UNIVERSITY OF SWAZILAND

FACULTY OF HEALTH SCIENCE

DEPARTMENT OF ENVIRONMENTAL HEALTH SCIENCES

DECEMBER MAIN EXAMINATION 2013

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 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

An adult is living in Msunduza with her single child and are both exposed to an airborne contaminant with a concentration of 28mg/m^3. The adult has an ADD of 8.8mg/kgBW/day, whilst the child's is 28.

a) **Calculate the intake rates of both the adult and the child (6)**

b) **An adult is exposed to arsenic, intake rate is 2L with an ADD of 0.01mg, calculate the concentration of arsenic in the atmosphere (3)**

c) **A school going child is exposed to the concentration you have calculated above, what will its ADD be? (3)**

d) **What would be the LADD for an adult exposed daily with an intake rate of 2L using the answer you have calculated above? (3)**

e) **Assume the quantity of lettuce ingested by an adult is 1.5kg daily, maximum is 0.4 kg, aldrin pesticide is 4 ppm.**

   Calculate the ADD for aldrin for both an adult and child for a one week exposure (6)

f) **Calculate the LADD for both a child and an adult given the same levels in the ADD example (4)**

QUESTION 2

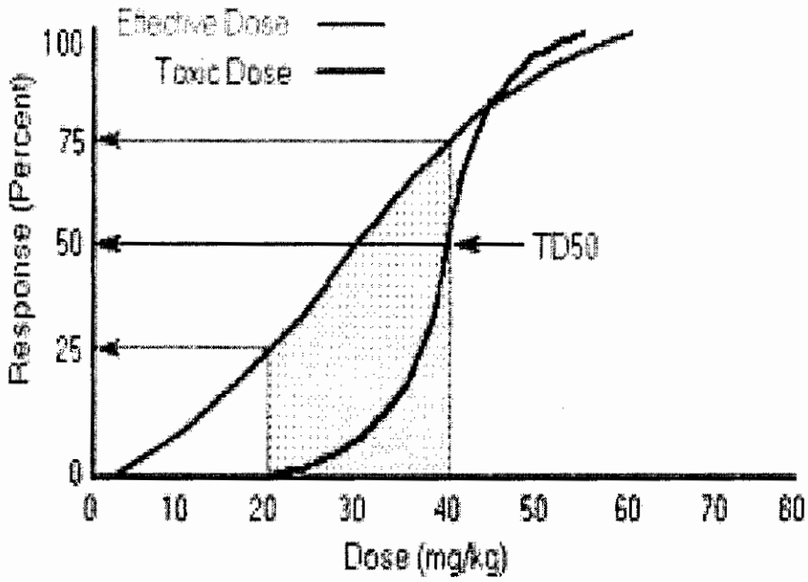
a) **Why is a bird used as an example of a vertebrate model for toxicity testing? (5)**

b) **Discuss dose fractioning and give an illustration thereof (10)**

c) **What are the physiological features that make the Blood Placental Barrier vulnerable to toxic insults (10)**

QUESTION 3

a) Discuss the therapeutic index using the figure below (10)



b) Name the factors that affect absorption of toxicants through the dermal route (6)

c) Write short notes on why the Blood Brain Barrier is vulnerable to toxicants (9)

QUESTION 4

a) All of the people listed below live in the same house. Who is most likely to experience the most toxic effects from the second-hand smoke? (4)

i. The mother, who smokes

ii. The teenage daughter who has asthma

iii. The son, who is in 5th grade

b) There are several ways of controlling or reducing your exposure to a chemical in the air like tobacco smoke. Opening a window in a room full of people who are smoking is an example of controlling exposure to environmental tobacco smoke by diluting the hazard. What other measures may you take to address the same problem? (5)

c) Name the four types of toxicity that may be experienced by the neurons (4)

d) Outline the pathway that may be followed after a drug is swallowed in the first pass effect (7)

e) What is the function of the smooth endoplasmic reticulum in relation to toxicology? (5)

QUESTION 5

a) From the following scenarios, who took the largest dosage of aspirin? Calculate the dose for each person in the question, show your calculations and include appropriate units? (10)

   i. An adult woman who weighs 125 kg and took 300 mg of aspirin

   ii. A teenage boy who weighs 135 kg and took 600 mg of aspirin

   iii. A baby who weighs 20kg and took 100 mg of aspirin

   iv. A Lomacala who weighs 5kg and took 50 mg of aspirin

b) A family home has a clogged furnace that is producing CO, a hazardous gas. Which family member is likely to be harmed the most and why.

   Give 3 reasons for your answer? (6)

   i. Billy, the son who is in 1st grade

   ii. Baby Mandla, who is going to be in preschool next year

   iii. Lomasontfo, the nanny who cares for the toddler every weekday morning

c) Write short notes on why the Blood Brain Barrier is vulnerable to toxicants insults (9)