

Cork Institute of Technology

Bachelor of Science (Honours) in Applied Biosciences – Award

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(NFQ – Level 8)

Spring 2005

Molecular Genetics & Cell Biology

(Time: 3 Hours)

Instructions

Examiners: Dr. R. Sleator
Dr. H. Tarrant
Dr. H. O'Shea
Dr. T. Beresford

Question 1 is compulsory. Answer all parts.

- Q1.
- (i) Describe Mendel's Laws of Inheritance.
 - (ii) In 1915 Thomas Hunt Morgan published "The mechanism of Mendelian Heredity",

what are its major tenets?
 - (iii) Define the term **Karyotype**, **Karyogram** and **Idiogram**.
 - (iv) Describe the use of re-association kinetics to analyse sequence complexity.
 - (v) Discuss the role of telomerase in compensating for the "end replication problem" during eukaryote cell division.
 - (vi) Write notes on collagen.
 - (vii) Describe, using a diagram, endogenous antigen presentation.
 - (viii) Discuss, using a diagram, the oncogene transfection assay.
 - (ix) Alteration in the neuronal membrane permeability to Na^+ and K^+ ions gives rise to an action potential; describe how this happens.
 - (x) Myelinated axons display greatly increased rates of action potential conductance compared with unmyelinated neurons. Explain why this is so.

(40 marks)

Section A – Molecular Genetics

Answer at least one question from this section. Each question carries 20 marks.

- Q2. In order for DNA to physically fit into the nucleus several levels of packaging are necessary – discuss this statement with the aid of diagrams.
- Q3. Write an essay on the human genetic linkage map.
- Q4. Write an essay on genomics, with respect to the human genome project, and its impact on medicine and society.

Section B – Cell Biology

Answer at least one question from this section. Each question carries 20 marks.

- Q5. Discuss how genetic studies using *Drosophila* have contributed to our understanding of development.
- Q6. Discuss the different forms of Cell Death, commenting on the role apoptosis plays in disease.
- Q7. Discuss, using examples, how viruses contribute to cancer.