

ASSIGNMENT

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Declaration Sheet			
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Solution to Question No. A:

A1.1 Advantages and disadvantages of concrete

Concrete is the most common material that are used in civil engineering or we can say to build a structure. This I because of durability, cheap in cost etc. there are many advantages of concrete in the field of civil engineering. The major advantages are discussed below:

1. Availability of ingredients of concrete- ingredient such as cement, lime and aggregates like sand, brick chips, stone chips, gravels, shells etc, are used to make a mixture of concrete. These ingredients are easily available in most places, so there I no difficulty to make concrete.
2. Durability: the main reason behind the use of concrete is its durability i.e. the durability of concrete is very high. Once it is fixed in a shape, it will be longer up to more than fifty years.
3. Concrete is free from defects and flaws (cracks, gap, fissure etc) unlike a natural stone.
4. Manufactured to desired strength- the concrete can be made as per the demand or we can say it can be manufactured to desired strength economically.
5. It can be cast to any desired shape and the casting of concrete can be done in the construction site, which make it very economical.
6. Resistance - one of the major advantage of concrete is that, it is resistant to wind, water, fire and weather. So, it is very useful in storm shelters.
7. Maintenance cost- the maintenance cost of concrete is almost negligible. One it is set to its shape we don't have to worry up to next many years.
8. It acts like a rigid membrane which have very low deflection.
9. It requires less skill labour for the erection of the structure as compared to the use of steel in structure.
10. The deterioration of concrete is not appreciable with age.
11. Concrete hardens at Ambient Temperature- Concrete sets, hardens, gain its [strength](#) at regular room temperature or ambient temperature. This is because cement is a low-temperature bonded inorganic material.

There are not only advantages on the use of concrete. Hence, there are many disadvantages of the use do concrete specially to the environment:

1. Tensile strength- the tensile strength of the concrete is low as compared to other binding material.
2. It is less ductile.
3. Weight: the weight of concrete is much high compared to its strength
4. Efflorescence- some mixture of concrete may contain soluble salt which cause efflorescence i.e. after some time a white soluble salt get deposited on the surface of concrete in the structure.
5. Shrinkage causes crack development and strength loss.

A1.2 Effect of concrete on the Environment

As the demand of the concrete in construction increases, the effect of it to the environment is also increases. As we know that cement is the major ingredient for the manufacture of a concrete. So, the three are is very huge impact of the manufacture of cement in the environment. The world's yearly cement production of sixteen million tons accounts for about seven percent of the global loading of carbon dioxide into the atmosphere. Portland cement, the principal hydraulic cement in use today, is not only one of the most energy-intensive materials of construction but also is responsible for a large amount of greenhouse gases. Producing a ton of Portland cement requires about 4 GJ energy, and Portland cement clinker manufacture releases approximately one ton of carbon dioxide into the atmosphere. Furthermore, mining large quantities of raw materials such as limestone and clay, and fuel such as coal, often results in extensive deforestation and top-soil loss.

concrete typically contains about twelve percent cement and eighty percent aggregate by mass. This means that globally, for concrete making, we are consuming sand, gravel, and crushed rock at the rate of ten to eleven billion tons every year. The mining, processing, and transport operations involving such large quantities of aggregate consume considerable amounts of energy, and adversely affect the ecology of forested areas and riverbeds. The concrete industry also uses large amounts of fresh water; the mixing water requirement alone is approximately 1 trillion L every year. Reliable estimates aren't available, but large quantities of fresh water are being used as wash-water by the ready mixed concrete industry and for curing concrete. Besides the three primary components, that is, cement, aggregates, and water, numerous chemical and mineral admixtures are incorporated into concrete mixtures. They too represent huge inputs of energy and materials into the final product. What about batching, mixing, transport, placement, consolidation, and finishing of concrete? All these operations are energy-

intensive. Fossil fuels are the primary source of energy today, and the public is seriously debating the environmental costs associated with the use of fossil fuels.

Even though there are some more harmful effects of concern on the environment, due to excess emission of carbon dioxide and carbon monoxide in the process of production of concrete, there is massive rise in temperature at the place of production and in the urban areas the structures made by concrete absorb excess of heat during the day time and that heat liberates at night time by which there are certain temperature changes in the urban area. Concrete can also lead to radioactive pollution because of the presence of various natural radioactive elements (K, U and Th) in concrete dwellings. However, it depends on the type of raw material used for the creation of the concrete.

