Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2021/2022

COURSE NAME	:	ENVIRONMENTAL SCIENCE
COURSE CODE	:	BWJ 21303
PROGRAMME CODE	:	BWW
EXAMINATION DATE	:	7TH FEBRUARY 2022
DURATION	:	3 HOURS
INSTRUCTION	:	1. ANSWER **ALL** QUESTIONS 2. THIS FINAL EXAMINATION IS AN **ONLINE** ASSESSMENT AND CONDUCTED VIA **CLOSED BOOK**

THIS QUESTION PAPER CONSISTS OF **FIVE (5)** PAGES

Q1 Scientific knowledge is advanced through a process known as the scientific method. Research study that adheres to the scientific method makes it easy for future researchers to repeat the study and attempt to replicate the results.

(a) Define scientific method.

(2 marks)

(b) Describe **SEVEN (7)** steps of the scientific method in order.

(14 marks)

(c) Describe **FOUR (4)** characteristics of the nature of science.

(8 marks)

(d) Describe the purpose of a control variable in scientific experiment.

(1 mark)

Q2 Pesticides have been utilized for many years to increase agricultural production and control pest population. Pesticide use can be both beneficial and harmful to human and also other organisms. Cotton farmers in the Texas used a chemical pesticide to control an insect cotton-crop pest over a 40-year period. To study the effectiveness of the pesticide as an insect pest-control, traps were placed in treated cotton field and the number of pests captured were compared to application rates for the pesticide. The results of the study are shown in **Table Q2** below.

(a) Describe **ONE (1)** benefit to human health that can result from the use of pesticide.

(2 marks)

(b) Identify **THREE (3)** ways chemical pesticide can enter the human body.

(6 marks)

(c) From the **Table Q2** shown, identify the year when the pesticide was most effective at reducing the size of the pest population.

(2 marks)

(d) There are many problems associated with the repeated application of chemical pesticides to reduce pest populations. Propose **SEVEN (7)** reasonable methods to reduce the use of pesticides in agricultural practices while still maintaining a high crop yield.

(7 marks)

(e) Explain how the changes in the cotton-crop pesticide effectiveness between the initial application in 1975 and the latest application in 2015 illustrates genetic resistance in pests, based on the data in the **Table Q2.**

(8 marks)

Q3 Read the following **Figure Q3** from the Fremont Daily Times and answer the questions that follow.

(a) Define carbon footprint.

(2 marks)

(b) Identify **ONE (1)** way the school's heating system is likely adding to the school's carbon footprint.

(2 marks)

(c) Give **FOUR (4)** realistic ways to reduce the contributions of the heating system to the school's carbon footprint.

(8 marks)

(d) Explain **FIVE (5)** environmental benefits of a living green roof, as suggested by Councilperson Fassler.

(5 marks)

(e) Renewable energy is one of the most effective tools we have in the fight against climate change. What are the **FOUR (4)** advantages and disadvantages of renewable energy?

(8 marks)

Q4 Habitat destruction and fragmentation can have many different effects on species.

> A rapidly growing suburban municipality purchases nearby forested land and proposes a newly planned housing development, which would involve clear-cutting much of the area for the construction of single-family homes. While evaluating the land, the development committee discovers that development will encroach upon the habitat of a wood thrush population. The wood thrush is a solitary, territorial bird whose preferred habitat consists of large, intact densely forested areas. Wood thrush populations are also threatened by cowbirds. A cowbird lays her egg in an existing nest of a wood thrush. After the cowbird egg hatches, the cowbird pushes the unhatched wood thrush eggs out. The wood thrush parents raise the cowbird hatchling as their own (no need table)

(a) From above statement, describe **THREE (3)** characteristic of a specialist species that would make the specialist species more likely to be negatively affected by habitat fragmentation than a generalist species.

(6 marks)

(b) Describe and explain the symbiotic relationship between the wood thrush and the cowbird.

(4 marks)

(c) Describe **FIVE (5)** ecological advantages of leaving areas of undeveloped forest in the development plan as compared to clear-cutting the property

(10 marks)

(d) Propose **FIVE (5)** solutions that will minimize the effect of development on the resident population of wood thrush while still meeting the municipality's need for a housing development.

(5 marks)

– **END OF QUESTIONS** –

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Year	Gram of Pesticide Applied Per Hectare	Number of Crop Insects Pest Captured
1960	0	700
1975	500	2
1980	500	3
1985	500	8
1990	550	14
1995	600	83
2000	700	150
2005	800	405
2010	900	727
2015	1,000	1,100

Table Q2

Fremont Daily Times May 1, 2018

GREEN IS THE NEW SCHOOL COLOR AT FREMONT HIGH SCHOOL!

A group of students from Fremont High School addressed the city council last night and proposed that one of the existing buildings at Fremont High School, which was built in 1970, be renovated to take advantage of recent advances in green technology. Currently the heat for the school is provided by fossil fuel combustion. The students said that the redesigned building would reduce the school's carbon footprint, which is a measure of the amount of carbon dioxide and other carbon compounds released by various human activities. Incorporating specific features that conserve energy and utilize renewable energy sources can help reduce the carbon footprint.

Councilperson Gail Fassler praised the idea, saying that the project could conserve local water resources, reduce the need for consuming new resources, and act as a "shining beacon" of sustainability for the greater Fremont community. Fassler suggested the project could even incorporate a living green roof as an additional sustainable feature. The council approved the initial site planning request and urged students to report back when the project was under way.

Figure Q3