FAQ's

1. Differentiate between manure and fertilizer.

Organic Manures vs **Fertilizers**

Organic Manures	Fertilizers
Nutrients from natural sources.	Nutrients from artificial sources.
Natural or organic origin	Mineral origin
Low nutrient compared to fertilizers.	High nutrient content
Very complex	Simple salts.
30 days or more to decompose.	Soluble or give rapid response.
Organic nutrients contain all the nutrients.	Only specific nutrient.
Do not cause side effects	Cause side effects
Examples: Excrete of animals, animal matter (blood, bones, flesh, horn)	Examples: urea, NH_3SO_4, Superphosphate.

2. What are the effects of modern agriculture?

Some Local and Regional Changes of Modern Agricultural Practices:

- It leads to soil erosion.
- It results into increase in sedimentation towards downstream side of river.
- Alteration in the fertility of soil.
- Increase in deforestation for more cultivated land.
- Leads to soil pollution.
- It leads to desertification i.e. lands converting into deserts.
- It results into change in the ecology of estuaries due to increase in sedimentation at the junctions of rivers.

3. ***Disadvantages of Use of Artificial Chemical Fertilizers:***

- Increase in water borne diseases due to contamination of surface and ground water resources.
- Loss of natural fertility of the soil.
- Loss of organic matter from the soil.
- Threat to the quality of drinking water due to disposal of fertilizers into landfills sites and lands.

Disadvantages of Use of Pesticides:

Pesticides are the chemicals used to mix with the soil to kill pests. Following are its disadvantages:

- Species which are not targeted are also killed or injured.
- After sometime the pest develop resistance against the pesticides.
- Soil fertility is reduced.
- On short duration exposure it causes illness and slow poisoning to human beings.
- On long duration exposure it causes cancer, genetic defects, immunological and other chronic diseases.

4. **What are energy resources?**

Energy Sources

There are 5 fundamental sources of energy:

- Nuclear fusion in the Sun (solar energy)
- Gravity generated by the Earth & Moon.
- Nuclear fission reactions.
- Energy in the interior of the Earth.
- Energy stored in chemical bonds.

Solar Energy

Solar Energy arrives from the Sun by electromagnetic radiation. It can be used directly for heat and converted to electricity for other uses. It is a nearly unlimited source, it is renewable, and largely, non-polluting.

Gravity Generated by the Earth & Moon.

Gravitational pull of the Moon on the Earth causes tides. Tidal flow can be harnessed to drive turbines. This is also a nearly unlimited source of energy and is largely non-polluting.

Combining both both solar energy and gravity provides other useful sources of energy. Solar radiation heats air and evaporates water.

Gravity causes cooler air to sink and condense water vapor. Gravity then pulls condensed water back to Earth, where it flows downhill. The circulation of the atmosphere by the process is what we call the wind. Energy can be extracted from the wind using windmills. Water flowing downhill has a result of gravity can also be harnessed for energy to drive turbines and generate electricity. This is called hydroelectric energy. This sources of energy are mostly renewable, but only locally, and are generally non-polluting.

Nuclear Fission Reactions

Radioactive Uranium is concentrated and made into fuel rods that generate large amounts of heat as a result of radioactive decay. This heat is used to turn water into steam. Expansion of the steam can then be used to drive a turbine and generate electricity. Once proposed as a cheap, clean, and safe way to generate energy, Nuclear power has come under some disfavor. Costs of making sure nuclear power plants are clean and safe and the problem of disposing of radioactive wastes, which are unsafe, as well as questions about the safety of the plants under human care, have contributed to this disfavor.

Energy in the Interior of the Earth

Decay of radioactive elements has produced heat throughout Earth history. It is this heat that causes the temperature to

increase with depth in the Earth and is responsible for melting of mantle rocks to form magmas. Magmas can carry the heat upward into the crust. Groundwater circulating in the vicinity of igneous intrusions carries the heat back toward the surface. If this hot water can be tapped, it can be used directly to heat homes, or if trapped at great depth under pressure it can be turned into steam which will expand and drive a turbine to generate electricity.

