

CSS; General Science 2016

QNo1-a

What is Kyoto Protocol?

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It was a first effort to shift industrial dependence from non-renewable sources to green sources.

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What is Kyoto Protocol?

Kyoto protocol was a joined effort put by the countries to shift their energy requirement from non-renewable energy sources to renewable energy sources. Similarly, it was a first step to curb down all carbon emission sources which are the major

cause of contributing pollutant elements in atmosphere. In city of Japan, Kyoto, during the time period of 11-Dec-1997, these

protocol were decided which came into force on 13-Feb-2005. Initially, about 192 countries were part of these protocol. However, many countries from global north removed themselves due to their economical concerns.

Objectives of Protocol:

Primary objective of Kyoto protocol was to encourage all countries of the world to shift their energy dependence on green energy sources. To achieve that, they had set some certain task for the countries, such as:

- Developed countries would shift their energy dependence in swiftest possible time, while some time would be given to developing economies of the world, so they can achieve maximum growth.
- Financially and/or technologically, developed countries would help poor countries

### Criticism on Kyoto Protocol:

Main criticism comes in the form of divide between global-north and global-south. Due to their difference of opinion, the objectives of Kyoto Protocol remained unsuccessful to achieve. Reason given by global north was that under the leadership of us and many other European countries was that these protocols were limiting their economical growth, at one hand. on the other hand, it was putting more burden on global north countries. However, global south is equally responsible for the contribution of polluting elements into the environment, as the global warming is not limited within the boundaries of countries. That was the reason Canada and USA under the presidency of Donald Trump resigned from this

agreement, respectively.

(b)

### Landfills:

Landfills are the sites where ~~municipal~~ waste can be buried or disposed. This land fill method can also be used for

the purpose of making foundation of a building. After a little upgradation, the gas formation process of these Landfills

can be also used as a natural gas.

It is considered completely safe, when it is completely degraded, chemically, biologically, and physically. Landfills are mostly of 4 types:

- Sanitary Landfills
- Industrial Landfills
- Construction waste Landfills
- Solid waste Landfills.

### Difference between Sanitary Landfills and Industrial Landfills:

#### Sanitary Landfills:

Sanitary Landfills are used to dispose municipal waste. Municipal waste is disposed on the form of layers, and the thickness of these layers can vary upto 3m. After making layers of this waste in compact form, this layered form of waste is covered by soil to prevent odors and windblown debris. Then, it is capped.

with a thick layer of clay to prevent it from water entering. A final layer of soil is placed, upgraded and compacted, where different types of so vegetables may be planted. Sanitary Landfills can be operated by the governments and private entities.

### Industrial Landfills;

Industrial waste Landfills are used for various purposes which include dumping of solid industrial waste, generation of bio-gas for industrial use, and making of tanks to store gas and fuel which can be used for gas and fuel stations and for storing fuels for industrial use etc. The solid waste may consist of nonhazardous waste which are used for manufacturing and other industrial activities and hara hazardous wastes that are harmful for human's health. Therefore, while choosing lands for such kinds of wastes, it must be considered that these lands are selected away from populated areas. Industrial Landfills are controlled by industry owners.

### Landfill selection criteria

• There must be sufficient land area available for the disposal of solid wastes for a reasonable period of time preferably greater than one year. This is due to the fact that for short periods the disposal operations become expensive

- Before selecting area for the disposal purposes, it must be made sure that the material that will be used to cover the waste must not be far from the site.

- climate conditions are important because this will have impact to landfill on the access to the land fill sites.

- The soil condition, topography with the of the site with geologic and hydro geologic conditions must be considered as these are to assess the pollution potential of the proposed site

- It should be ensured that the movement of leachate and the gasses from the landfill will not contaminate the ground water aquifer

### Q No. 3-a

What is Artificial Intelligence?

Artificial intelligence is the making of machines that are characterized to do work like a human. It includes complex computer systems like robots, e-commerce and apps like chat GPT. Initially self intelligence of machines was built to do specific works, but in 20th century, intelligence of these machines has grown at the level where they can do multiple tasks.

