

**CORK INSTITUTE OF TECHNOLOGY
INSTITIÚID TEICNEOLAÍOCHTA CHORCAÍ**

Autumn Examination 2013/2014

Module Title: Laboratory Practice (CA)

Module Code: BIOL6003

School: Science and Informatics

Programme Title: BSc (Hons) in Nutrition & Health Science
BSc (Hons) in Herbal Science
BSc (Hons) in Pharmaceutical Biotechnology
BSc in Applied Biosciences

Programme Code: SNHSC_8_Y1
SHERB_8_Y1
SPHB1_8_Y1
SBIOS_7_Y1

Internal Examiners: Dr. Máire Begley
Ms. Richenda Kiernan

External Examiners: Dr. Tom O'Connor

Instructions: Answer **Question 1** and any **three** other questions.
All questions carry equal marks (25 marks).

Duration: 2 Hours

Sitting: Autumn 2014

Requirements for this examination: Calculator

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.

Q1 COMPULSORY QUESTION

Answer **all** parts. Show **all** of your calculations.

- (a) List two safety precautions that should be taken when dealing with a minor fire outbreak in the laboratory. **(2 marks)**
- (b) Convert 0.075ml to microlitres (μL) and state which of the following pipettes would be used to deliver this volume: P100, P1000 or P5000. **(3 marks)**
- (c) Comment on the precision of the following set of data (units are in g): 5.0, 5.01, 4.99, 5.0, 5.01, 5.0, 6.02, 5.01, 4.99, 5.0 **(2 marks)**
- (d) What is the weight in grams of 1ml of water? **(2 marks)**
- (e) What is the weight in grams of 1 ml of glycerol (specific gravity = 1.26)? **(2 marks)**
- (f) List two corrosive acids and two corrosive bases. **(2 marks)**
- (g) What quantities of sodium chloride (NaCl) and water are required to make up a 2% (w/v) NaCl solution? **(2 marks)**
- (h) Give the names of two pH indicators commonly used in the laboratory. **(2 marks)**
- (i) Give two reasons why a pH meter gives a more accurate measurement of pH than indicators. **(2 marks)**
- (j) Sketch a rough graph to illustrate what is meant by the λ_{max} of a solution. Label the axes appropriately. **(4 marks)**
- (k) Name two buffers commonly used in biological applications. **(2 marks)**

Q2

- (a) Calculate the weight of Na_2HPO_4 (MW = 142g/mol) and KH_2PO_4 (MW = 136g/mol) required to make 100ml of a 0.01M phosphate buffer pH = 6.4 and $\text{pK}_a = 6.8$ **(13 marks)**
- (b) Calculate the amount of sodium hydroxide (NaOH) (MW 40g/mol) required to prepare 500ml of 0.25M NaOH solution.
Express the amount in terms of g/L, % wt/vol and Normality. **(12 marks)**

Q3 Write short notes on five of the following:

- (a) Analytical balances
- (b) Autoclave
- (c) Biological Safety Cabinet
- (d) Buffers
- (e) pH meter
- (f) Spectrophotometer

(5 x 5 marks)

Q4

- (a) List two safety precautions that should be adhered to when working in a laboratory. **(2 marks)**
- (b) Explain the First Aid procedures that should be followed when treating a person with a chemical splash in their eye. **(4 marks)**
- (c) Explain what is meant by accuracy and precision. **(5 marks)**
- (d) Explain what a hazard is, and list the three main groupings of hazards that may be encountered in a laboratory. **(6 marks)**
- (e) State the Beer Lambert Law and give an equation based on the law and explain what each component of the equation means. **(8 marks)**

Q5

- (a) Explain what CLP regulations are. **(4 marks)**
- (b) Explain what an MSDS is and name two pieces of information that an MSDS should contain. **(5 marks)**
- (c) Explain what an SOP is and name two pieces of information that an SOP should contain. **(5 marks)**
- (d) Explain the role of the HSA. **(4 marks)**
- (e) Explain what biosafety is. **(4 marks)**
- (f) List the three main routes of entry of chemicals into the body **(3 marks)**