

# Cork Institute of Technology

## Bachelor of Science in Applied Bioscience and Biotechnology – Award

(NFQ – Level 7)

Autumn 2007

### **Environmental Science and Industrial Hygiene**

(Time: 3 Hours)

#### Instructions

Answer any FIVE questions.

All questions carry equal marks.

Examiners: Mr. E. Callery

Prof. R. J. Fitzgerald

Q1. (a) How is acid rain formed and discuss the environmental impact of this air pollution?

(8 marks)

(b) What measures have been taken both nationally and internationally to combat the formation of acid rain?

(6 marks)

(c) Outline the main aims of the Air Quality Framework Directive and how it was implemented into Irish Law.

(6 marks)

Q2. (a) Discuss the main environmental impacts that agricultural processes have on soil and the surrounding receiving waters.

(12 marks)

(b) Describe the serious health risks of radon gas illustrating how radon is formed, its potential effects and what controls are available to minimize this risk.

(8 marks)

Q3. (a) Describe in detail the process of activated sludge in secondary treatment of wastewaters.  
(12 marks)

(b) Outline the main process steps in the treatment of potable water.  
(8 marks)

Q4. Write an informative account on environmental toxins commenting on their sources and toxic effects under the following headings:  
(i) Organic Compounds  
(ii) Inorganic Compounds  
(20 marks)

Q5. (a) Discuss the processes by which a toxic material can (i) be taken in, (ii) is distributed and (iii) excreted from the human body?  
(12 marks)

(b) Explain FOUR of the following terms in relation to toxicology:  
(i) Acute Toxicity  
(ii) Chronic Toxicity  
(iii) Teratogenicity  
(iv) Cumulative Toxicity  
(v) Systemic Toxicity  
(vi) Mutagenicity  
(8 marks)

Q6. (a) What mechanisms does the body utilize to prevent heat loss?  
(4 marks)

(b) Discuss the term Hypothermia under the following headings:  
(i) How it effects the body  
(ii) How wind chill contributes  
(iii) The controls that should be implemented to minimize the risk.  
(12 marks)

(c) Describe ONE possible effect of working in a very cold environment  
(4 marks)

Q7. (a) Write an informative account on the skins anatomy and its defenses against the absorption of toxic agents.

(10 marks)

(b) Describe the different types of contact dermatitis, the occupational sources of the toxic agents that cause the dermatitis and their effects on the human body.

(10 marks)

Q8. (a) Define THREE of the following terms in relation to monitoring the atmosphere for air contaminants.

- (i) Grab Sampling
- (ii) Integrated Sampling
- (iii) General Air Sampling
- (iv) Personal Air Sampling
- (v) Adsorption Tubes
- (vi) Stain Detector Tubes

(6 marks)

(b) Discuss the importance of good ventilation to prevent the risk of exposure to inhalation hazards. Describe in your answer the advantages and disadvantages of general and local exhaust ventilations.

(7 marks)

(c) What respiratory personal protective equipment are available to prevent exposure to inhalation hazards? Discuss TWO in detail commenting on their applications and advantages.

(7 marks)

Q9. (a) Under the provisions of the Safety, Health and Welfare at Work Act, 1989 (updated in 2005) discuss in detail:

- (i) The Duties of the Employer to Employees
- (ii) The Duties of the Employer to Non-Employees

(10 marks)

(b) Outline the various roles of the Health and Safety Authority and discuss the enforcement powers of Health and Safety Authority Inspectors.

(10 marks)