

# Cork Institute of Technology

## Bachelor of Science in Applied Biosciences – Stage 1

(NFQ Level 7)

Autumn 2007

### 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.

Examiners: Prof. R. J. Fitzgerald  
Ms. M. Lane  
Dr. J. O'Mahony  
Ms E. Flannery

### Section A

Q1. (Compulsory) Answer all parts

- (a) State the purpose of the following parts of the binocular light microscope; (i) the ocular lenses, (ii) the stage, (iii) the 4x objective lens and (iv) the condenser.
- (b) What combination of lenses would you use for optimum viewing of (i) onion cells and (ii) bacteria?
- (c) In the case of the Benedict's test, say what controls should be used and why.
- (d) Explain what is meant by the isoelectric point of a protein.
- (e) On a rough standard graph of glucose concentration (%) *versus* time to decolourise potassium permanganate, illustrate how you would estimate the glucose concentration of an unknown solution.
- (f) What will result if a dialysis bag containing distilled water is placed in a beaker of 60% sucrose solution? Explain the reason for your answer.
- (g) (i) Give a rough graph to illustrate the effect of pH on the enzyme amylase. (ii) Explain the term "critical point".
- (h) Give the reaction for the enzyme urease.
- (i) Explain the term c.f.u. Why is this term used in viable cell counts instead of "bacteria per ml"?
- (j) Give **two** labelled diagrams of *E.coli* as it would appear under 1000X magnification after preparation by (i) a simple stain with crystal violet and (ii) a Gram stain.

(20 marks)

## Section B – Answer two questions

- Q2. (a) Using diagrams explain the structure of each of the following:
- (i) An amino acid
  - (ii) A pentose sugar
  - (iii) A triglyceride
  - (iv) A nucleotide (8 marks)
- (b) Write an account of Carbohydrates. Include in your answer Monosaccharides, Disaccharides and Polysaccharides. (12 marks)
- Q3. (a) What are the three principles of cell theory? (6 marks)
- (b) Explain why cells are small. (6 marks)
- (c) Explain how you would use Cell fractionation and Differential centrifugation to study individual cell components. (8 marks)
- Q4. Write a detailed account of the structure and function of the plasma membrane. (20 marks)

## Section C – Answer two questions

- Q5. Discuss the importance of enzymes in biological systems. (20 marks)
- Q6. Discuss the role of food and nutrition in terms of energy production. (20 marks)
- Q7. Using specific examples, write an essay on the diversity of micro-organisms. (20 marks)