



UNIVERSITY OF RUHUNA
FIRST EXAMINATION IN B.Sc GREEN TECHNOLOGY (PART I)

September – 2022

ID1102-Environment and Pollution

Time: 1 Hours and 30 Minutes

Structured and Essay Type

Index Number

INSTRUCTIONS

- Answer ALL questions.
- Answer to the structured questions in Part A must be written in the spaces provided.
- Answers to essay type questions in Part B must be written on the answer books.
- All questions carry equal marks.
- Only non-programmable calculators are permitted.
- Mobile Phones are not allowed

PART A – Structured Type - Answer ALL Questions

1. Risk analysis is very important in the determination of threats due to the environmental pollution.

a. List the major steps in risk analysis.

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(05 Marks)

b. How do you differentiate hazard and risk?

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(05 Marks)

c. List the reasons for the environmental risk assessment.

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(10 Marks)

d. List the steps in Risk assessment with a brief description of each step.

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(20 Marks)

e. Dose Response Assessment is performed during the environmental risk assessment.

- What does it mean by the Dose Response Assessment?

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(10 Marks)

- RfD, NOAEL, Actual Threshold, LOAEL are frequently used terms in environmental risk assessment. Explain them using suitable sketches.

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(20 Marks)

f. A farmer is exposed to Trifluralin, a commonly used pesticide, while working in the fields. Calculate the risk of the worker exposed to $0.015\text{mg}/\text{m}^3$ who works 8 hours per day, 6 days a week, for 4.5 months a year, and for 30 years. Assume a body weight of 70.0 kg and an inhalation volume of 20m^3 per 8 hours. The slope factor for Trifluralin is $8.4 \times 10^{-1} (\text{mg}/\text{kg} \cdot \text{day})^{-1}$.

- Determine the carcinogenic risk arising from the above exposure.

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(20 Marks)

- If the carcinogenic risk is higher than the acceptable risk, what would be the advices you are suggesting to the farmer?

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(10 Marks)

PART B – Essay Type - Answer ALL Questions

1. (a). What does remediation mean with respect to the environmental pollution? Briefly explain. (10 Marks)
- (b). The small tank near the gate of the Faculty of Agriculture, University of Ruhuna have been polluted. Faculty Administration requests you to look into the matter and identify the sources of pollutions and make a long-lasting plan to prevent the pollution further.
- i. What are the very basic steps to be followed to identify the pollution problem? (15 Marks)
 - ii. What are the steps you would follow for the preparation of pollution prevention plan. (15 Marks)
- (c). What are the major anthropogenic activities that accelerate the environmental pollution? (20 Marks)
- (d). Once a toxicant enters into the body, the actual effect of a toxic chemical on the target organ determined by several processes. What are those processes? Explain them briefly. (30 Marks)
- (e). List major pollutants that release to the environment due to agricultural activities (including animal husbandry) (10 Marks)

2. (a). Phase distribution is very important in pollution distribution. What is meant by phase distribution? (20 Marks)

- (b). How do you use following coefficients for the phase distribution?
 - i. Sorption coefficient

(c). Following soil properties were determined in a contaminated site.

- Soil water content - 28 % (volume basis)
- Soil gas content - 12%
- Bulk density of the soil - 1.5 g/cm³

i. The concentration of a particular pollutant in soil water is 6.5 mg/L. If the sorption coefficient and the Henry's constant of the pollutant in the site is 10 mL/g and 0.25, respectively; Determine the unit mass of the contaminant in the site

(25 Marks)

ii. Determine the pollutant fraction in water, air and retained by soil solids.

(15 Marks)

iii. If the volume of contaminated soil in the site is 550 m³, calculate the total contaminant mass.

(20 Marks)

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