

Cork Institute of Technology

Bachelor of Science in Applied Biosciences – Stage 2

(SBIOS_7_Y2)

Summer 2008

Microbiology 2

(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

Dr. T. Beresford

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) In the Gram stain why does alcohol decolourise Gram negative bacteria? (4 marks)
- (d) Describe how you would perform a viable plate count in the laboratory. (4 marks)
- Q2. (a) Outline the differences that exist between the following types of media and give an example of each:
Complex
Selective
Differential (6 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)
- (d) Why are obligate anaerobes killed by the presence of oxygen? (5 marks)

- Q3. (a) Describe various forms of heat treatment used in the control of microbial populations. (10 marks)
- (b) With the aid of graphs explain the differences that exist between bacteriostatic, bacteriocidal and bacteriolytic antimicrobial agents. (10 marks)
- Q4. (a) Draw a typical growth curve for a bacterial population in a batch culture and describe the various phases of growth. (10 marks)
- (b) Write short notes on *two* of the following structures and describe their function in prokaryotic cells:-
- Plasmids
 - Flagella
 - Endospores
- (10 marks)

Section B

- Q5. (a) Briefly explain what is meant by bacterial Conjugation. (2 Marks)
- (b) Describe what is meant by the term Hfr. (2 Marks)
- (c) Explain the mechanism of conjugation. (4 Marks)
- (d) Describe how you would design selection media used to identify recombinants following Hfr conjugation. (4 Marks)
- (e) Write a description of chromosome mapping using conjugation. (8 Marks)

Q6. For each of the following fermentations

Mixed acid fermentation.

Homolactic acid fermentation.

Heterolactic acid fermentation.

Describe

- (a) The biochemical pathway involved. (4 Marks /fermentation)
- (b) The organisms that carry out the fermentations (1 Mark /fermentation)
- (c) Methods of identification associated with the fermentation. (5 Marks)

- Q7. (a) Describe how you would detect the presence of micro-organisms in a sample of water. (4 Marks)
- (b) Describe how you would positively identify the organism present in the water sample.
In your answer describe the microscopy, media, biochemical tests, serology, etc that you would use for the identification. (16 Marks)

Q8. Write a brief account of the following groups of organisms;

Enterobacteriaceae

Pseudomonas

Include in your answer:

Genera and species included in both groups

Characteristics of the organisms

Habitats

Pathogenicity

Media and biochemical tests used to identify them. (20 Marks)