This self intelligence of machines has been using in different fields, from medical sector to agricultural sector and other. Along with benefits, this technology is creating different kinds of problems for the man kind, ~~these problems are~~ included as from attention span to social distrubente

### Advantages of AI:

- Cost efficient
- increases work efficiency
- Saves time
- Reduces error
- All time available.
- less human interaction is needed.

### Dis-advantages of AI:

- Reduces attention; According to experts, due to increasing use of AI, people are unable to creative thinking
- Social distrubente; easily facilitates to spread false news.
- Threat to people job, less expensive, so there are more chances it can replace labor work

3-6

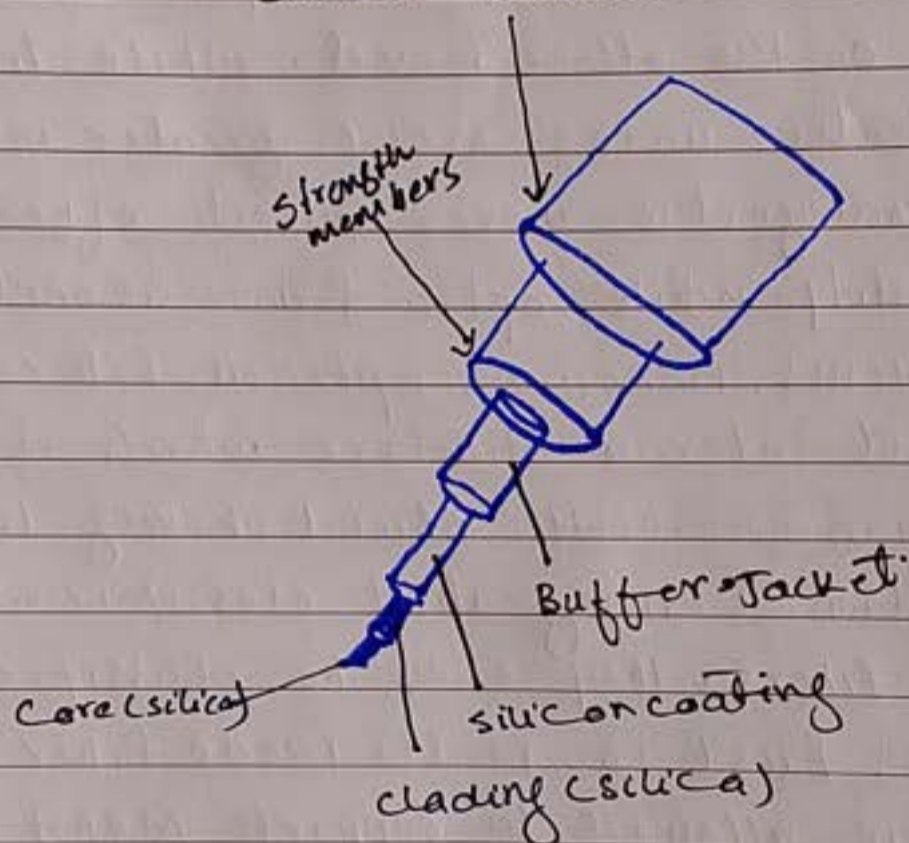
### (i) Fiber optic:

Fiber optic is relatively new technology that uses glass or plastic

threads (fibers) to transmit data. optical fiber is consist upon a bundle of threads which are capable of transferring information modulated on light waves. These fibers are commonly used in the transmission of information where they are allowed to carry information at longer distances, and with broader width, by incurring less amount of energy loss, which is a common problem in metallic wire. on the other hand, while transferring data, metallic wires make greater interference with electromagnetic waves which effect the data quality, while optic fibers donot face such problems. Because, optical fibers have transparent interior structure which is surrounded by transparent shell shield having lower index of reflection. Talking about classification of optic fibers, they can be classified into two types; first is multi mode fiber; such fibers are allowed to support many propagation paths and transverse modes. Having wider diameter, such fibers are allowed to support short length communication through links and applications where high energy is required. the second is single mode fiber; such fibers are used for long communication purposes where low amount of energy is required. optical fibers are used for different purposes, such as, remote sensing, and sometimes remote sensor itself works as an optical fiber. other uses of optic fibers are: measurement of pressure,

temperature, strain and other physical quantities. These fibers are also used for security purposes where light is reflected through optical sensor and transferred into data form, so it can be analyzed. In case of any disturbance, the alarms trips.

