UNIVERSITY OF RUHUNA

BACHELOR OF SCIENCE GENERAL DEGREE LEVEL III (SEMESTER II)

EXAMINATION – February 2023

Subject: Zoology **Time: 01 ¼ hours**

COURSE UNIT: ZOO 3272 – Environmental Pollution and Toxicology

Answer **all questions in Part I** and **one question from Part II.**

Illegible handwriting would be penalized

Part I – Answer all Questions

1.

(a) Write three major routes of land pollutant generation.

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(b) What are the **greenhouse gases**? Give three examples.

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(c) Briefly describe the difference between **ground level ozone** and **stratospheric ozone.**

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(d) List out three health effects of air pollution.

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(e) What are the **common physical unit operations** used in **waste water treatment plants**?

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(f) What is meant by **dechlorination**?

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(g) Briefly mention the **importance of dechlorination** in residential water treatment plants.

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(h) Name two principal nutrients found in **waste water** discharge.

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(i) List out three sources of noise pollution and three impacts.

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(25 minutes) ***(50 marks)***

2.

(a) Define the terms "**toxicant**" and "**toxin**".

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(b) Briefly describe the **three main functions** studied in **Environmental Toxicology**.

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(c) Describe the terms **LC50** and **LD50**.

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(d) State the difference/s between **acute** and **chronic exposure**.

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(e) What is meant by **intra-media transport** of toxicants? Giving examples, briefly explain the differences between **inter-media transport** and **intra-media transport.**

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(f) Briefly **describe** the process of **biomagnification**.

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(g) **"Hydrophilic toxicants** can be easily excreted by the human body". Giving one example, **justify this statement**.

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(h) Briefly describe the main steps involved in **Ecological Risk Assessment**.

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(i) Name **three effects** of endocrine disrupting chemicals in **females**.

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(25 minutes) ***(50 marks)***

Part II – Answer only one Question

1. A pesticide company is planning to introduce **two new herbicides** (X) and (Y) to control an invasive aquatic weed in a freshwater pond located in the Sinharaja forest reserve. It has been found that **Predicted Environmental Concentration** (PEC) of X and Y are 1.8 and 0.42 µg/l respectively. Toxicity data for X and Y for some **selected species** are given in Table 1 and **assessment factors** to derive **Predicted No Effect Concentration** (PNEC) is given in Table 2.

Table 1:

Compound	Species No	Taxonomic Group	Endpoint	Concentration (ug/L)
X	1	Fish	LC50	5.62
	2	Algae	EC50	0.86
	3	Algae	NOEC	0.04
	4	Fish	EC50	0.72
Y	1	Fish	LC50	0.52
	2	Crustacean	LC50	37.65
	3	Algae	EC50	0.045
	4	Algae	EC50	0.005
	5	Crustacean	EC50	0.65

Table 2

Available data	Assessment / application factor
At least one short-tern L(E)C50 from each of the three trophic levels of the base-set (Fish, Daphnia and Algae)	1000
One long-term NOEC (either fish or Daphnia)	100
Two long-tern NOECs from species representing two trophic levels (Fish and/or Daphnia and/or algae)	50
Long-term NOECs from at least three species (Fish, Daphnia and algae) representing three trophic level	10

Using the data given in Table 1 and Table 2, perform a **Preliminary Ecological Risk Assessment** (ERA) for the **compounds X and Y**. Comment on your results with suitable recommendations.

(25 minutes) ***(50 marks)***

2. Write an account on main routes of toxicant exposure and the factors affecting them.

(25 minutes) ***(50 marks)***

(Please attach this question paper to your answer script)

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