A1.3 Justification of stance taken

Even though there are many demerits of concrete, but still concrete is very important in now a day to make a good and an efficient structure. Concrete helps us with many benefits. Like, construction of dams, to make a barrier for overflow of water at sea shore. Since the structures of concrete are very long lasting about 70 to 100 years so, it is very beneficial for the complete environment. As if we use other material instead of concrete, then we have to do maintenance in every 10 to 15 years, which is not efficient. After the concrete is made in a shape, it can be crushed and recycled into aggregate for use in new concrete pavements or as a backfill or road base. Concrete is a friend of the environment in all stages of its life span, from raw material production to demolition, making it a natural choice for sustainable home construction.

Solution to Question No. B1:

Fracking is the process of drilling down into the earth before a high-pressure water mixture is directed at the rock to release the gas inside. Water, sand and chemicals are injected into the rock at high pressure which allows the gas to flow out to the head of the well.

Hydraulic fracturing or fracking creates fractures in the shale formation to release the gas. A fracturing fluid is pumped under high pressure (ca. 100 bar) into the drilling pipe to widen fractures in the rock or to create new ones. The fluid consists mainly of water.

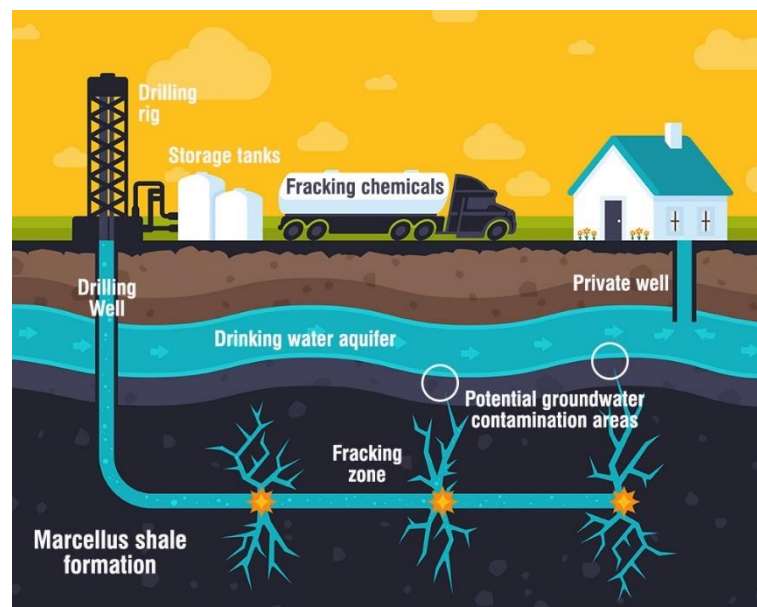


Fig 1.1 representation process of fracking

B1.1 Effects of Fracking on soil and ground water table

there are some risks to the fracking process, as the water with chemical, that chemical and the emission of gas causes many risks such as Contamination of groundwater, air pollution impacts by the toxic gasses released, exposure of toxic chemicals, waste despoil.

In the process of fracking the amount of water is mixed with various toxic chemical compounds to frack fluid. This frack fluid is further contaminated by the heavy metals and radioactive elements that exist naturally in the shale. Underground water supplies can also be contaminated by fracking. In the hydraulically fracture shale and extract the hydrocarbons, large quantities of water and chemicals must be injected underground. In this process, the chemical additives are used in the drilling mud. Each well produces millions of gallons of toxic fluid containing not only the added chemicals, but other naturally occurring radioactive material, liquid hydrocarbons, brine water and heavy metals. Fissures created by the fracking process can also create underground pathways for gases, chemicals and radioactive material, which effects the fertility

of soil at that area. Leaks, spills, illegal dumping, and the attendant risk of soil contamination, ground and surface water pollution cannot be denied in this case.

For example, we are taking an incident that happened in one of the companies in Pennsylvania, USA. Fracking companies are not legally obliged to reveal which chemicals they are using in the fracking process. As a result of this investigation, it was found that the fracking industry uses at least 59 chemicals in the waste water or the air that are dangerous to human health or the environment, including arsenic, benzene, lead and radioactive materials. Many of these are known carcinogens and can affect your livestock too. In Ryedale we rely on aquifers (underground layers of water-bearing rock) for our clean drinking water. If any of the waste water escapes or migrates into these aquifers, it will contaminate the local water supply. Another danger to our water is well failure, which occurs when the concrete well-casing cracks or ruptures. In the USA, 5% of wells fail in their first year of operation, 25% will leak within five years, and 50% leak within fifteen years. Eventually all wells fail, allowing contaminated water to escape into the water supply. • Every fracking well in Ryedale would need to drill through an aquifer before it reaches the Bowland Shale. A recent report by state regulators in Pennsylvania, USA, listed 243 cases of contaminated drinking water in the last six years that were caused by companies fracking for oil or gas.

