

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

**Semester 1 Examinations 2014-2015**

**Module Title: Immunoanalysis**

**Module Code: BIOT6002**

**School:** Science

**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):** Anne Ward

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

**Duration:** 2hr

**Sitting:** Semester 1 2014

**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) Define each of the following:

- (i) Epitope (2 marks)
- (ii) Paratope (2 marks)
- (iii) Monoclonal antibody (2 marks)
- (iv) Polyclonal antibody (2 marks)

(b) Draw a fully labelled diagram illustrating the structure of IgG. (8 marks)

(c) Define each of the following:

- (i) Primary immune response (2 marks)
- (ii) Secondary immune response (2 marks)

Include a graph illustrating the antibody response during each of these immune responses.

(5 marks)

Q2. (a) Explain the principle of a non-competitive sandwich immunoassay. Use a diagram to illustrate your answer. (12 marks)

(b) Draw an example of the calibration curve typical of this type of immunoassay

(6 marks)

(c) Describe briefly the type of label which would be used for this type of immunoassay

(7 marks)

Q3. (a) Illustrate the principle of each of the following immunoprecipitation assays:

- (i) Rocket immunoelectrophoresis (6 marks)
- (ii) Ouchterlony Assay (6 marks)
- (iii) Immunoelectrophoresis (6 marks)

Include diagrams to illustrate all methods

(b) For Single Radial Immunodiffusion (SRID) outline why this is classified as a quantitative assay

(7 marks)

Q4. (a) Write a brief overview of the use of control charts in Internal Quality Control under the following headings:

- (i) Statistics (5 marks)
- (ii) Control limits (5 marks)
- (iii) Non-random patterns (5 marks)

(b) In Good Laboratory Practice (GLP) sources of error must be identified and eliminated to achieve a reliable assay. Outline the main sources of error associated with analytical methods.

(10 marks)

Q5. (a) Outline how you would validate a typical immunoassay (5 marks)

(b) Outline how you would optimise a typical immunoassay (5 marks)

(c) Write a brief overview of each of the following statistical parameters:

- (i) Precision (5 marks)
- (ii) Accuracy (5 marks)

In your answer, outline how you would calculate each of these parameters (5 marks)

Q6 (a) Define what is meant by a heterogeneous immunoassay (5 marks)

(b) Outline, using a diagram for illustration the principle of immunoaffinity chromatography (12 marks)

(c) In polyclonal antibody production define each of the following:

- (i) Immunogen (4 marks)
- (ii) Adjuvant (4 marks)