

Cork Institute of Technology

(Higher Certificate in Science in Applied Biology-Award)

National Certificate in Science in Applied Biology - Award

(NFQ – Level 6)

Autumn 2005

Microbiology

(Time: 3 Hours)

Instructions

Answer FIVE questions.

Answer two questions from each section and one other from either section.

Section A: Dr. D. Gilroy

Section B: Ms. M. Lane

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) Outline Koch's postulates. (4 marks)
- (b) Describe the chemical structure and function of the bacterial cytoplasmic membrane. (8 marks)
- (c) Which transport system is best suited to the transport of nutrients present in the environment in extremely low amounts, and why? (4 marks)
- (d) Describe how you would perform a viable plate count in the laboratory. (4 marks)
- Q2. (a) With the use of diagrams, describe both a tube dilution method and an agar diffusion method for the assessment of antibiotic activity. (10 marks)
- (b) Draw a typical growth curve for a bacterial population in a batch culture and describe the various phases of growth. (10 marks)
- Q3. (a) Describe various forms of heat treatments used in the control of microbial populations. (12 marks)
- (b) Classify microorganisms according to their temperature and oxygen preferences. (8 marks)

- Q4. (a) With the aid of a diagram describe the basic structure and function of an antibody. (6 marks)
- (b) Explain immunological memory. (6 marks)
- (c) Describe the components of the non-specific immune system. (8 marks)

Section B

- Q5. (a) Explain what is meant by each of the following terms:
- I. Missense mutation
 - II. Nonsense mutation
 - III. Silent mutation
 - IV. Frameshift mutation (8 marks)
- (b) Explain when and how indirect selection is used in the detection of mutants. (4 marks)
- (c) Write a brief account of the Ames test. (8 marks)
- Q6. Write a detailed account of bacterial sporeformers. (20 marks)
- Q7. (a) Describe what is meant by the term fermentation in the context of bacterial metabolism. (2 marks)
- (b) Using THREE different carbohydrate fermentations,
- i. Show the biochemical pathways involved.
 - ii. Name the end products.
 - iii. Name the organism that carries out the fermentation.
 - iv. Explain how the fermentations could be monitored as they are occurring or how their end products could be measured after growth has occurred. (18 marks)

Q8. Write a detailed account of the steps involved in viral replication.

(20 marks)