

**CORK INSTITUTE OF TECHNOLOGY
INSTITIÚID TEICNEOLAÍOCHTA CHORCAÍ**

Autumn Examination 2014/2015

Module Title: Laboratory Practice (CA)

Module Code: BIOL6003

School: Science and Informatics

Programme Code: SNHSC_8_Y1
SHERB_8_Y1
SPHB1_8_Y1
SBIOS_7_Y1

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

Duration: 2 hours

Sitting: Autumn 2015

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 three types of fire extinguishers (2 marks)
- (b) Express 75 microlitres in mls. Which of the following pipettes should be used to deliver this volume: P100, P1000 or P5000? (4 marks)
- (c) List two safety precautions that should be used when working in the Biology Lab. (2 marks)
- (d) What is the standard international unit used to describe the amount of a substance present? (2 marks)
- (e) Give two applications of Buffers. (3 marks)
- (f) Comment on the precision of the following set of data (units are in grams). 5.0, 4.99, 5.01, 5.0, 4.99, 5.0, 5.0, 5.02, 5.03, 5.01. (5 marks)
- (g) Show your calculations for the following: 2% (w/v), 0.05% (v/v) and 0.15% (w/w). (5 marks)
- (h) What two buffers are used to calibrate the pH meter? (2 marks)

Q2

(a) The Table below shows the absorbance values (at λ_{max}) obtained for six tubes containing different concentrations of bromophenol blue (BPB).

Tube number	Concentration of BPB in the Tube (mg/L)	Absorbance
1	1.50	0.105
2	3.00	0.270
3	4.50	0.355
4	7.50	0.692
5	11.25	1.010
6	15.00	1.400

Use the data provided in the table to plot a graph of BPB concentration vs absorbance.

(10 marks)

(b) Use the graph to determine the concentration of BPB in a tube with an absorbance of 0.455. (5 marks)

(c) Explain how the graph proves the Beer-Lambert Law. (5 marks)

(d) Comment on the potential sources of error in using a spectrophotometer. (5 marks)

Q3.

(a) Using the equations below calculate the weight of the salt Na_2CO_3 (MW = 106g/mol) and the acid NaHCO_3 (MW = 84g/mol) required to make 100 cm³ of a 0.02M bicarbonate buffer pH = 9.6 and pK_a = 10.25.

$$\text{pH} = \text{pK} + \log_{10} \frac{[\text{S}]}{[\text{A}]}$$

$$[\text{A}]$$

$$[\text{A}] + [\text{S}] = \text{Molarity of buffer} \quad (13 \text{ marks})$$

(b) Explain how you would prepare a 1% (w/v) glucose solution. (5 marks)

(c) Explain how you would prepare 100cm³ of a 0.01M Na_2CO_3 (MW = 106g/mol) solution.

(7 marks)

Q4. Write short notes on five of the following:

(a) Analytical balances

(b) Autoclave

(c) Biological Safety Cabinet

(d) Centrifuge

(e) Thin Layer Chromatography

(f) Gel electrophoresis

(5 x 5 marks)

Q5.

- (a) Explain what a hazard is and describe the three main groupings of hazards that may be encountered in a laboratory. **(10 marks)**
- (b) Explain what CLP regulations are. **(5 marks)**
- (c) Explain what an MSDS is and name two pieces of information that an MSDS should contain. **(5 marks)**
- (d) Explain what an SOP is and name two pieces of information that an SOP should contain. **(5 marks)**