

**ENGR 202/1 section AA**

**- Summer 2013**

**Sustainable Development and Environmental Stewardship**

**Instructor : Dr. John Hadjinicolaou**

**FINAL EXAM**

**June 18, 2013**

**CLOSED BOOK**

**Total : 60 Marks**

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**Problem # 1 ( 5 marks )**

Define or explain the following terminology :

- CAA
- PCB
- NOAEL
- $T_e$
- USDOE

**Problem # 2 ( 5 marks )**

- a. Name some major effects of oil pollution ? ( 3 marks )
- b. Give two benefits of designing a product to fit into a life cycle ? ( 2 marks )

### **Problem #3 ( 6 marks)**

- a. What is a pathogen ( 3 marks)
- b. Give the quantities for as many standards as you can ( International, US or Canadian) for drinking water ( 3 marks )

### **Problem # 4 ( 2 marks)**

Among the many toxic metals the quantitative analysis on mercury is one of the most widely studied. Give me some reasons why mercury has received attention in scientific studies?

( 2 marks)

### **Problem #5 ( 6 marks)**

- a) What is the difference between Potency Factor and Chronic Daily Intake for a carcinogenic chemical ? (3 marks)
- b) Explain some of the “uncertainties” in assessing risk for non-carcinogens ? (3 marks)

### **Problem # 6 ( 5 marks)**

- a) What are the 3 major factors affecting increase in CO<sub>2</sub> emissions ? ( 3 marks )
- b) What is bioaccumulation and give an example ( 2 marks )

### **Problem # 7 ( 7 marks)**

- a) What is Hazard Quotient ? (3 marks)
- b) Name the four steps of risk assessment (4 marks)

**Problem # 8 ( 6 marks)**

- a) Describe what are the scientific results of the research done on the ice core section at the Vostok, Antarctica test station ? (3 marks)
- b) Describe some of the stabilization scenarios developed by the Intergovernmental panel of climate change ( IPCC ) (3 marks)

**Problem # 9 ( 6 marks)**

A well has 2.0 mg/L of zinc, 2.5 mg/L formaldehyde and 70 µg/L of chloroform. Would there be any concern about carcinogenic health effects of using this water for drinking purpose ?

**Problem # 10 ( 6 marks )**

A contaminated site has 100 mg/kg of chloroform. Is the cancer risk low enough for the site to be used as a playground for children according to the EPA guideline of  $1 \times 10^{-6}$  ? Assume that a child would use it 4 hours/day, 350 days /year for 12 years

**Problem # 11 ( 6 marks)**

- a) What are the 3 key factors that influence the environmental change ? ( 3 marks )
- b) The population of a city is currently 1 million people. Using a constant annual growth rate, what is the percent increase in population after 10 years with the annual growth rate at 5 percent ? ( 3 marks )

**BONUS ( 6 marks)**

- a) What is “ bad ozone ” and its source ? ( 3 marks )
- b) What is eutrophication and what is its cause ? ( 3 marks )