UNIVERSITY OF SWAZILAND

Faculty of Health Sciences

Department of Environmental Health Science

Dec 2015 Main Examination

Title of paper: ENVIRONMENTAL TOXICOLOGY

Course code: EHM 314

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)

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.

a) Calculate the following
   i. The ADD for an adult during the winter season?
   ii. The 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)

   i. $1 + 1 = 2$

   ii. $1 + 1 = 4$

   iii. $0 + 1 = 5$

d) Define the threshold level in the dose-response curve. (2)
e) What is meant by the first – pass metabolism? (3)

QUESTION 2

a) What is a dose – response curve? (5)
b) Outline the basic assumptions of a dose-response curve. (6)
c) Define the term threshold and explain its significance in toxicity. (4)
d) Briefly discuss any five reasons that make children to be more vulnerable to chemical insults. (10)

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)

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

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

d) What are the 3 key functions of the blood brain barrier? (6)

QUESTION 4

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

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

c) List the 3 Phase I and any 5 Phase II metabolic reactions. (8)

d) Define the following terms. (4)

i) Margin of safety.

ii) Potentiation.

iii) Allergic reaction.

iv) Therapeutic index.

QUESTION 5

The rapid changes that occur during development render the embryo/foetus as target toxicity.

a) Complete the following given scenario to indicate level of toxicity to the embryo.

Only write the number and the corresponding answer. (6)
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)

c) What is the story behind the use of thalidomide by women? (4)

d) Define a toxicant (1)