonal antibody production and purification. In your answer describe the principle of immunoaffinity chromatography. Use diagrams to illustrate your answer. (18 marks)
- (b) Define each of the following terms:
- (i) Immunogen (3 marks)
  - (ii) Adjuvant (4 marks)
- Q3. (a) What is a heterogeneous immunoassay? (7 marks)
- (b) Describe the principle of ONE of the following heterogeneous immunoassays:
- (i) Non-competitive sandwich immunoassay
  - (ii) Competitive immunoassay
- Show a diagram illustrating the principle of the assay. (12 marks)
- (c) List three labels that are commonly used as detection methods in immunoassay systems. (6 marks)

- Q4. (a) Explain the basis of an immunoprecipitation reaction between an antibody and an antigen. (4 marks)
- (b) Illustrate each of the following immunoprecipitation assays and describe the principle of each assay:
- (i) Single radial immunodiffusion (7 marks)
  - (ii) Rocket Immunoelectrophoresis (7 marks)
  - (iii) Ouchterlony assay (7 marks)
- Q5. (a) Define what is meant by validation. (5 marks)
- (b) List three situations when an immunoassay method should be validated. (3 marks)
- (c) Write a short overview of each of the following validation parameters:
- (i) Precision (5 marks)
  - (ii) Limit of Quantitation (4 marks)
  - (iii) Accuracy (5 marks)
  - (iv) Specificity / Interferences (3 marks)
- For each parameter, describe briefly how you would assess it in a validation study.
- Q6. (a) Define each of the following:
- (i) Internal Quality Control (4 marks)
  - (ii) External Quality Assessment (4 marks)
- (b) Write a brief overview of the use of control charts in Internal Quality Control under the following headings:
- (i) Statistics used (3 marks)
  - (ii) Control limits (3 marks)
  - (iii) Non-random patterns (3 marks)
- (c) List the important stages of immunoassay development. (5 marks)
- (d) List any three optimisation parameters that should be investigated in a typical immunoassay optimisation protocol. (3 marks)