Energy Stored in Chemical Bonds

Energy stored in chemical bonds drives chemical reactions. When the reactions take place this energy is either released or absorbed. If it is absorbed, it is stored in the chemical bond for later use. If it is released, it can produce useful heat energy. electricity, and light.

Hydrogen Fuel Cells are one example: A chemical reaction occurs wherein Hydrogen reacts with Oxygen in an electrolyte bath to produce H_2O, and releases electricity and heat. The reaction is non-polluting, but currently has problems, such as safely storing and distributing compressed hydrogen gas, and producing hydrogen efficiently.

Biomass Energy is another example. It involves burning (a chemical reaction) of wood, or other organic by-products. Such organic material is produced by photosynthesis, a chemical process which derives energy from the Sun and stores that energy until the material is burned.

Fossil Fuels - Biomass energy that is buried within the Earth where it is stored until humans extract and burn it to release the energy. Among these sources are petroleum (Oil & natural gas), oil shale, tar sands, and coal. All of which will be one of the primary topics of our discussion here.

Geology and Energy Resources

Exploitation for human use of nearly all of the energy sources listed above, requires geologic knowledge.

While using direct solar energy to heat water and homes does not require geologic knowledge, the making of solar cells does, because the material to make such cells requires knowledge of specific mineral deposits. Chemicals to produce wires (iron, copper, gold), batteries, (Li, Cd, Ni), and electric motors (Fe, Cu, Rare Earth Elements) all must be extracted from the Earth using geologic knowledge.

Hydroelectric energy requires geologic knowledge in order to make sure that dams are built in areas where they will not collapse and harm human populations.
Finding fossil fuels and geothermal energy certainly requires geologic knowledge.
Nuclear energy requires geologists to find deposits of uranium to generate the fuels, geologists to find sites for nuclear power plants that will not fall apart due to such things as earthquakes, landslides, floods, or volcanic eruptions, and requires geologists to help determine safe storage sites for nuclear waste products.
Again, here will concentrate on the fossil fuels.

Fossil Fuels

The origin of fossil fuels, and biomass energy in general, starts with ***photosynthesis***. Photosynthesis is the most important chemical reaction to us as human beings, because without it, we could not exist. Photosynthesis is the reaction that combines water and carbon dioxide from the Earth and its atmosphere with solar energy to form organic molecules that make up plants and oxygen essential for respiration. Because all life forms depend on plants for nourishment, either directly or indirectly, photosynthesis is the basis for life on Earth.

5. **Differentiate between the two main groups of energy.**

Renewable Resources

Renewable resources are those resources which can be renewed or replaced over time. Great examples of infinite, renewable resources are: wind, sunlight, tides, biomass, etc. Some of the renewable resources are supposed to have continuous supplies, such as wind energy and solar energy, while some others take a greater time in their renewal like wood, oxygen, etc.

Geothermal energy is another good example of renewable resources. It is the source of energy which is extracted from the heat which is stored under the surface of the Earth. This source is considered to be cost efficient and mostly sustainable. It is found in the form of inactive volcanic sites and hot springs. This form of energy may be utilized in heating, generating electricity, and heat pumps. Geothermal energy is a sustainable source as the hot water seeps down into the crust again.

A biomass is also considered a renewable resource if used properly.

Non-renewable Resources

Non-renewable resources are those natural resources which cannot be renewed once they are completely consumed. The resources which are replenished very slowly are also considered non-renewable resources. This is because these resources will not be available again or available only after a long time.

The best examples of non-renewable resources are fossil fuels such as coal, oil, and natural gases. Fossil fuels are produced by the decay of animal and plant matter. Their rate of production is very slow as compared to the rate of their extraction and consumption.

Another example of a non-renewable resource is our lifetime. Once used up, any individual cannot get back lost time. Other good examples of non-renewable resources are; nuclear fuels, minerals, and shale.
Water is a controversial resource which can be categorized as both a renewable and non-renewable resource. The cyclic change of water makes it a renewable resource while its unmanaged usage is making it a non-renewable resource.