B1.2 methods of overcome the effects due to Fracking:

The important and most effective methods to overcome the effect due to fracking are the following:

- 1) We can use a method in the site of fracking where wastewater produced, in which positively charged ions are bubbled to remove particles from water.
- 2) By using additives and chemicals which can work with wastewater as well as freshwater hereby eliminating the need for using clean water.
- 3) Some companies use gel made from propane in the place of water for fracking. The propane is present already in the site they do the fracking, by which a cycle is formed and it is more suitable. That fluid can simply merge into flow being extracted from ground which eliminates the need for draining contaminated wastewater.
- 4) We can add additives and chemicals which can work with waste water as well as fresh water.
- 5) Foam-based fracturing can be used where a little water is used with some foaming agent like CO₂ and N₂. This method can reduce the water usage up to seventy to ninety percent.

Solution to Question No. B2

B2.1 Impact of mobile phones on flora and fauna:

As we know that the mobile radiates electromagnetic radiation (EMR) and it is so powerful that it affects the biological systems of birds, insects, and even humans. The study, released by the environment ministry, called for the protection of flora and fauna by law. The electromagnetic fields are regarded as electro smog. The birds and bees are more sensitive to electromagnetic radiation. Hence the birds get more effect than the other members in flora and fauna. That is why the bird migrates from cities to the other areas where they are not get effected by the electromagnetic radiation. But the Honey bees seem to be the most sensitive and their behavior signifies an indication of EMF pollution.

the bird's habitat and food sources. Modern buildings devoid of eaves and crannies, disappearing home gardens and crop fields cleaned of insects by the use of chemical pesticides, all play a part indenting sparrow nesting sites and food, especially for the young. It is the same sad story for the sparrow all over the globe.

There is also some concern about the ill-effects of mobile towers and mobile phones, and few reports have been made by several studies about the negative effects on biological systems and environment. The World Health Organization (WHO)'s International Agency of Research on Cancer (IARC) has classified electromagnetic fields from mobile phones and other sources to be "probably carcinogenic to humans" and has advised the public to adopt safety measures to reduce exposures.

B2.2 Effect of Electromagnetic radiation on Sparrows:

The electromagnetic radiation emerging from mobile tower and mobile phones has caused the decline of sparrows. Increasing number of mobile towers in urban and rural areas is affecting the breeding of sparrows. The eggs of sparrows failed to hatch in presence of electromagnetic radiation even after a month, though their normal incubation period ranged from 10 -12 days. Apart from this, changing lifestyles and architectural evolution have wreaked havoc on the bird's habitat and food sources. Short-term exposure of pulsated mobile phone radiation with some threshold frequency reduced the reproductive capacity of insects by 60%. Birds have thin skulls and their body readily accepts microwave radiations. The microwaves can interfere with the magnetic navigation which sparrows use with their sensors to navigate but microwaves inhibit them from doing so, affecting their instincts while catching prey. On 2002 to 2006 a experiment is held called "house of sparrow experiment" in which forty visitors sparrow were to the place. And after exposing them

in the microwaves and radio frequencies, the bird density started decreasing. So by this experiment it was confirmed that there is very huge effect on sparrows of electromagnetic radiations.

Question No. B3

Solution to Question No. B3:

B3.1 Role of Genetic Engineering the development of a country

Genetic engineering, also called genetic modification, is the direct manipulation of an organism's genes using biotechnology. It is a set of technologies used to change the genetic makeup of cells, including the transfer of genes within and across species boundaries to produce improved or novel organisms. Genetic engineering could potentially fix severe genetic disorders in humans by replacing the defective gene with a functioning one. It is an important tool in research that allows the function of specific genes to be studied. Drugs, vaccines and other products have been harvested from organisms engineered to produce them. Crops have been developed that aid food security by increasing yield, nutritional value and tolerance to environmental stresses.

Plants, animals or microorganisms that have been changed through genetic engineering are termed genetically modified organisms. In Europe genetic modification is synonymous with genetic engineering while within the United States of America and Canada genetic modification can also be used to refer to more conventional breeding methods.

