

## 國立臺北科技大學 113 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

第 1 頁 共 1 頁

**注意事項：**

1. 本試題共 6 題，第 1 題 10 分，第 2-3 題 每題 15 分，第 4-6 題 每題 20 分，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. **Explain** the concept of biodiversity and its importance in environmental science. Please **provide one** example of how changes in biodiversity can impact ecosystems. (10%)
2. Plastic pollution in aquatic ecosystems has become one of the global issues. Explore the environmental impacts of plastic pollution in aquatic ecosystems. Please answer the following questions.
  - a. Please **discuss** the sources of plastic pollution, its effects on marine life, and potential mitigation strategies. (10%)
  - b. What is microplastic? Please **define** microplastic. (2%)
  - c. **Identify three** sources of microplastics. (3%)
3. Global temperatures are higher than at any other time in history, a tax on carbon emissions would be aimed at incentivizing the reduction of greenhouse gases. Before rate the carbon tax, the carbon footprint of products may need to be revealed. Please answer the following questions.
  - a. What is a carbon tax? **Define** carbon tax. (3%)
  - b. **Define** carbon footprint. (3%)
  - c. A heating system in an old building in some cold areas is often provided by fossil fuel combustion. **Identify one** way the heating system is likely adding to the carbon footprint. (3%)
  - d. The green roof has been proposed to cool the temperature of buildings. **Identify two** environmental benefits of a green roof. (6%)

4. In order to mitigate climate change, it is necessary to retire coal-fired plants and build new natural gas power plants. Please answer the following questions.
  - a. **Describe** why coal is considered a non-renewable energy source. (2%)
  - b. Why using natural gas power plants can mitigate climate change. **Describe two potential environmental** advantages and **two economic** advantages of replacing a coal-fired power plant with a natural gas power plant. (12%)
  - c. Particulate matter is a common air pollutant in emissions from coal-fired power plants, vehicles, and other sources. Recently, PM<sub>2.5</sub> has become a serious issue and presents a particular risk to human health. Please **define** PM<sub>2.5</sub> and PM<sub>10</sub> and **elaborate on the reason** why PM<sub>2.5</sub> is more important and concerning than PM<sub>10</sub>. (6%)
5. Offshore wind farms are considered one of the suitable renewable energy sources for Taiwan. It will be located along the west coast of Taiwan. This project will consist of 100 wind turbines, each with a capacity of 4 megawatts (MW). Each turbine costs \$0.1 billion NTD to build. The government expects to provide 2.15x10<sup>6</sup> MWh per year to fulfill the electrical demand. Please answer the following questions.
  - a. **Describe one** environmental benefit associated with an offshore wind farm. (3%)
  - b. **Identify and describe one** potential economic effect of an offshore wind farm. (6%)
  - c. Customers in the service area pay \$3 NTD/kWh for electricity. **Calculate** how much revenue will be produced if the wind turbines provide 42% of the annual electrical demand in the service area. Please show all work as much as you can. (6%)
  - d. Assuming all turbines are operating, **calculate** how many hours the wind turbines must operate to provide 42% of the annual electrical demand in the service area. Please show all work as much as you can. (5%)
6. The 2030 Agenda for Sustainable Development provides a blueprint for world peace and prosperity for people and the planet. There are 17 sustainable development goals (SDGs). Please **identify five** of 17 goals and their main targets. (20%)