

Cork Institute of Technology
Higher Certificate in Science in Applied Biology – Award
(National Certificate in Science in Applied Biology – Award)
(NFQ – Level 6)
Summer 2005
Microbiology
(Time: 3 Hours)

Instructions

Answer FIVE questions. Answer TWO questions from each Section and ONE from either Section.

Use separate answer books for each Section.
All questions carry equal marks.

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

Section A

- Q1. (a) How did Pasteur defeat the theory of spontaneous generation? (4 marks)
- (b) Describe the structure, composition and function of Gram positive bacterial cell walls. (8 marks)
- (c) In the Gram stain why does alcohol decolourise Gram negative bacteria? (4 marks)
- (d) Describe how prokaryotic chromosomal DNA is organised. (4 marks)
- Q2. (a) With the aid of graphs explain the differences that exist between bacteriostatic, bacteriocidal and bacteriolytic antimicrobial agents. (10 marks)
- (b) Outline the influence of pH and A_w on microbial growth. (10 marks)
- Q3. Briefly discuss each of the following treatments used to control microbial growth:
- Autoclaving
 - Pasteurisation
 - Filtration
 - Ionising radiation
- (20 marks)

- Q4. (a) What are the differences between a primary and secondary immune response?
(8 marks)
- (b) Describe the structure of IgG. (5 marks)
- (c) Describe the components of the innate immune response. (7 marks)

Section B

- Q5. (a) Explain the two different types of bacteriophage infections that can occur when a bacteria is infected with a phage. Use a diagram to illustrate your answer.
(8 marks)
- (b) Write an account of generalised and specialised transduction. Use diagrams to illustrate your answer. (12 marks)
- Q6. *E coli* is a facultative anaerobic organism.
- (a) Explain the above statement in the context of *E coli* metabolism.
(4 marks)
- (b) Write a descriptive account of how *E coli* can use two types of catabolic metabolism depending on the environmental oxygen that is available to it.
Use diagrams to show the pathways involved. (16 marks)
- Q7. The identification of microorganisms is fundamental in microbiology; many techniques are available for this purpose. Discuss the use of the following techniques in identification.
- (a) Dichotomous key
 - (b) Cultural characteristics of the organism
 - (c) Morphological characteristics of the organism
 - (d) Biochemical characteristics of the organism
 - (e) Serological characteristics of the organism
 - (f) Phage-host typing
- (Give specific examples to illustrate your answer) (20 marks)
- Q8. Write a detailed account of the organisms comprising the Enterobacteriaceae. In your answer mention the importance of being able to differentiate these organisms from each other and the use of biochemical tests in their identification. (20 marks)