

國立臺北科技大學 111 學年度碩士班招生考試

系所組別：3220 環境工程與管理研究所乙組

第一節 環境科學 試題

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注意事項：

1. 本試題共五題，共 100 分。
2. 不必抄題，作答時請將試題題號及答案依照順序寫在答案卷上。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

1. In a typical health risk assessment process, understanding the dose-response relationship is a critical step.

- a. Please describe the four steps of health risk assessment process. (5%)
- b. What is median lethal dose (LD_{50})? (5%)
- c. How to use LD_{50} to describe the dose-response relationship? You can draw a schematic diagram to explain it. (5%)

2. Environmental Science is an approach to study the impact of human activities in multidisciplinary aspects. Currently, there is an increasing growth of population, economy, and industrialization that result in huge greenhouse gases (GHGs) emission from human activities. Thus, the global warming is one of the most important environmental issues. Please answer the following questions.

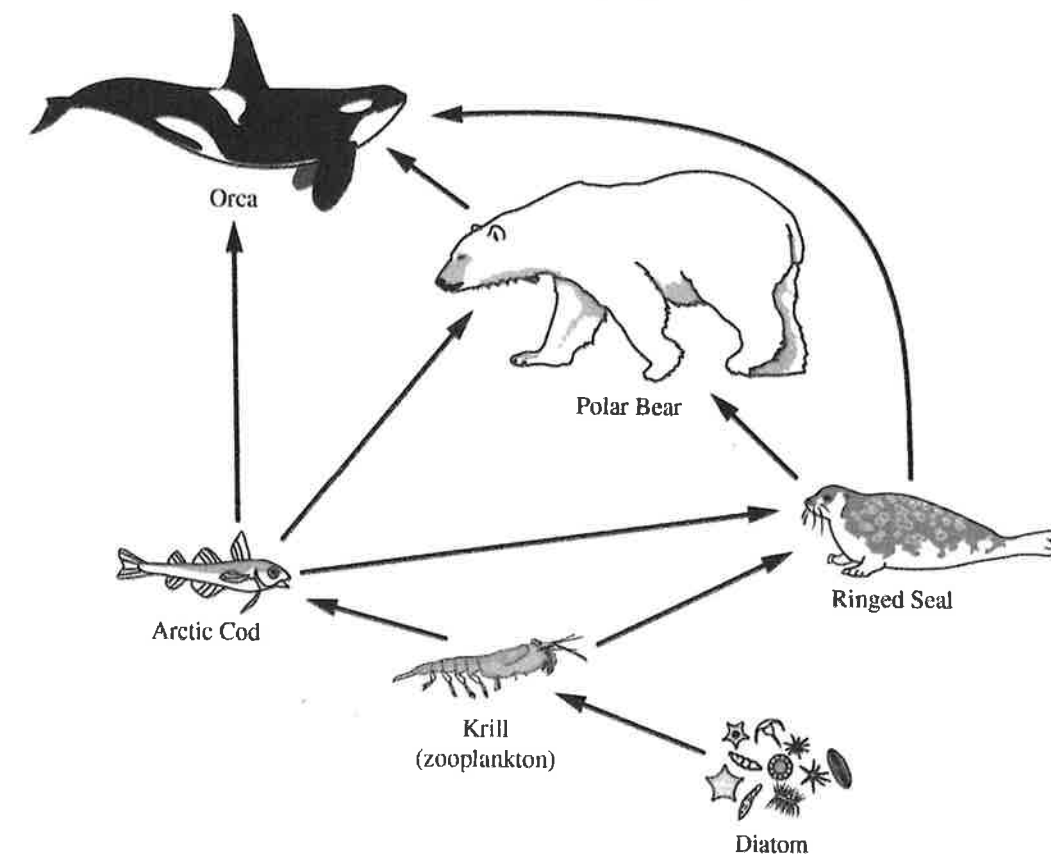
- a. Explain what is “greenhouse effect”? (5%)
- b. List the six GHGs described in the Kyoto Protocol and the seventh GHG described in 17th session of the Conference of the Parties (COP17). (5%)
- c. Describe where comes the GHGs. (10%)

3. As conventional sources of crude oil are depleted, unconventional sources such as oil sands (also known as tar sands) are being utilized. Oils sands contain bitumen, which can be processed into a synthetic crude oil. A region of boreal forest in Alberta, Canada, that covers a deposit of oil sands will be cut and removed during the process of bitumen extraction. It is estimated that the deposit contains 73 billion barrels of recoverable bitumen. The rate of extraction from the deposit will be approximately 1 million barrels of bitumen per day. Please

answer the following question.

- a. Identify TWO ecological benefit, other than providing habitat, that is provided by forests. (4%)
- b. Identify TWO economic benefit that is provided by forests. (4%)
- c. Describe TWO environmental consequences, other than those related to the loss of boreal forest habitat, that result from the extraction of bitumen or the transportation of synthetic oil to customers. (4%)
- d. Assuming the above extraction rate, calculate how many days will be needed to extract the recoverable volume of bitumen from the oil sands. (4%)
- e. Calculate how many years will be needed to fully extract the recoverable volume of bitumen from the oil sands. (2%)
- f. Monthly production of synthetic crude oil is 30 million barrels. Producing one barrel of synthetic crude oil uses two barrels of heated freshwater. Calculate the number of barrels of freshwater needed each year to supply this demand. (2%)

4. An Arctic food web includes the following organisms.



注意：背面尚有試題

- a. Refer to the food web above to complete the following question.
- (i) Identify a primary producer. (1%)
 - (ii) Identify a primary consumer. (1%)
 - (iii) Identify a secondary consumer. (1%)
- b. Other than showing which organisms are consumed by other organism, describe what is indicated by the direction of the arrows in the diagram. (2%)
- c. Explain how melting sea ice leads to a feedback loop that increases Arctic warming. (4%)
- d. Many species, including some whales and birds, will travel thousands of kilometers during annual migrations.
- (i) Provide one reason a species may migrate a long distance. (2%)
 - (ii) The North Atlantic right whale migrates between subtropical and polar waters annually. Nearly 50 percent of right whale deaths are due to human activities. Describe one commercial activity, other than whaling, that may result in the death of right whales. (2%)
 - (iii) Describe one strategy that could reasonably be implemented to decrease right whale deaths caused by the commercial activity you described in part (ii). (2%)
5. Due to the limited resource, we are facing the transition period from a linear economy to circular economy. The economy is key to fighting climate change. That's why we must continue the shift from a linear to a circular economy to make sure society progresses in a way that is environmentally-friendly. Please answer the following question.
- a. How is a circular economy different from a linear economy? (10%)
 - b. What are the disadvantages of the current linear economy? (5%)
 - c. What are the environmental benefits of the circular economy? (5%)
 - d. Provide an example of how to work on the circular economy. (10%)