

CORK INSTITUTE OF TECHNOLOGY
INSTITIÚID TEICNEOLAÍOCHTA CHORCAÍ

Examinations 2007/08

Module Title: Microbiology

Module Code: MBIO S4002

School: Science

Programme Title: Bachelor of Science (Honours) in Applied Biosciences - Award

Programme Code: SBIOE_8_Y4

External Examiner(s): Dr. T. Beresford

Internal Examiner(s): Dr. A. Sheehan

Instructions:

PART I: Answer ALL questions in Part I (Multiple Choice). Circle the correct answer on the question sheet, write your name on the sheet and hand up with your answer book.

PART II: Answer FOUR questions from Part II. One from each section (A, B and C) and one other of your choice.

Duration: 3 hours

Sitting: Winter 2007

**TOTAL marks from this examination is 70 marks (PART I - 10 marks, PART II – 60 marks)
(Continuous assessment provides the remaining 30 marks)**

Note to Candidates: Please check the Programme Title and the Module Title to ensure that you have received the correct examination paper.
If in doubt please contact an Invigilator.

NAME: _____

PART I

Multiple Choice Questions (10 marks total)

1. In which type of symbiosis do both members benefit from their interaction?
 - a) Mutualism
 - b) Parasitism
 - c) Commensalism
 - d) Pathogenesis
 - e) None of the above

2. When pathogenic bacterial cells lose their ability to make adhesins, they
 - a) Become avirulent
 - b) Produce endotoxin
 - c) Absorb exotoxin
 - d) Increase in virulence
 - e) Produce excessive amounts of invasions

3. A patient contracted athlete's foot after long-term use of a medication. His GP explained that the malady was directly related to the medication. Such infections are termed
 - a) Nosocomial infections
 - b) Exogenous infections
 - c) Iatrogenic infections
 - d) Endogenous infections
 - e) None of the above

4. *Enterococcus faecalis* is best described as
 - a) Gram negative coccus
 - b) Often implicated in nosocomial wound infections & endocarditis
 - c) Typically beta-hemolytic
 - d) Usually residing in the mouth and throat
 - e) Typically sensitive to the antibiotics in use today

5. The vaccine against *Staphylococcus aureus* which is currently being tested in clinical trials consists of which of the following
 - a) An inactivated toxin
 - b) An attenuated bacterial cell
 - c) A mixture of live and dead *Staphylococcal* species
 - d) A conjugated capsular polysaccharide
 - e) A conjugated capsular protein

6. The mode of killing employed by the disinfectant Quaternary ammonium compounds (QACs) is
 - a) Oxidation
 - b) Protein denaturation
 - c) Binding of -SH groups in proteins
 - d) Disruption of cell membranes by intercalating in them
 - e) Blockage of DNA replication

7. A disease that is constantly present in low numbers in a population is called
- Epidemic
 - Pandemic
 - Endemic
 - Emerging
 - Endosymbiotic
8. 'Complex lipid structure containing unusual sugars and fatty acids found in the outer membrane of most gram-negative bacteria' best describes which of the following
- Lipoprotein
 - Lipopolysaccharide (LPS)
 - Lipoteichoic acid (LTA)
 - Periplasm
 - Cytoplasmic membrane
9. In an ecosystem, a population of metabolically related microorganisms is called
- A population
 - A guild
 - A community
 - A microenvironment
 - A mycorrhizae
10. Deep sea hydrothermal vents are habitats where the primary bacterial producers are
- Phototrophic
 - Chemolithotrophic
 - Heterotrophic
 - Nitrogen fixers
 - Chemoorganotrophic

PART II (60 marks total)

Section A – Microbial Biotechnology

- Q. 1 Discuss the key roles of microorganisms in cheese manufacture and ripening. (15 marks)
- Q. 2 Describe (with the use of a diagram) the process of gene cloning using the example of cloning of a human gene using a bacterial plasmid vector. (15 marks)

Section B – Microbial Pathogenicity and Virulence

- Q. 3 Discuss *Staphylococcus aureus* under the following headings:
Description/characteristics
Diseases
Major virulence factors
Prevention & treatment (15 marks)

OR

- Discuss *Cryptosporidium* under the following headings:
Description/characteristics
Transmission & disease
Treatment & control (15 marks)

- Q.4(a) Discuss (with examples) three approaches that epidemiologists use to study infectious diseases. (7.5 marks)
- AND**
- (b) Compare exotoxins and endotoxins. (7.5 marks)

Section C – Pharmaceutical and Environmental Microbiology

- Q. 5 Discuss the effects of the manufacturing environment on the microbiological quality of pharmaceutical products under the following headings:
Atmosphere
Water
Raw materials (15 marks)
- Q. 6 Discuss the use of physical, chemical and biological indicators for monitoring sterilization processes. (15 marks)