

Cork Institute of Technology
Bachelor of Science in Cell & Molecular Biology - Award

(NFQ – Level 7)

Spring 2006

Microbiology

(Time: 3 Hours)

Answer **five** questions in total.
Answer **two** questions from Section A,
And **two** questions from Section B, and
one other question from either Section.

Examiners: Prof. R. Fitzgerald
Ms. M. Lane
Ms. D. Gilroy

Use separate answer books for each Section.

Section A

- Q1. Describe with the aid of diagrams the regulation of the lac genes in *E coli* when
- (a) lactose is present in the medium. (4 marks)
 - (b) lactose is absent from the medium. (4 marks)
 - (c) Glucose is present in the medium. (12 marks)
- Q2. Write short descriptive notes on each of the following:
- (a) Rna polymerase (4 marks)
 - (b) Initiation of transcription in Procaryotes (4 marks)
 - (c) Termination of Transcription in Procaryotes (4 marks)
 - (d) The steps involved in the translation process (8 marks)
- Q3. (a) Explain what is meant by the term Virulence. (2 marks)
- (b) List the factors that affect the virulence of organisms and state how virulence is measured. (2 marks)
 - (c) Write a detailed account of bacterial toxins. (16 marks)

- Q4. Write an account of *Salmonella* using the following headings:
- General characteristics (4 marks)
 - Features of illness caused (2 marks)
 - Foods with which *Salmonella* is associated (2 marks)
 - Control of *Salmonella* infections (2 marks)
 - Methods used to isolate *Salmonella* from foods (10 marks)

Section B

- Q5. Describe the principle and microbiological applications of the following techniques:
- (i) Enzyme linked immunosorbent assay
 - (ii) Polymerase chain reaction. (20 Marks)
- Q6. (i) Highlight the differences that exist between 2 and 3 class sampling plans and provide an example of each. (16 Marks)
- (ii) Provide an example of a biochemical test used to differentiate between *Escherichia coli* and *Enterobacter aerogenes*. (4 Marks)
- Q7. (i) Write short notes on each of the following:
- Restriction endonucleases
 - Gel electrophoresis
 - Nucleic acid hybridisation (15 Marks)
- (ii) Explain how ATP bioluminescence can be used to estimate microbial numbers. (5 Marks)
- Q 8. (i) With the aid of a diagram, describe the design of a clean room facility for the production of a sterile pharmaceutical product. (10 Marks)
- (ii) Name three biological indicators used to validate various sterilisation regimes. (6 Marks)
- (iii) How can electrical impedance be used to estimate microbial numbers? (4 Marks)