

**CORK INSTITUTE OF TECHNOLOGY  
INSTITIÚID TEICNEOLAÍOCHTA CHORCAÍ**

**Autumn Examinations 2012**

<b>Module Title:      Bioanalytical Science I</b>
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**Module Code:**      **BIOL 6003**

**School :**      Biological Science

**Programme Title:**    Bachelor of Science in Applied Sciences – Year 1  
                                 Bachelor of Science in Nutrition and Health – Year 1  
                                 Bachelor of Science in Pharmaceutical Biotechnology – Year 1

**Programme Code:**   **SBIOS\_7\_Y1**  
                                 **SNHSC\_8\_Y1**  
                                 **SPHBI\_8\_Y1**

**External Examiner(s):**      Dr. Alison Gallagher, Dr. Anne Nelson, Dr. Jerry Bird

**Internal Examiner(s):**      Ms. R. Kiernan, Dr. M. Sheahan

**Instructions:**      Answer **FOUR** questions as follows:  
                                 Section A: Answer *any two questions* from section A  
                                 Answer Question 4 **and** either question 5 **or** 6 from section B  
                                 Use **separate answer book** for each section

**Duration:**      2 Hours

**Sitting:**      Autumn 2012

**Requirements for this examination:**

<p><b>Note to Candidates:</b> 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.</p>
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## Section A

### Q1.

- (a) List three methods used for the identification of carcinogens (3 marks)
- (b) Distinguish between a *primary* and a *secondary carcinogen* (3 marks)
- (c) List four routes by which chemicals can enter the body (2 marks)
- (d) As a laboratory supervisor, list the instructions you would give laboratory personnel with regard to their behaviour and conduct in the laboratory (4 marks)
- (e) Describe the responsibilities placed on employers and employees under the Safety, Health and Welfare at Work Act (2005) (7 marks)
- (f) Write a note on the different types of fire extinguishers and their suitability for different types of fires (6 marks)

### Q2.

- (a) The *flash points* and *flammability / explosive ranges* for three solvents are given.

	Flash Point (°C)	LEL(%v/v)	UEL(%v/v)
Toluene	4	1.27	6.75
Diethyl ether	– 45	1.9	36
Methyl alcohol	11	6.7	36

- (i) Explain the terms in italics? (4 marks)
  - (ii) Using the data in the table, comment on the relative hazard presented by each solvent (6 marks)
- (b) Write a note which clearly distinguishes between ionizing and non-ionizing radiation (5 marks)
- (c) Identify four sources of radiation in a laboratory. How would one assess the hazard presented by radiation and outline the precautions that must be observed to minimize exposure (10 marks)

**Q3.**

- (a) State the precautions which should be observed when handling corrosive agents in the laboratory (5 marks)
- (b) Summarize the information that may be included in material safety data sheets (6 marks)
- (c) For what do the letters *TLV* and *LD<sub>50</sub>* stand? Hence distinguish between the two parameters and assign units to each parameter. (7 marks)
- (d) What is a *safety statement*? Give an over view of the information which may be included in a safety statement for an organization (7 marks)

**Section B**

**Q4.** Answer ALL of the following:

- (a) List two safety precautions when working in the biology laboratory (2 marks)
- (b) Express 220 microlitres in millilitres. Which of the following pipettes should be used to deliver this volume: P100, P1000 or P5000? (3 marks)
- (c) What is a standard solution? Name the glassware used for the preparation of a standard solution (3 marks)
- (d) List three methods used to measure solution pH (2 marks)
- (e) Name three indicators suitable for acid-base titrations (2 marks)
- (f) Using appropriate examples, explain how the following solutions may be prepared in the laboratory: 1% w/v, 0.05% v/v and 0.15% w/w. Show your calculations in each case (5 marks)
- (g) What is the purpose of the blank when using the spectrophotometer? (3 marks)
- (h) Differentiate between *accuracy* and *precision*? (5 marks)

**Q5.**

- (a) Define *First Aid* (5 marks)
- (b) Name six types of burns? Give an example for each type (9 marks)
- (c) Discuss electrical burns under the following headings:
  - (i) Aims (3 marks)
  - (ii) Signs and symptoms (4 marks)
  - (iii) Treatment (4 marks)(11 marks)

**Q6.**

- (a) Define the term *decontamination* (5 marks)
- (b) What is a biohazard? Draw its symbol (5 marks)
- (c) List the facilities required in a Bio-Safety Level 1 laboratory (5 marks)
- (d) Calculate the grams of solid NaOH (40g/mole) required to prepare 120cm<sup>3</sup> of a 0.2M solution. Express the concentration in g/L and % (w/v). (10 marks)

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(233)	(226)			(227)		(261)	(262)	(263)	(264)	(265)	(266)	(267)	(268)	(269)	(270)	(271)	(272)	(273)	(274)	(275)	(276)	(277)																