Using genetic engineering, new organisms can be created. Just like an exotic species, the release of a new genetically engineered species would also have the possibility of causing an imbalance in the ecology of a region. Through genetic engineering, people could maintain their lifestyles without the threat of AIDS or Cancer. People of the world would not have to live in fear of contracting a deadly virus or hereditary disease.

B3.2 Effect of Genetically Modified Crops on human health

genetically modified crops have many effects on health, some of the effects are discussed below:

1. **Cancer**- according to the study reports in 2012, rats were more likely to develop tumors and die after eating a diet of Monsanto GM corn. The study was retracted due to concerns about methodology but the researchers claim Monsanto's economic interests were the cause
2. According to Andres Carrasco, head of the molecular Embryology Lab at the University of Buenos Aires glyphosate "is responsible for causing birth defects, infertility, sperm destruction, and cancer." So, the crops that are routinely treated with the herbicides may cause birth defects.

3. GM food products intersect with the eight most common food allergens: eggs, milk, fish, peanuts, shellfish, soy, tree nuts, and wheat. Organic Consumers Association states that protein in foods is what triggers allergic reactions and "most of the foreign proteins being gene-spliced into foods have never been eaten by humans before or tested for their safety."
4. There are concerns that GM DNA can transfer to humans and the environment. According to geneticist Dr. Mae Wan Ho, "It is now clear that horizontal transfer of GM DNA does happen, and very often. Evidence dating from the early 1990s indicates that ingested DNA in food and feed can indeed survive the digestive tract, and pass through the intestinal wall to enter the bloodstream."

Solution to Question No. B4:

B4.1 Causes for change in climate:

The earth's climate is dynamic and always changing through a natural cycle. What the world is more worried about is that the changes that are occurring today have been speeded up because of man's activities. These changes are being studied by scientists all over the world who are finding evidence from tree rings, pollen samples, ice cores, and sea sediments. The causes of climate change can be divided into two categories - those that are due to natural causes and those that are created by man.

The Earth's climate has never been completely static and in the past the planet's climate has changed due to natural causes but the climate changes seen today are being caused by the increase of carbon dioxide and other greenhouse gases in the atmosphere by humans.

The climate change can be classified in two different factors, one is by human resources and another is by natural resources. Following are the causes of climate changes in human resources and natural resources:

a) human resources

- 1) deforestation and land use changes: this is the heaviest cause that affect climate change and deforestation is the fastest growing factor by the human being. Due to deforestation there will be more soil erosion and due to this there is more chances of flood by which the chances of more rain may occur.
- 2) Change in the greenhouse gas concentration: the concentration of greenhouse gasses is increasing day by day, due to which the climate change occurs very widely. This is because the greenhouse gas traps the heats and that heat is liberated at the night time by which the climate become hot every time. Methane is another important greenhouse gas in the atmosphere. About $\frac{1}{4}$ of all methane emissions are said to come from domesticated animals such as dairy cows, goats, pigs, buffaloes, camels, horses, and sheep.
- 3) Sulfate aerosols

b) natural sources

- 1) Variations in the Earth's orbital characteristics: due to the variation of earth orbital characteristics there is the over flow of winds in the north part. due to which climate change takes place in the form of Katrina and cyclone.
- 2) Volcanic eruptions: volcanic eruptions effect the climate to a particular area only. The emission of lava and the many gases like Carmon dioxide, methane, carbon monoxide. It change the

climate by make that environment hot and by covering the area like a blanket with dust particle along with harmful gasses.

- 3) Variations in solar output
- 4) Natural aerosols

B4.2 Methods to create awareness among people about climatic change:

1. We can plant more trees as much as your place permits so as to increase the quality of air in your area and also to keep the environment cooler as these trees would take in the extra CO₂ which will reduce global warming not only that they also increase the aesthetic value of your locality.
2. Purchase a fuel-efficient car to replace your most frequently used automobile.
3. Recycle your home's waste newsprint, cardboard, glass and metal.
4. Install a solar heated system to provide your hot water
5. Replace incandescent light bulbs with compact fluorescent bulbs.
6. Buy food and other products with reusable or recyclable packaging instead of those in non-recyclable packaging.
7. Buy food and other products with reusable or recyclable packaging instead of those in non-recyclable packaging.
8. Use an electric or push mower instead of a gasoline-powered mower to cut your lawn.
9. Plant native, drought-resistant trees and shrubs around your home and outdoor air conditioning unit.

