UNIVERSITY OF ESWATINI

Faculty of Health Sciences

Department of Environmental Health Science

DEGREE IN ENVIRONMENTAL HEALTH SCIENCE

MAIN EXAMINATION PAPER DECEMBER 2019

TITLE OF PAPER	:	ENVIRONMENTAL TOXICOLOGY
COURSE CODE	:	EHS313
DURATION	:	2 HOURS
MARKS	:	100

INSTRUCTIONS

:	READ THE QUESTIONS & INSTRUCTIONS CAREFULLY
:	ANSWER QUESTION **ONE AND ANY OTHER THREE** QUESTIONS
:	EACH QUESTION CARRIES 25 MARKS.
:	WRITE NEATLY & CLEARLY
:	NO PAPER SHOULD BE BROUGHT INTO THE EXAMINATION ROOM.
:	STUDENTS ARE ALLOWED TO USE GRAPH PAPERS AND SCIENTIFIC CALCULATORS
:	BEGIN EACH QUESTION ON A SEPARATE SHEET OF PAPER.

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

QUESTION ONE

This question is compulsory. It is a multiple choice question that is carrying 25 marks. You are required to copy only the question number on to your answer sheet and besides it, write the letter of the correct answer to the question. Do not copy the question on to the answer sheet.

1. The solubility and mobility of toxins do not necessarily determine where and when then chemical move.
    a. True
    b. False
2. The Exposure and susceptibility determine how we respond to toxins.
    a. True
    b. False
3. Bioaccumulation and biomagnification are two processes that decrease the concentration of organic toxins in the body of an individual.
    a. True
    b. False
4. Some materials are made to be of greater threat to individuals due to persistence
    a. True
    b. False
5. The interaction of different chemicals cannot increase toxicity
    a. True
    b. False
6. Evaluating the potential harm to humans of a particular chemical requires determining all of the following except
    a. The source and amounts of exposure.
    b. The amounts absorbed and distributed throughout the body.
    c. The amount excreted.
    d. The metabolic rate of the individual.
7. A person receiving background radiation from a low-level radiation dump site for a lifetime has experienced
    a. A chronic exposure.
    b. A sub-chronic exposure.
    c. An acute exposure.
    d. A sub-acute exposure.
8. A person experiencing dizziness after using a strong household cleaner is showing
    a. A chronic effect.
    b. A sub-chronic effect.
    c. An acute effect.
    d. A sub-chronic effect.
9. A person experiencing liver damage after a lifetime of alcohol abuse is showing
    a. A chronic effect.
    b. A sub-chronic effect.
    c. An acute effect.

d. A sub-acute effect.

10. Which statement is true?
    a. All chemicals are unsafe.
    b. Natural chemicals are safe, and synthetic chemicals are deadly.
    c. Some chemicals, whether synthetic or natural, are safe and others are deadly.
    d. All chemicals are safe.
11. Case studies are most useful in toxicology because
    a. The health status of individuals studied is clearly known.
    b. They provide clues about possible environmental hazards.
    c. Acute dosages of harmful substances are documented.
    d. Exposure of individuals to a variety of harmful substances is controlled.
12. Laboratory investigations involve all of the following except
    a. Tests on live laboratory animals.
    b. Controlled experiments.
    c. Construction of dose-response curves.
    d. Extrapolation from fairly low dosages to high dosages.
13. Of the following, the least likely to be used in laboratory investigations of toxicity are
    a. Swallows.
    b. Mice
    c. Bacteria.
    d. Rats.
14. Dose-response curves are generated from
    a. Field studies.
    b. Epidemiological studies.
    c. Laboratory studies comparing experimental to control groups of test animals.
    d. Computer models.
15. Dose-response curves
    a. Show the effects of various doses of toxic agents on a group of test organisms.
    b. Are extrapolated using mathematical models to project possible effects of high doses.
    c. Are extrapolated from humans to other primates.
    d. All of these answers.
16. The model most often assumed because it errs on the side of safety is the
    a. Acute toxicity model.
    b. Chronic toxicity model.
    c. Threshold dose-response model.
    d. Linear dose-response model.
17. A threshold dose-response model
    a. Implies there is a dose below which no detectable harmful effects occur.
    b. Errs on the side of safety.
    c. Implies that each dose of ionizing radiation or toxic chemical carries a risk of causing harm.

d. Is useful for assessing chronic toxicity.

