**MIDTERM 1**

1. Which is the role of engineering in relationship with the environmental stewardship concept?

Engineers are primarily involved in problems related to technology development and deployment. Engineers also design and build all the manufacturing processes, industrial technology, and transportation infrastructure needed to extract, transport and refine raw materials; fabricate products; and distribute the goods and services of modern societies worldwide

1. Name three activities that impact air quality
2. Diesel Combustion (Particulate Matter PM)
3. Combustion of coal and oil (Produces Sulphur Dioxide)
4. Carbon Containing materials are not completely combusted (Produces Carbon Monoxide)
5. Name three activities that impact soil quality

General (specific):

* Solid Waste (Paper and paperboard)
* Hazardous Waste (Wastewater treatment)
* Radioactive Waste (Uranium mining, milling, and refining)

1. If the equivalent CO2 emissions are reduced from 1.26x105 tonnes per year to 7.6x104 by replacing coal with natural gas, what is the % reduction in emission?

((initial – final) / initial ) \* 100

1. What is the difference between primary and secondary water quality standards?

**Primary:** Designed to protect public health

**Secondary:** Non-enforceable guidelines related to public welfare criteria

1. What is the difference between smoke and smog?

**Smoke:** GREY OR BLACK VAPOUR PRODUCED BY SOMETHING BURNING

**Smog:** MIXTURE OF SMOKE AND FOG,IT IS NOT PRODUCED BY SOMETHING BURNING (it’s a result of a complex chemical reaction in the atmosphere)

1. What do the following acronyms stand for: EPA, PM, NAAQS and IPCC

**EPA:** Environmental Protection Agency

**PM:** Particulate Matter

**NAAQS:** National Ambient Air Quality Standards

**IPCC:** Intergovernmental Panel on Climate Change.

1. Which are the four characteristics that define hazardous wastes?

**Ignitability:** An ability to burn easily or cause or enhance fires.

**Corrosivity:** Strong acids and bases, or substances able to corrode metal.

**Reactivity:** An ability to react violently or cause explosions, including reactions with water.

**Toxicity:** An ability to threaten water supplies and health, as determined by a laboratory test of leach ability.

1. Specify the wavelength of Ultra-Violet and Infra-Red radiation?

**Ultra-Violet:** Bellow 3 Micro Meters

**Infra-Red:** Above 3 Micro Meters

1. What is the average production of solid wastes per capita/per day?

100 Kg/ person/ day

1. Explain in your own words:

* One successful story which shows that as global community we did what was necessary to address an environmental problem or concern

In recent years, after the criticism of (CERCLA) has led to a more flexible approach such as, EPA’s Brownfields initiative where this approach is concerned with the promotion and redevelopment of abandoned industrial sites in a sound way.

* Another not successful story that our reaction and action as global community was not as drastic and appropriate as the scientific evidence indicates.

Historically, the catastrophe that happened in 1978 at Love Canal near Niagara Falls, New York, where the families were relocated and children were exposed to potential carcinogens. After, the congress in the States responded with (CERCLA) Comprehensive Environmental Compensation and Liability Act (superfunds)

1. What is the atmospheric window?

Is one small region of the spectrum, where relatively little absorption occurs. This is a region between about 8 micro m and 12 micro m, where terrestrial radiation passes directly through the atmosphere to space.

1. Which is the typical test developed to evaluate toxicity?

**TCLP:** Toxicity Characteristics Leaching Procedure

**BONUS**

1. What do we mean, when we refer to Low Level Radioactive Wastes?

Consists of low levels of radioactivity spread across large volumes of materials.

(Any radioactive waste that is not officially classified under high level radioactive waste)

80% civilian sector ---- 20% governmental sector

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**MIDTERM 2**

1. What is the relationship between environmental engineering and sustainable development?

Both of Environmental Engineering and Sustainable development aim to constantly develop the environment and fulfill the present needs without compromising the abilities of the future generations to meet their own needs

1. Name three activities that impact water quality
2. Sulphuric acid, when sulphur-bearing minerals react with water (acidity)
3. Land Erosion from human activities (sediments)
4. Agriculture and Detergents (nutrients)
5. If the equivalent CO2 emissions are reduced from 1.26x105 tonnes per year to 7.6x104 by replacing coal with natural gas, what is the % reduction in emission?

((initial – final) / initial ) \* 100

1. What is the difference between primary and secondary air quality?

**Primary:** Designed to protect human health

**Secondary:** human welfare

1. Define acid rain by describing how it is formed

Gaseous sulfur dioxide emitted from chimneys of coal-burning plants is partially converted to fine sulfate particles by chemical processes in the atmosphere. This mix of sulfurous gases and particles leads to acid rain, which can damage lakes and forests hundreds of miles away.

