

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

**Semester 1 Examinations 2014/2015**

**Module Title: Industrial Biotechnology**

**Module Code:** BIOT 7003

**School:** Science

**Programme Title:** BSc Applied Biosciences& Biotechnology  
BSc (Hons) in Analytical Chemistry with Quality Assurance  
BSc Analytical and Pharmaceutical Chemistry

**Programme Code:** CR\_SBIBI\_7  
CR\_SCHQA\_8  
CR\_SCHEM\_7

**External Examiner(s):** Dr Gillian Gardiner  
**Internal Examiner(s):** Ms Margaret Lane

**Instructions:** Answer 4 Questions. All questions carry equal marks.

**Duration:** 2 hours

**Sitting:** Winter 2014/2015

**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 requirements for a Bioreactor and list the parameters that should be considered when designing a bioreactor for a specific process. (10 marks)

(b) Briefly explain the design and operation of each of the following bioreactors:

Stirred Tank Bioreactor

Bubble Column

Airlift loop

Packed bed

Wave bag

(15 marks)

Q2 Explain the following as they relate to a biotechnology Industry

(a) Start up and technology transfer

(5 marks)

(b) Design Criteria for a production facility

(4 marks)

(c) Containment

(4 marks)

(d) Process Validation

(12 marks)

Q3 List and discuss the various cell expression systems used in Biotechnology.

In your answer include the advantages and disadvantages of each.

(25 marks)

Q4 Write descriptive notes on both of the following:

(a) Mammalian cell culture media

(15 marks)

(b) Different types of water and their uses in the Biotechnology Industry.

(10 marks)

- Q5 (a) Explain the LAL test. Include the principle of the test and its importance in the pharmaceutical industry. (9 marks)
- (b) Describe the three Endotoxin testing methods used for pharmaceutical products. (16 marks)
- Q6 List and describe the main steps in Downstream processing. Explain where these steps would vary depending on the type of product being produced and whether the product was intracellular or extracellular. (25 marks)