科 目	環境化學及環境微生物	適用系所	環境工程與科學學系B組	時間	100 分鐘

※請務必在答案卷作答區內作答。

環境微生物（50%）

1. 請比較原生動物(protozoa)，細菌(bacteria)，真菌(fungi)與藻類(algae)在細胞架構上的區分。（10%）

2. 請比較有機廢水分別以好氧(aerobic)與厭氧(anaerobic)方法處理之差異，並說明那一型化合物較易被此二種處理法分解，且利用此二方法處理後，其分別之最終產物為何？(15 %)

3. 你最熟悉的細菌有哪些？請舉三個例子。它們個別在環境(或生活)上的意義或功能(作用)是甚麼？(15%)

4. 分子生物技術(molecular biotechnology)是目前研究或檢測方面最常利用的工具，請舉一例，並說明其原理與應用性。（10%）

環境化學 (50%)

5. Explain the following questions:　(9%)

    (a) What is the superfund program in soil and groundwater pollution control？

    (b) What is the meaning of ZPC as applied to colloids？Is the surface of a colloidal particle totally without charged groups at the ZPC?

    (c) Please illustrate three of endocrine disrupting chemicals.

6. Explain why the Japanese nuclear power plant reactor could not be shut down in few days and keep releasing radioactive materials after the 311 earth quake　(6%)

7. The recent global CO_2 concentration is 393 ppm, at 25℃ the partial pressure of water is 0.0313 atm in atmosphere. At 25℃ water in equilibrium with unpolluted air. Please use activities method to calculate the pH of a water with ionic strength （μ）of 0.20M.　(*Henry's Law constant for CO_2 is 3.38 x 10^{-2} mole/L/atm, pKa_1=6.35 and pKa_2=10.33 for H_2CO_3*)　$\log\gamma = -0.5Z^2 (\frac{\sqrt{\mu}}{1+\sqrt{\mu}})$　(15%)

8. The air inside a garage was found to contain 10 ppm CO **by volume** at standard temperature and pressure (STP). What is the concentration of CO in mg/L and in ppm **by mass**? (Mw=29.0 as the average molecular weight of air at STP 22.4 L, and Mw=28.0 for CO)　(10%)

9. What is the value of the hardness in mg $CaCO_3$/L for a 500 mL of water that contains 0.0040g of Ca^{2+} and 0.0012g of Mg^{2+}. (Mw: Ca=40.1, Mg=24.3, $CaCO_3$=100.1)　(10%)