18. Toxic substances
    a. Are fatal to over 50% of test animals at given concentrations.
    b. Cause birth defects.
    c. Are harmful because they are flammable, explosive, irritating to skin or lungs, or cause allergic reactions.
    d. Cause mutations.
19. Suppose you accidentally drink a substance with an LD50 of 1 mg/kg. You are least likely to
    a. Call the Emergency Management Services (EMS) department for an ambulance.
    b. Continue doing what you were initially doing.
    c. Go to the hospital.
    d. Call your doctor.
20. The level of threat posed by a particular substance is least determined by
    a. Laboratory investigations.
    b. Epidemiology.
    c. Case studies.
    d. Exposing people to it so as to see the response.
21. The principal types of chemical hazards include all of the following except
    a. Toxic and hazardous substances.
    b. Mutagens.
    c. Teratogens.
    d. Zygogens.
22. Mutagens
    a. Are fatal to humans in low doses.
    b. Cause birth defects.
    c. Are harmful because they are flammable, explosive, irritating to skin or lungs, or cause allergic reactions.
    d. Cause mutations.
23. Teratogens
    a. Are fatal to humans in low doses.
    b. Cause birth defects.
    c. Are harmful because they are irritating to skin or lungs.
    d. Cause mutations.
24. Of the following chemicals, the least likely to cause birth defects is
    a. PCB
    b. Thalidomide
    c. Iodized sodium chloride
    d. teroid hormones
25. Carcinogens cause
    a. Genetic defects.
    b. Birth defects.
    c. Cancer.

d. Chronic health effects

Total 25 marks

QUESTION TWO

1. Name any three organs in a human body where the metabolic degradation and excretion of toxins occur [3 marks]
2. Describe how metabolic degradation and excretion is achieved by **any two** of the organs you listed above [22 marks]

Total 25 marks

QUESTION THREE

1. Acute and chronic doses and effects differ. With supporting points, discuss this statement. [12 Marks]
2. When dealing with chemical substances, usually there is risk associated with it.
   a. Define the word risk as it applies in toxicology. [2 marks]

Complete the following sentences by copying the sentence and inserting the right answer. [11 marks]

3. A poison, or toxicant is a substance that is ----------.
4. Toxicology is defined as ----------.
5. Based on the duration and location, exposure can be divided into the four categories of----------, ----------, ---------- and ----------.
6. Organisms that serve as indicators of various kinds of pollutants are called ----------.
7. The difference between the effective and lethal dose of a toxic substances employed for purposes, such as pharmaceutical uses, is called the ----------'
8. The dose at which half of test subjects are killed is denoted by ----------.
9. If there is no lasting effect from a toxic substance, the effect is said to be ---------- whereas if the effect is permanent, it is termed ----------.

Total 25 marks

QUESTION FOUR

1. The exposure of a person to toxic substances occurs on daily basis through a variety of pathways. What are these ways? [4 marks]
2. Earliest and recent humans used animal venoms and plant extracts for hunting, warfare and assassination. Briefly account for the life and death and the disasters of the following prominent people and places in the history of toxicology giving details.
   a. Socrates in 400BC. [7 marks]
   b. Charles VI October 20th, died 1740, Holy Roman Emperor, King of Bohemia, Hungary, and Croatia [7 marks]
   c. 1932 – 1968: Minamata disaster [7 marks]

Total 25 marks

QUESTION FIVE

It is well known that when individuals within a population are exposed to a single dose of the same toxicant, they will demonstrate a wide array of responses. For example, 10 mg/kg of the pesticide parathion will not kill every rat. **List five** of these factors that cause such variation in responses and **in detail account for each** of them.

Total 25 marks

End of examination