

Cork Institute of Technology
Higher Certificate in Science in Applied Biology – Stage 1
(NFQ – Level 6)
Summer 2006
Biology
(Time: 3 Hours)

Answer FIVE questions in total.

Question 1 in section A is compulsory.
Answer TWO questions from section B and
TWO questions from section C.

Use separate answer books for each section.
All questions carry equal marks.

Examiners: Prof. R. Fitzgerald
Ms M. Lane
Dr A. Coffey
Dr. Jim O'Mahony

Section A

Q1. (Compulsory)

- (a) How is the magnifying power of the microscope calculated?
- (b) Explain how you would test for the presence of a protein in the laboratory.
- (c) Explain how you would test for the presence of a reducing sugar in the laboratory.
- (d) In thin layer chromatography, what is meant by the R_f value?
- (e) Express 0.35 millilitres (ml) in microlitres (μl) and indicate which of the following micropipettes would be best to deliver this volume: P5000, P1000, P100.
- (f) A length of dialysis tubing containing 5 ml of 8% glucose and 20 ml of starch solution is suspended in a large beaker containing water and iodine.
What visible results would you see after an hour? Why?
- (g) Name the enzymes responsible for the following reactions:



- (h) Explain how heat-sensitive liquids might be sterilized.
- (i) What is nutrient agar and how is it prepared?
- (j) What does a viable plate count measure? (20 marks)

Section B – Answer two questions

- Q2. (a) State two important functions of carbohydrates. (2 marks)
- (b) Explain using diagrams and give an example of each of the following:
- Monosaccharide
 - Disaccharide
 - Sugar isomers
 - α form of glucose
- (8 marks)
- (c) Explain using diagrams why cellulose and chitin are not useful sources of energy in man. (6 marks)
- (d) Name and describe the storage form of carbohydrate found in plants and animals. (4 marks)
- Q3. Write a detailed account of biological membranes using the following headings:
- Functions of membranes (4 marks)
 - Fluid mosaic model structure (use diagram) (6 marks)
 - Types of proteins found in membranes (4 marks)
 - Types of movement across a membrane (6 marks)
- Q4. Write an explanatory account of the cell cycle and cellular reproduction. (20 marks)
(Include a description of mitosis in your answer)

Section C – Answer two questions

- Q5. Discuss the importance of enzymes in biological systems. In your answer describe the general structure of an enzyme and outline the factors that influence enzyme activity. (20 marks)
- Q6. Describe the cellular mechanisms employed by micro-organisms to obtain energy from a carbohydrate substrate. (20 marks)
- Q7. Outline the nutritional requirements of an adult human and discuss the importance of a balanced diet in preventing disease. (20 marks)