

# Cork Institute of Technology

## Higher Certificate in Science in Applied BioSciences – Award

(NFQ Level 6)

Summer 2007

### Microbiology

(Time: 3 Hours)

Instructions:

Answer **FIVE** questions.

Answer **TWO** questions from each section and **ONE** other from either section.

Use separate answer books for each Section.

All questions carry equal marks.

Examiners:

Dr. D. Gilroy

Ms. M. Lane

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 prokaryotes, 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 prokaryotic chromosomal DNA is organised. (4 marks)
- Q2. (a) Bacteria can be divided into groups in the basis of their Carbon, Energy and Hydrogen/Electron Sources, describe these. (10 marks)
- (b) With the aid of a test tube diagram show how oxygen levels can influence the growth rate of a culture and identify the different bacterial classes based on their sensitivity to oxygen. (6 marks)
- (c) Give examples of laboratory methods for the generation of conditions for anaerobic microbial growth. (4 marks)

- Q3. (a) With the aid of graphs explain the differences that exist between bacteriostatic, bacteriocidal and bacteriolytic antimicrobial agents. (10 marks)
- (b) Discuss the use of heat as a method to control microbial populations. (10 marks)

- Q4. (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)

## Section B

Q5. Write detailed notes on each of the following:

- (a) Bacterial chromosome replication. (6 marks)
- (b) Direct and Indirect selection techniques. (6 marks)
- (c) Ames Test. (8 marks)

Q6. Write an account of each of the following fermentations;

- (a) Homolactic acid fermentation.
- (b) Mixed acid fermentation.
- (c) Butandiol fermentation.
- (d) Heterolactic fermentation.

For each fermentation describe the biochemical pathway, the end products of the fermentation, the organism that carries out the fermentation and any laboratory tests associated with the fermentation. (20 marks)

Q7. Describe

- (a) The structure of viruses. (6 marks)
- (b) The replication of viruses. (14 marks)

- Q8. (a) List the techniques that can be used in the identification and classification of microorganisms. (4 marks)
- (b) Write an account of the commonly used techniques for the **identification** of unknown organisms. Use examples to illustrate your answer. (16 marks)