1. What do the following acronyms stand for: VOC, CAA

**VOC:** Volatile Organic Compound

**CAA:** Clean Air Act

1. Which are the four characteristics that define hazardous wastes?

**Ignitability:** An ability to burn easily or cause or enhance fires.

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**Toxicity:** An ability to threaten water supplies and health, as determined by a laboratory test of leach ability.

1. Name an environmental impact and benefit for each of the following energy sources: a) solar, b) biomass

Solar: benefit 🡪 considered among the world’s cleanest energy form  
Environmental impact🡪 the massive amount of electricity used in solar plants causes some harmful emissions in the air.

Biomass: benefit🡪 Biomass fuels produce virtually no sulfur emissions, and help mitigate acid rain.

Environmental impact🡪 contributes to some emissions of greenhouse gases

1. Explain the positive and negative radiative forcing and give examples

*By changing solar input radiation 🡪 Increase would mean positive forcing (warm)  
Changing Albedo 🡪 melting of ice sheets would mean positive Radiative forcing because less radiation would be reflected back to space.  
Addition of aerosols (suspension of fine particles less than 10um in dia, most important are ones from combustion of biomass and fossil fuels) in the atmosphere.  
🡪 tend to reflect incoming solar radiation , negative feedback (cold)*

1. Name some of the less most important greenhouse gases

- N2O Nitrous Oxide (*Laughing gas*)

- CFC-11, CFC-12, CFC-113, Halocarbons

- O3 Tropospheric Ozone

1. Define the climate sensitivity factor

The climate sensitivity factor is known as the ratio of the final temperature change, ∆Te, to the change in radiative forcing, ∆Frad:

*caused by greenhouse gases and aerosols to the resulting change in the earth’s average temperature.*

1. How much is the carbon content (weight %C) of crude oil?

85%

**BONUS**

1. What do you mean when you refer to transuranic wastes?

Waste containing more than 100 nanocuries of alpha-emitting transuranic isotopes per gram of waste with half-lives greater than 20 years, except for high-level waste... *All TRU elements are heavier than uranium, have several isotopes, and are typically man-made*.

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**MIDTERM 3**

1. What is green engineering?

Green engineering is the design, and use of processes and products, which are feasible and economical while minimizing generation of pollution, and risk to human health and the environment.

1. Name 3 activities that impact groundwater quality

Petroleum extraction (organic chemicals)

Agricultural fertilizers (used in agriculture)

Abandoned chemical waste dumps (industries)

1. Explain the main results of the tests done in the test station in Vostok, Antarctica

* Better understanding of the climate in the past (420,000yrs ago)
* Relationship between temperature and greenhouse gases concentration
* Changes in Carbon Dioxide and Methane concentrations from the past till now

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SOLVED ABOVE!!

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**Secondary Standard:** Related to human welfare.

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Gaseous sulfur dioxide emitted from chimneys of coal-burning plants is partially converted to fine sulfate particles by chemical processes in the atmosphere. This mix of sulfurous gases and particles leads to acid rain, which can damage lakes and forests hundreds of miles away.

1. What do the following acronyms stand for?

**CFCs:** Chlorofluorocarbons

**CAA:** Clean Air Act

**TRI:** Toxics Release Inventory

**IPCC:** Intergovernmental Panel on Climate Change

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1. Name an environmental impact and benefit for each of the following energy sources: a) solar, b) wind

Solar: benefit 🡪 considered among the world’s cleanest energy form  
Environmental impact🡪 the massive amount of electricity used in solar plants causes some harmful emissions in the air.

Wind: benefit🡪 renewable, fast growing, and clean (improve air quality)  
 Environmental impact🡪 wind plant infrastructure is a significant disruption for wild animals (birds and bats)

1. Which are the two modes of Radiative Forcing?

Positive and Negative

1. Name some of the less important greenhouse gases

- N2O Nitrous Oxide (*Laughing gas*)

- CFC-11, CFC-12, CFC-113, Halocarbons

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1. What is Carbon Sequestration

The natural ability of biomass to absorb Carbon Dioxide from the atmosphere represents a well-known method of limiting or offsetting anthropogenic Carbon Dioxide emissions from fossil fuel combustion.

**BONUS**

1. What do you mean by Stratospheric Ozone Depletion?

Stratospheric Ozone Depletion is the depletion of the ozone by human-made chemicals, most notably the family of compounds known as chlorofluorocarbons.