UNIVERSITY OF SWAZILAND

Faculty of Health Sciences

Department of Environmental Health Science

BACHELOR OF SCIENCE IN ENVIRONMENTAL
MANAGEMENT AND OCCUPATIONAL HEALTH

JULY 2018 RESIT EXAMINATION PAPER

TITLE OF PAPER   :   ENVIRONMENTAL TOXICOLOGY

COURSE CODE   :   EHM 314

DURATION   :   2 HOURS

MARKS   :   100

INSTRUCTIONS

1. Read the questions & instructions carefully

2. Question 1 is compulsory

3. Then answer ANY OTHER THREE (3) questions

4. Each question is weighted 25 marks

5. Write neatly and clearly

6. Begin each question in a separate sheet of paper

7. Numbering within a chosen question should be in a sequential order

8. BEGIN EACH QUESTION ON A SEPARATE SHEET OF PAPER.

DO NOT OPEN THIS QUESTION PAPER UNTIL PERMISSION IS GRANTED BY
THE INVIGILATOR.

QUESTION 1

a) Match the terms on the left with their definitions. Letters can be used more than once
(7marks).

1.Teratogen	A. A scientist who studies the cellular, biochemical or molecular pathways involved in toxicity
2.Descriptive toxicologist	B. A scientist who assesses the risk of a given chemical
3.Mechanistic toxicologist	C. A chemical that causes liver damage
4.Target organ	D. A chemical that causes birth-defects
5. Hepatogen	E. Tries to understand the ill effects caused by toxicants
6.Product dev. toxicologist	F. The site where a toxicant will cause the majority of damage or impact
7. Molecular toxicologist	G. A scientist who performs toxicity testing on whole organism to produce data for safety/risk evaluation

b) There have been several important people and events in the history of Toxicology. Match the person or terms on the left with their accomplishments or definitions on the right (10 marks).

1.Sheng Nung	a. Supplied arsenic to women who wanted to kill their husband, died due to strangulation
2.Mount Vesuvius	b. Used arsenic in a concoction called ''La Cantrella''
3.Gulia Tophania	c. Convicted poisoner, was burnt at the stake
4.Hieronyma Spara	d. Group of people who murdered by poison for a fee
5.Rodrigo & Cesare Borgia	e. Christian military order alleged expects in poison
6. LaVoison	f. Thy drugs are quick. Thus I die with a kiss
7.Knights Templars	g. First to study venomous snakes, discovered that viper venom affects the blood
8.Venetian Council of Ten	h. Fortune teller who sold arsenic to wealthy wives to kill their husbands
9. Shakespeare	i. Pliny the elder suffocated due to volcanic gases
10.Felice Fontana	j. Tasted 365 herbs and died of overdose

c) What is the story behind Mr. Yuk 1971   (5marks)

d) Write briefly about the Chernobyl accident   (3marks).

TOTAL [25 MARKS]

QUESTION 2

    a) Differentiate between a toxicant and a toxin   (4marks).
    b) Write briefly about the functions of an analytical toxicologist   (5marks).
    c) Name the heavy metal that caused Minamata disease   (1mark).
    d) The right dose differentiates a poison from remedy, write this statement in full. Who is famous for this statement, do you agree with his assertion and why?

                                      (5marks).
    e) "There are no harmless substances; there are only harmless ways of using substances". Who is famous for this utterance? Do you agree with this statement and why? Support your response in not more than 5 lines   (5marks).
    f) When was the EPA established and what was its mandate   (5marks).

TOTAL [25 MARKS]

QUESTION 3

    a) Under what classes of biomarkers would you classify the following? (7marks)
      - Biologically effective dose
      - Fat soluble substance

      - A chemical that interacts with a critical cellular targets

      - A measure of metabolites of pesticides

      - Genetic factors that may influence how the body interacts with chemicals

      - A measurement that can be recognized as a disease
      - Monitoring workers exposed to pesticides
    b) What is the characteristic of an ideal bio-marker?   (2marks).
    c) What is the difference between the amnion and the amniotic fluid?   (4marks).
    d) Name the 4 types of transport mechanism that toxicants use to cross the Blood Placental Barrier (BPB)   (4marks).
    e) List the substances that cross the BPB by simple diffusion, special mediation and secondary active transport   (4marks).
    f) Name the lipid soluble substances that can pass through the BPB?   (3marks).
    g) What is the element that prevents all blood cells to enter the brain? (1mark).

TOTAL [25 MARKS]

QUESTION 4

a) Why is it considered ideal to take breath for analysis other than blood? (4marks).

b) Name the physical barriers that lie between the blood and the lumen of the seminiferous tubules of animals (2marks).

c) Give 4 effects that are observed in animals that have been exposed to EDCs (4marks).

d) Define and name the key 3 metabolites of DDT (4marks).

e) Define exposure and how it can be determined (5marks).

f) What are the 3 functions of the suppository routes? (6marks).

TOTAL [25 MARKS]

QUESTION 5

a) For the following please only write the appropriate word that well defines the scenario given, e.g. I = Scara

i. The quantity of a substance administered to an individual over a period of time (1mark).

ii. The lowest point where one can safely say there is some effects caused by a toxicant (2marks).

iii. Type of a dose referred to as a benchmark dose? (2marks).

iv. Unpack this formula LD_{50}? (3marks).

v. The highest data point at which there is no detectable toxic effects in an exposed animal (2marks).

vi. The type of transport mechanism that is able to move toxicants faster and is capable of moving larger molecules (3marks).

b) What would be the TI if the LD_{50} is 200 and the ED_{50} of 20 (3marks).

c) Which drug would be safer to administer between one with a TI of 10 and 3 and why? (4marks).

d) Who took the largest dosage of aspirin, calculate the dose for each person in the question, show your calculations and include appropriate units? (5marks).

i. Woman: 300 mg/125kg = 2.4mg/kg

ii. Boy: 600 mg/ 135 kg = 4.4 mg/ kg

iii. Baby: 100 mg/20 kg = 5.0 mg/ kg

iv. Lomacala: 50 mg/5 kg = 10 mg/ kg

TOTAL [25 MARKS]