

# 國立屏東教育大學 100 學年度研究所碩士班入學考試

## 基礎科學 試題

(數理教育研究所科學教育碩士班)

- ※請注意：1.本試題共二頁。  
2.答案須寫在答案卷上，否則不予計分。

### 問答題 (共 100 分)

- 一、請說明 (1) 溫室效應現象與形成的原因；(2) 溫室效應對地球的影響與防治策略。  
(20 分)
- 二、下列科學家有哪些科學發現？這些發現對人類的思想或文明的發展有哪些貢獻？  
(1) 伽利略 (5 分)  
(2) 居里夫人 (5 分)
- 三、請閱讀下面文章，說明你對“人造生命”基本原理的認識，以及你對人造生命的正面與負面評論？(20 分)  
2010 年 5 月 20 日，美國 J·克雷格·文特爾研究所宣佈，他們利用人工合成的基因組，創造出了世界上第一個“人造生命”，取名為“辛西婭”。文特爾領導的研究團隊首先選取了一種名為絲狀支原體的細菌，對這種細菌的基因組進行測序後，人工合成了它的基因組。然後，將人造基因組移植到另一種名為山羊支原體、去除了遺傳物質的細菌中。通過分裂和增生，山羊支原體逐漸為人造基因組控制，最終成為一種全新的生命。在培養皿中，合成細菌的分裂等行為就像天然細菌一樣。  
(引自 <http://big5.china.com/gate/big5/tech.china.com/science/news/154/20101228/16314711.html>)
- 四、附件一 (第 2 頁) 為 CNN 對於 2011 年 3 月 11 日發生於日本強烈大地震的報導，身處於地震帶上的台灣居民，對於地震應有基本的認識，請回答下列問題。(25 分)  
(一) 試說明地震發生的原因，並列舉不同原因可能造成之災害有哪些？  
(二) 報導中指出，由於此次日本大地震，約有 50 個國家接獲海嘯警報，位於日本鄰近的台灣自然首當其衝，北部、東北部及花蓮、台東一帶均列為海嘯警示區；2004 年鄰近的印尼大地震同樣也引起大海嘯並造成重大傷亡，然而 2004 年南亞大海嘯時台灣並未接獲海嘯警報，為什麼？
- 五、試分別設計簡單製備、收集、檢驗氧氣與二氧化碳的實驗，須詳列材料、器具、操作步驟，以及檢驗方法與結果。(25 分)

## 附件一

(CNN) -- The powerful earthquake that unleashed a devastating tsunami Friday (March 11) appears to have moved the main island of Japan by 8 feet (2.4 meters) and shifted the Earth on its axis.

"At this point, we know that one GPS station moved (8 feet), and we have seen a map from GSI in Japan showing the pattern of shift over a large area is consistent with about that much shift of the land mass," said Kenneth Hudnut, a geophysicist with the U.S. Geological Survey (USGS).

Reports from the National Institute of Geophysics and Volcanology in Italy estimated the 8.9-magnitude quake shifted the planet on its axis by nearly 4 inches (10 centimeters).

The temblor, which struck Friday afternoon near the east coast of Japan, killed hundreds of people, caused the formation of 30-foot walls of water that swept across rice fields, engulfed entire towns, dragged houses onto highways, and tossed cars and boats like toys. Some waves reached six miles (10 kilometers) inland in Miyagi Prefecture on Japan's east coast.

The quake was the most powerful to hit the island nation in recorded history and the tsunami it unleashed traveled across the Pacific Ocean, triggering tsunami warnings and alerts for 50 countries and territories as far away as the western coasts of Canada, the U.S. and Chile. The quake triggered more than 160 aftershocks in the first 24 hours -- 141 measuring 5.0-magnitude or more.

The quake occurred as the Earth's crust ruptured along an area about 250 miles (400 kilometers) long by 100 miles (160 kilometers) wide, as tectonic plates slipped more than 18 meters, said Shengzao Chen, a USGS geophysicist.

Japan is located along the Pacific "ring of fire," an area of high seismic and volcanic activity stretching from New Zealand in the South Pacific up through Japan, across to Alaska and down the west coasts of North and South America. The quake was "hundreds of times larger" than the 2010 quake that ravaged Haiti, said Jim Gaherty of the LaMont-Doherty Earth Observatory at Columbia University.

The Japanese quake was of similar strength to the 2004 earthquake in Indonesia that triggered a tsunami that killed over 200,000 people in more than a dozen countries around the Indian Ocean. "The tsunami that it sent out was roughly comparable in terms of size," Gaherty said. "[The 2004 tsunami] happened to hit some regions that were not very prepared for tsunamis ... we didn't really have a very sophisticated tsunami warning system in the Indian Ocean basin at the time so the damage was significantly worse."

The Japanese quake comes just weeks after a 6.3-magnitude earthquake struck Christchurch on February 22, toppling historic buildings and killing more than 150 people. The timeframe of the two quakes have raised questions whether the two incidents are related, but experts say the distance between the two incidents makes that unlikely.

"I would think the connection is very slim," said Prof. Stephan Grilli, ocean engineering professor at the University of Rhode Island.