UNIVERSITY OF SWAZILAND

Faculty of Health Science

Department of Environmental Health Sciences

Dec 2015 Main Examination

Title of paper: INTRODUCTION TO TOXICOLOGY I

Course code: EHS 560

Time allowed: 2 HOURS

Marks allocation: 100 Marks

Instructions:

1) Question 1 is compulsory
2) Answer ANY OTHER THREE (3) questions
3) Each question is weighted 25 marks
4) Write neatly and clearly
5) Begin each question on a separate sheet of paper

This paper is not to be opened until the invigilator has granted permission

QUESTION 1

In Mbabane Campus, the average concentration of diesel fumes in the air is $28mg/m^3$ in the 3 months of winter, but it is $0mg/m^3$ during the rest of the year. Assume that everyone is exposed daily to diesel fumes in the air that they breathe   (14 marks)

The following assumptions are made;
Concentration = $28mg/m^3$, 0.35mg/L, Body weight for adult = 70kg, child = 15 kg. Intake rate = $22m^3$ adult and $15m^3$ for child. Lifetime = 70 years for adult and 15 years for a child.

a) Calculate the following
   i.   The ADD for an adult during the winter season?
   ii.   ADD for a child during the same period?
   iii.   The LADD for an adult living in Mbabane?
   iv.   LADD for a child living in Mbabane?
b) Assuming that a person who lives in Manzini is exposed daily to arsenic concentration in the drinking water of 0.35 mg/L. Intake rate is 2L and 1L for adult and child respectively.
   i.   What is the ADD for an adult living in this area?
   ii. ADD for a child living with his parents?
   iii. What is the LADD for an adult exposed daily?

c) Under toxicant reactions, what chemical reactions would be best represented by these numbers?   (6 marks)

   i. $1 + 1 = 2$

   ii. $1 + 1 = 4$

   iii. $0 + 1 = 5$

d) State the reasons that make studying toxic responses of the reproductive sytem in humans cumbersome at times   (5 marks)

QUESTION 2

a) Toxicologists usually use risk assessments to address two key issues, What are they? (4)
b) What is a dose – response curve?   (1 marks)
c) Outline the basic assumptions of a dose-response curve   (6 marks)
d) Define the term threshold and explain its significance in toxicity   (4 marks)
e) With an aid of a diagram show how simple diffusion occurs   (10 marks)

QUESTION 3

a) You have been asked to make a presentation on the factors that influence toxicity to animals in your locality. As an environmental toxicologist student, your area of expertise will have to cover environmental factors. Discuss the salient points that your presentation will cover in your presentation (9 marks)

b) The strength of a poison is measured by its potency. In not more than five lines explain what is meant by potency (2 marks)

c) Sequentially indicate the level of toxicity rating and labeling requirements for pesticides (8 marks)

d) Write briefly as to how kupffer cells function and they identify toxic matter in the system (6 marks)

QUESTION 4

a) How does DDE interfere with reproductive enzymes in birds? (8 marks)

b) What is meant by the disposition of a chemical? (5 marks)

c) Outline the questions that a Health Risk Assessor may address under hazard identification in order to implicate a certain xenobiotic to an adverse effect (8)

d) Define the following terms (4 marks)

   i)   MoS

   ii) LD_{50}

   iii) Effective dose

   iv)   Therapeutic index

QUESTION 5

a) The rapid changes that occur during foetal development render the embryo a target of toxicity. Only write the number and corresponding answer.

Complete the following given scenario to indicate toxicity to the embryo. (6 marks)

The most sensitive period of gestation is during the period of ____1__. This covers the ____2____ after conception to the____3_____. The severity of the teratogen is thus related to the ____4__, _____5___, and __6____.

b) With an aid of a diagram explain how carbon monoxide acts on the blood and give an account of the effects of increasing levels of exposure   (14 marks)

c) What were the reasons for the abolishment of the use of thalidomide by women during the evolution of toxicology?   (4 marks)

d) Name the process when an inactive substance enhances the action of an active one (1 mark).