



UNIVERSITY OF SWAZILAND
Faculty of Health Sciences
Department of Environmental Health Science

DEGREE IN ENVIRONMENTAL HEALTH SCIENCE

MAIN EXAMINATION PAPER DECEMBER 2018

TITLE OF PAPER : ENVIRONMENTAL TOXICOLOGY

COURSE CODE : EHS313

DURATION : 2 HOURS

MARKS : 100

INSTRUCTIONS :

- : READ THE QUESTIONS & INSTRUCTIONS CAREFULLY
- : ANSWER **ANY FOUR** 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 is a multiple choice question that is carrying 25 marks. You are required to copy the question number on to your answer sheet and besides it, write the letter of the correct answer to the question. This question is compulsory.

1. Evaluating the potential harm to humans of a particular chemical requires determining
 - a. The source and amounts of exposure.
 - b. The amounts absorbed and distributed throughout the body.
 - c. The amount excreted.
 - d. All the above.
2. A person receiving background radiation from low-level radioactive 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
3. A person flying over the Chernobyl site two days after the explosion most probably experienced ----- to radioactive substances
 - a. A chronic exposure.
 - b. A sub chronic exposure.
 - c. An acute exposure.
 - d. A sub acute exposure.
4. 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 acute effect.
5. 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.
6. A person with kidney damage after acute exposure to a toxic chemical is showing
 - a. A chronic effect.
 - b. A sub chronic effect.
 - c. An acute effect.
 - d. A sub acute effect.

7. Dose and response may be affected by the following chemical's characteristics except
- Solubility.
 - Biomagnifications.
 - Antagonistic and synergistic interactions with other chemicals
 - Temperature.
8. Which statement is true?
- All chemicals are unsafe.
 - Natural chemicals are safe, and synthetic chemicals are deadly.
 - Synthetic chemicals are deadly, and natural chemicals are safe.
 - Some chemicals, whether synthetic or natural, are safe and others are deadly.
9. Suppose you accidentally drink a substance with an LD₅₀ of 1 mg/kg. You are least likely to
- Call the Emergency Management Services (EMS) department for an ambulance.
 - Continue doing what you were initially doing.
 - Go to the hospital.
 - Call your doctor.
10. The level of threat posed by a particular substance is least determined by
- Laboratory investigations.
 - Epidemiology.
 - Case studies.
 - Exposing people to it so as to see the response.
11. Case studies are most useful because
- The health status of the individuals studied is clearly known.
 - They provide clues about possible environmental hazards.
 - Acute dosages of harmful substances are documented.
 - Exposure of individuals to a variety of harmful substances is controlled.
12. Laboratory investigations of toxic chemicals involve all the following except
- Tests on live laboratory animals.
 - Controlled experiments.
 - Construction of dose-response curves.
 - Extrapolation from fairly low dosages to high dosages.
13. Of the following, the least likely to be used in laboratory investigations of toxicity are
- Cattle egrets.
 - Mice.
 - Bacteria.
 - Rats.

14. An epidemiological study showing a standard increase in physical effects for each rise in the dose of a toxic substance would imply
- A threshold dose-response curve.
 - An exponential dose-response curve.
 - A linear dose-response curve.
 - No dose-response curve.
15. A threshold dose-response model
- Implies there is a dose below which no detectable harmful effects occur.
 - Errs on the side of safety.
 - Implies that each dose of ionizing radiation or toxic chemical carries a risk of causing harm.
 - Is useful for assessing chronic toxicity.
16. The principal types of chemical hazards include all of the following except
- Toxic and hazardous substances.
 - Mutagens.
 - Teratogens.
 - Zygogens.
17. Mutagens
- Are fatal to humans in low doses.
 - Cause birth defects.
 - Are harmful because they are flammable, explosive, irritating to skin or lungs, or cause allergic reactions.
 - Cause mutations.
18. Toxic substances
- Are fatal to over 50% of test animals at given concentrations.
 - Cause birth defects.
 - Are harmful because they are flammable, explosive, irritating to skin or lungs, or cause allergic reactions.
 - Cause mutations.
19. Teratogens
- Are fatal to humans in low doses.
 - Cause birth defects.
 - Are harmful because they are irritating to skin or lungs.
 - Cause mutations.
20. Of the following chemicals, the least likely to cause birth defects is
- PCB
 - Thalidomide
 - Iodized sodium chloride
 - Steroid hormones

21. All of the following are synthetic chemicals that can act as hormone mimics or hormone blockers except
- Dioxins.
 - Adrenalin.
 - PCBs.
 - Some pesticides.
22. According to the World Health Organization (WHO), which of the following plays the most important role in causing or promoting cancer?
- Viruses.
 - Genetic factors.
 - Cigarette smoke.
 - Environmental pollutants.
23. Carcinogens cause
- Genetic defects.
 - Birth defects.
 - Cancer.
 - Chronic health effects.
24. A delay of ----- years between initial exposure to a carcinogen and appearance of detectable symptoms is typical.
- 1 – 2
 - 2 – 5
 - 5 – 10
 - 10 – 40
25. All of the following are considered to be cultural hazards except
- Smoking.
 - Drought.
 - Drugs.
 - Diet.

QUESTION TWO

- Define the following toxicological terms
 - Toxicology. 3 marks.
 - Dose 2 marks.
 - Toxicity 2 marks.
 - Response 2 marks.
- The toxicity of a substance depends on some factors. Account for these factors.

5 marks.
- The exposure of a person to toxic substances occurs on daily basis through a variety of pathways. What are these ways? 4 marks.

4. The exposure on an organism to a toxicant alone does not determine whether the substance will have toxic effects or not. Explain why this is so. 7 marks.

Total 25 marks.

QUESTION THREE

1. Who is regarded as the father of toxicology? 1 mark.
2. Earliest and recent humans used animal venoms and plant extracts for hunting, warfare and assassination. Briefly account for the life and death of the following prominent people in the history of toxicology giving details.
 - a. Socrates in 400BC. 8 marks.
 - b. Eva Braun, on April 30th, 1945. 8 marks.
 - c. Bando Mitsugoro VIII on Jan 16th, 1975. 8 marks.

Total 25 marks

QUESTION FOUR

1. Draw a dose-response curve for beneficial substances and explain the curve. 11 marks
2. Give the full meaning of the following abbreviations associated with Dose-Response curves in toxicology
 - a. ED: 2 marks.
 - b. TD: 2 marks.
 - c. LD: 2 marks.
 - d. NOAEL: 2 marks.
 - e. LOAEL 2 marks
 - f. FEL 2 marks.
 - g. SHD 2 marks

Total 25 marks

QUESTION FIVE

1. Write short notes on the following process associated with movement of toxins in the human body.
 - a. Passive transport. 5 marks.
 - b. Active transport. 5 marks.
 - c. Phagocytosis 5 marks.
 - d. Pinocytosis 5 marks.

2. There are three major organs involved in the excretion of toxic chemical substances bioaccumulated in the human body. Briefly explain how the kidneys facilitate the mechanism of this process. 5 marks.

Total 25 marks.