



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2022/2023**

COURSE NAME : GEOENVIRONMENT

COURSE CODE : BFG 40303

PROGRAMME CODE : BFF

EXAMINATION DATE : JULY/ AUGUST 2023

DURATION : 3 HOURS

- INSTRUCTIONS
1. ANSWER ALL QUESTIONS
 2. THIS FINAL EXAMINATION IS CONDUCTED VIA **CLOSED BOOK**.
 3. STUDENTS ARE **PROHIBITED** TO CONSULT THEIR OWN MATERIAL OR ANY EXTERNAL RESOURCES DURING THE EXAMINATION CONDUCTED VIA CLOSED BOOK

THIS QUESTION PAPER CONSISTS OF **FOUR (4)** PAGES

- Q1** (a) Explain **TWO (2)** types of contamination that have effects on human health and the environment. (5 marks)
- (b) Pollutants are derived from biological, chemical and physical processes. Although natural processes such as evaporation can sometimes cause water pollution, most pollution is derived from human, land-based activities. Water pollutants can move through different reservoirs, as the water carrying them progresses through stages of the water cycle. Predict what could happen to human health if surrounded by biological and chemical contaminant. (8 marks)
- (c) Justify and briefly describe **FOUR (4)** Resource Conservation and Recovery Act (RCRA) hazardous waste characteristics. (12 marks)
- Q2** (a) Landfill is the oldest and most common form of waste disposal. In this process, the waste that cannot be reused or recycled is separated out and spread as a thin layer in low-lying areas across a city. A layer of soil is added after each layer of garbage. However, once this process is complete, the area is declared unfit for building construction for the next 20 years. Instead, it can only be used as a playground or a park. Identify the purpose of landfills and the effects of landfill. (5 marks)
- (b) Pesticides are unique among toxic substances as they are deliberately added to eliminate some form of life. Under ideal conditions, the injuring action should be specific and affect only the target organisms. The toxicity should disappear after the purpose for which it was applied has been achieved. However, none of these features are met with in most of the pesticides which are in common use these days. This has made the use of these synthetic pesticides extremely hazardous pollutants of the environment and the biosphere. Verify the possibility of problems associated with the use of pesticides. (20 marks)
- Q3** (a) The environmental behaviour of rock and oil pollutants in soil has always been the focus of environmental protection research. The sources, hazards, and existing states of the stone oil pollutants in the soil, their migration, adsorption and degradation behaviour in the soil have been acknowledged. Identify what could happen if the soil is surrounded by petroleum. (4 marks)

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- (b) Biodegradable wastes produced in a domestic or industrial establishment are usually based on two types which are liquid wastes and solid waste. Biodegradable pollutants can be effectively treated with microorganisms and decomposed to simple harmless constituents. The biological treatment is rather an inexpensive treatment. It not only eliminates the pollution but may also provide economically useful products. Distinguish **THREE (3)** types of treatment to dispose liquid wastes.

(8 marks)

- (c) Trace elements in general cause only local pollution problems. Environmental significance of the enhanced levels of these elements is judged in terms of the degree of toxicity, the extent of exploitation of the element, their application and consequent mobilization into the air, water and soil. From time to time an increasing concern has been expressed about contamination caused by trace elements like lead, mercury, cadmium, chromium, arsenic, and nickel. Justify the possibility of problems associated with trace element pollution.

(13 marks)

- Q4** (a) Classify **THREE (3)** physical mechanisms which transport solutes in saturated media in groundwater.

(7 marks)

- (b) The spatial distribution of any such pollutants that are likely to be present on the site must be investigated. Detailed site investigations shall be done in both the geological medium and groundwater so that each pollutant that is causing the contamination can be detected. Describe **FIVE (5)** phases of site investigation for soil contamination remediation.

(5 marks)

- (c) Crude oil pollution is one of the component environmental pollution due to transportation, accidental discharge and spillage. Due to the presence of crude oil, it affects soil properties irrespective of seasons, by precipitating a hydrophobic layer thus creating a competitive interaction between heavy metals and essential nutrients. Recommend **FOUR (4)** methods to remove the crude oil to avoid soil affections.

(8 marks)

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- (d) The analysis of the remediation possibilities will consider the characterization of the area realized by geological, hydrogeological investigations, sampling for analytical determinations, assessing the dynamic of contaminant in the subsurface etc forming a conceptual model. The conceptual model provides an image of the structure of the underground environment, its important characteristics for pollutant migration and its behavior, and the characteristics of the pollutants found underground. Besides that, the conceptual model offers a three-dimensional image of the conditions of a contaminated site, illustrating the distribution and the mechanisms of contamination behavior. Interpret the assembled data that help to establish a qualitative and quantitative representation of the characteristics of the contamination area.

(5 marks)

- END OF QUESTIONS -