國立臺北科技大學104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

第二節　環境科學　試題

注意事項：

1. 本試題共 20 題，每題 5 分，配分共 100 分。
2. 請標明問題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

Question 1　(5%)

A scientist takes multiple measurements over several days with a nitrogen dioxide monitor to assess air quality inside a road tunnel.

The scientist takes more than one measurement over several days with the monitor in order to

A. establish a control reading.

B. assess the impact of the pollutant.

C. eliminate any abnormally high or low pollution readings.

D. ensure that the monitor is accurately measuring nitrogen dioxide concentrations.

Question 2　(5%)

A solar cell panel has a surface area of 3.0 m^2 and receives 980 W of light per m^2. This energy is converted into 530 W of electricity total.

The solar cell has an efficiency of approximately

A. 5.5%

B. 16%

C. 18%

D. 54%

Question 3　(5%)

The correct sequence of layers of the atmosphere from innermost to outermost is

A. mesosphere—stratosphere—thermosphere—troposphere.

B. troposphere—stratosphere—mesosphere—thermosphere.

C. stratosphere—thermosphere—troposphere—mesosphere.

D. thermosphere—stratosphere—mesosphere—troposphere.

Question 4 (5%)

Which of the following statements is ***false***?

A. Ozone in the lower stratosphere shields the earth from about 95% of the sun's harmful ultraviolet rays.

B. CFCs are odorless and stable.

C. CFCs are nonflammable, nontoxic, and noncorrosive.

D. Fluorine atoms are most responsible for the breakdown of ozone to molecular oxygen.

Question 5 (5%)

The dosage of a pollutant that a person receives is the amount of pollutant

A. that will cause harm.

B. absorbed per unit of body weight.

C. occurring naturally in the environment.

D. to which they are exposed over a period of time.

Question 6 (5%)

In the country in which the study was conducted, some whale meat is still eaten by people. Which one of the following is likely to be the consequence of consuming large amounts of whale meat over a long period of time?

A. indigestion

B. breathing difficulties

C. unpleasant taste of the meat

D. mental and nervous system disorders

Question 7 (5%)

Which one of the following statements about elemental mercury is true?

A. It dissolves readily in water.

B. It is a solid at room temperature.

C. It is less dense than sulfur dioxide.

D. It can be absorbed through the skin.

Question 8 (5%)

Mercury oxide can be converted to methyl mercury by

A. settling in soil.

B. bacteria in lakes.

C. reacting with water.

D. reacting with oxygen.

注意：背面尚有試題

Use the following information to answer Questions 9–11.

Alex uses solar cells to power her electric car. The energy conversions and their efficiencies are shown in the following diagram.

$$\text{solar energy} \xrightarrow{} \underset{25\%}{\text{solar cells}} \xrightarrow{} \underset{80\%}{\text{control system}} \xrightarrow{} \text{motor}$$

The solar energy striking the car's solar cells is 800 watts.

Question 9　(5%)

What is the energy used by the motor at top speed (maximum efficiency)?

A. 160 watts

B. 180 watts

C. 800 watts

D. 2400 watts

Question 10　(5%)

Which one of the following represents a form of energy loss in the electric car during the process in which sunlight is converted into motion?

A. speed

B. heat energy

C. kinetic energy

D. mechanical energy

Question 11　(5%)

In a different type of electric car, the motor is powered by a battery instead of solar cells. The main energy transformation that takes place between the battery and the motor is

A. electrical energy to chemical energy.

B. kinetic energy to mechanical energy.

C. chemical energy to mechanical energy.

D. chemical energy to endothermic energy.

Use the following information to answer Questions 12 and 13.

A major electronics company conducts a Life Cycle Assessment (Analysis) of the refrigerators that it produces.

The company considers energy efficiency, pollutants released during the manufacturing process and the sources of materials that are used in the manufacturing process.

Question 12 (5%)

As part of this, the company should also

A. investigate methods of disposal of old refrigerators, including recycling.

B. consult consumer groups regarding the visual appeal of the refrigerators.

C. develop new markets for the refrigerator, to extend its manufacturing life.

D. consider the economic risks of developing improved types of refrigerators.

Question 13 (5%)

The company changes the process for manufacturing the frames of the refrigerators so that less material has to be trimmed off.

This is best described as an example of

A. hazard avoidance.

B. waste minimization.

C. the precautionary principle.

D. compliance with regulatory frameworks.

Use the following information to answer Questions 14–17.

An old water storage dam is to have its dam wall repaired.

To access the dam wall for repairs, a large amount of water stored in the dam needs to be released into a river.

An Environmental Risk Assessment is required before the project is approved.

Question 14 (5%)

In releasing the water into the river, which one of the following environmental consequences will most likely need to be avoided?

A. erosion

B. evaporation

C. dryland salinity

D. increased salinity in the river

Question 15 (5%)

The main purpose of the Environmental Risk Assessment is to

A. ensure maximum local employment on the project.

B. eliminate any disruption to the environment during repair.

C. minimize the number of people likely to object to the project.

D. balance any environmental damage against the benefit of the repair.

Question 16　(5%)

Which one of the following factors best indicates that the dam repair is ecologically sustainable?

A. disruption to local wildlife is temporary

B. employment is created during the repair project

C. the habitat of endemic threatened populations has been disturbed

D. previously submerged heritage buildings can be investigated

Question 17　(5%)

After the dam is repaired, it is found that soil sediments in the flood plain of the river contain significant levels of phosphorus that were not present before the water release.

A scientist suggests that this can be corrected by planting a particular type of vegetation that absorbs and bioaccumulates phosphorus from the soil.

This is an example of

A. recycling.

B. soil bioremediation.

C. water conservation.

D. waste minimization.

Use the following information to answer Questions 18–20.

Unwanted electronic equipment, such as old televisions, computers and mobile phones, end up as waste – known as e-waste. E-waste contains many metals and other materials that are valuable but also toxic, and these often end up in landfills.

A company decides to set up an e-waste recycling plant. Various processes are used to separate valuable metals from plastic and other waste; this includes using a high-temperature furnace to remove plastic coating from copper and silver wires.

Some local groups are opposed to the project because of concerns about emissions.

Question 18　(5%)

The company requires the e-waste recycling plant to be ecologically sustainable.

Which one of the following is the **strongest** argument for considering the project to be ecologically sustainable?

A. It avoids any environmental damage due to mining.

B. It provides income for the local community, both present and future generations.

C. It minimizes damage to the environment by avoiding heavy (toxic) metals being added to landfills.

D. It provides for the electronic requirements of today, while reducing the need for the mining of valuable metals in the future.

Question 19 (5%)

The Environment Protection Authority has guidelines for the maximum amount of non-recyclable toxic material that may be emitted from the furnace chimneys.

These guidelines are best described as

A. a waste minimization scheme.

B. part of a regulatory framework.

C. an environmental impact assessment.

D. an Environmental Management System.

Question 20 (5%)

The hot gases from the furnace are passed over pipes to heat water, which is required for another separation process.

This is best described as an example of

A. a Life Cycle Analysis.

B. a waste minimization scheme.

C. an environmental management plan.

D. a process that reduces the environmental risk of the project.