

# Cork Institute of Technology

Bachelor of Science (Honours) in Applied BioSciences – Award

(Bachelor of Science in Applied BioSciences – Award)

(NFQ – Level 8)

Autumn 2005

## Molecular Genetics & Cell Biology

(Time: 3 Hours)

### Instructions

Answer Question 1 and THREE others,  
choosing one question from each of Sections A  
& B. Use separate answer books for each  
Section.

Examiners: Dr. T. Beresford

Dr. R. Sleator

Dr. H. Tarrant

Dr. H. O Shea

- Q1.** (i) Describe the various levels of packaging necessary for DNA to physically fit into the nucleus.
- (ii) Describe Mendel's laws of inheritance.
- (iii) Describe briefly the different types of vector used to construct genomic libraries.
- (iv) There are two types of genetic marker: **Morphological markers** and **DNA markers**, write a brief note describing each.
- (v) Describe the use of re-association kinetics to analyse sequence complexity.
- (vi) Write notes on collagen.
- (vii) Describe the grafting experiments used to illustrate the concept of a cell's 'positional value'.
- (viii) Discuss, using examples, the genetic mechanisms underlying retinoblastoma.
- (ix) Draw a comprehensive diagram illustrating the different events involved in neuronal signal transmission at a typical chemical synapse. In your labelling of the diagram indicate clearly the sequence in which these events occur.
- (x) Describe, with the aid of diagram(s), the changes in ion channel permeability and current flow that occurs during the three main phases of the action potential.

## Section A (Molecular Genetics)

Answer at least ONE question from this Section. Each question carries 20 Marks.

- Q2. “Genetic mapping resolution has been increased through the application of recombinant DNA technology”. Discuss this statement.
- Q3. Write an essay on the human genome project with particular reference to project goals, milestones to date i.e. what the draft sequence tells us, and future challenges in the post-genomic era.
- Q4. Write notes on each of the following chromosomal structures
- (a) The Centromere
  - (b) Telomeres
  - (c) Origins of replication.

## Section B (Cell Biology)

Answer at least ONE question from this Section. Each question carries 20 Marks.

- Q5. Discuss Antigen Processing and Presentation.
- Q6. Discuss the different forms of Cell Death, commenting on the role apoptosis plays in disease.
- Q7. Discuss, using examples, genetic changes in tumor cells.