

Cork Institute of Technology

Higher Certificate in Science in Applied Biology – Award

(NFQ Level 6)

Summer 2006

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:

Dr. D. Gilroy

Ms. M. Lane

Dr. T. Beresford

Section A

- Q1. (a) Outline the structure of Gram-negative bacterial cell walls. (14 marks)
- (b) Describe the following transport processes with regard to cellular function:
- Passive diffusion
 - Active transport (6 marks)
- Q2. (a) Write short notes on *three* of the following structures and describe their function in prokaryotic cells:-
- Granules
 - Plasmids
 - Flagella
 - Endospores (15 marks)
- (b) Using examples, explain what you understand by the terms selective and differential media for bacterial growth. (5 marks)

Q3. (a) Draw a typical growth curve for a bacterial population in a batch culture and describe the various phases of growth. (10 marks)

(b) Classify microorganisms according to their temperature and oxygen preferences. (10 marks)

Q4. (a) Describe various forms of heat treatment used in the control of microbial populations. (12 marks)

(b) Write explanatory notes, on the use of the following for reducing or removing microorganisms from an environment:

- Filtration
- Alcohol
- Chlorine
- Phenol

(8 marks)

Section B

- Q5. Write an account of the fermentations carried out by *E coli*, *Enterobacter*, *Streptococcus* and *Saccharomyces*; Describe
- (a) The biochemical pathways involved and indicate where the energy is produced.
 - (b) Any tests that may be used to identify these organisms based on the end products of their fermentations. (20 marks)
- Q6. (a) Explain what is meant by Conjugation. (2 marks)
- (b) Describe what is meant by the term F^+ bacterium
- Hfr bacterium (4 marks)
- (c) Discuss the design of selection media in genetic exchange experiments. Use examples. (4 marks)
- (d) Explain in detail how you would determine the order/position of genes on a chromosome of a bacteria using Hfr mediated conjugation. (10 marks)
- Q7. List and explain the Genetic and Molecular characteristics that can be used in identification of microorganisms. (20 marks)
- Q8. Write descriptive notes on four of the following organisms.
- Pseudomonas*
- E coli*
- Salmonella*
- Enterobacter*
- Staphylococcus*
- Streptococcus* (20 marks)