ENGR 202 ASSIGNMENT

1. How do concepts of green design, industrial ecology and sustainable development differ from past approaches to engineering design? Prepare a brief report on this topic, using some specific examples for illustration.

To differentiate between the current and past approaches in engineering designs, I will begin by explaining the three different terms stated in the question: Green design, Industrial ecology and sustainable development. Green design is the concept of reducing the factors of production of a given design without compromising its functionality.
Industrial ecology, as defined by Graedel and Allenby (1995), it is a system view in which one seeks to optimize the total material cycle from virgin material, to finished material, to component, to product, to obsolete product and to ultimate disposal.
Sustainable development, as defined by the World Commission on Environment and Development, is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
In the past, engineering design did not include any of these approaches to help keep the environment safe to live in, pollution free and without over abusing the natural resources that the future generations might need for living.
According to a recent National Research Council study (NRC, 1996) suggests that industrial ecology should include:

Circulation and reusing material flows within the system
Reducing the amount of materials used in products to achieve a particular function
Protecting living organisms by minimizing or eliminating the flow of harmful substances
Minimizing the use of energy and the flow of waste heat back to the environment.
In the automotive industry, the use of tires is vital for functionality of any car, to be sport, race and on or off-road cars. The processes and different designs result in different kinds of tires, but at the end, the same materials are used: metal and rubbers resins. In the past, there was no way to recycle a tire; or in other words, it was considered too costly for any manufacturer to consider this option. Instead, the tires waste ended in the middle of the oceans, which is affecting the waters and the aquatic life. Only recently, when the pollution of the oceans is increasing catastrophically, some companies started reusing the tires in floor mats production or other products that involves rubber.

2. Question 2.2

State: New York Top 5 substances emitted in greatest quantity: ammonia, hydrochloric acid, carbon disulfide, carbonyl sulfide, sulfuric acid

- ➔ Air: 5.4 million lbs

- ➔ Water: 5.8 million lbs
- ➔ Land: 465.0 thousand lbs

3. Question 2.10

Lead has a World Reserve Base Life Index of 38 years.

Lead is mainly used in the production of car batteries, projectiles for fire arms, pencils, and the production of electrical high voltage wires, electronics and paints.
According to Wikipedia source about lead, the production of the substance in 2010 was 9,6 million tonnes which about half of it is made from scrap recycling.
For example, the lead is mostly used in production of car batteries and ammo for fire arms. With the amount of wars that are currently happening around the world, no war can be driven without a gun. If the amount of guns and wars grows rapidly, the lead will become very rare to find, therefore it will be very expensive also. Scientists are working on finding different alloys that might still need a small percentage of lead in order to satisfy every application.
As for the batteries, the lithium Ion batteries are replacing the old lead and alkaline batteries. Since the production of hybrid and electric cars, the demand on batteries has grown to the point that another substance had to replace lead, in this case, it is the Lithium.

4. Question 2.11

According to BP's Statistical Review of World Energy , there is still 1,333 billion barrels of crude oil on the planet, enough for 40 years at current usage rate.
The closer we get to the exhaustion of the petroleum, the higher the prices will get. At a certain point, the law of demand and supply will come in question. The higher the prices get, the less most of the population will be able to afford. Therefore there will be a large sector of the industry that will be affected by this decrease of the demand. The lesser the demand become, the longer the resource will last. Currently, the petroleum is mainly used as fuel for transportation: cars, buses, motorcycles, etc., but the industry has noticed the upcoming lack of supply of petroleum and is designing cars and other vehicles to work with the use of Electricity, a renewable energy.