### Black Polyurethane outer jacket



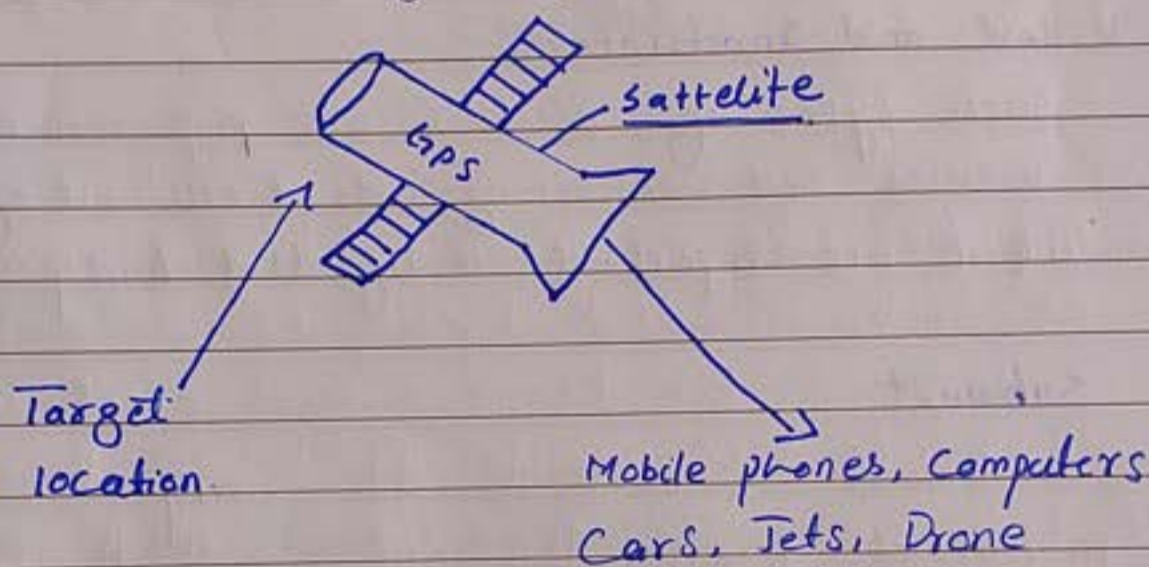
b-ii

What is GPS and how it works?

Global positioning system that is installed in satellites which revolve around the earth, to find precise location of desired objects. A system of GPS moving unit is installed in satellites which are helpful in determining the exact location of target, even it moves. Now a days, GPS is being used for multiple purposes; It is being used on cars and mobility.



to recover them, whenever they get stolen. Furthermore, this system is also being used in digital maps to help people to reach at their desired destination; similarly, high profile criminal cases have also been solved with the help of surveillance and GPS. Lastly, military operations have also the edge of using GPS system to target their enemies through fighter jets and drones.



Transformation of target's information through GPS to in different devices.

#### Q.No.4.

##### (a) Vaccines:

Vaccines are made through biological preparation of antigens that help living organisms in the preparation of their community to fight against different diseases. Vaccines are classified into different types on the basis of their preparation and use which are discussed below:

##### Classification:

### 1. Live Attenuated

Such vaccines are prepared by modifying those diseases which cause virus or infection in the body of living organisms. Such vaccines do not have any harmful effect, when they are injected in human body.

### 2. Killed and Inactivated

Such types of vaccines are prepared by killing viruses and extracting dead cell out of them which are injected in infected body.

### 3. Subunit

Subunit vaccines are only used prepared from the antigens that are known to provide active and immunity. These subunit vaccines are further classified as:

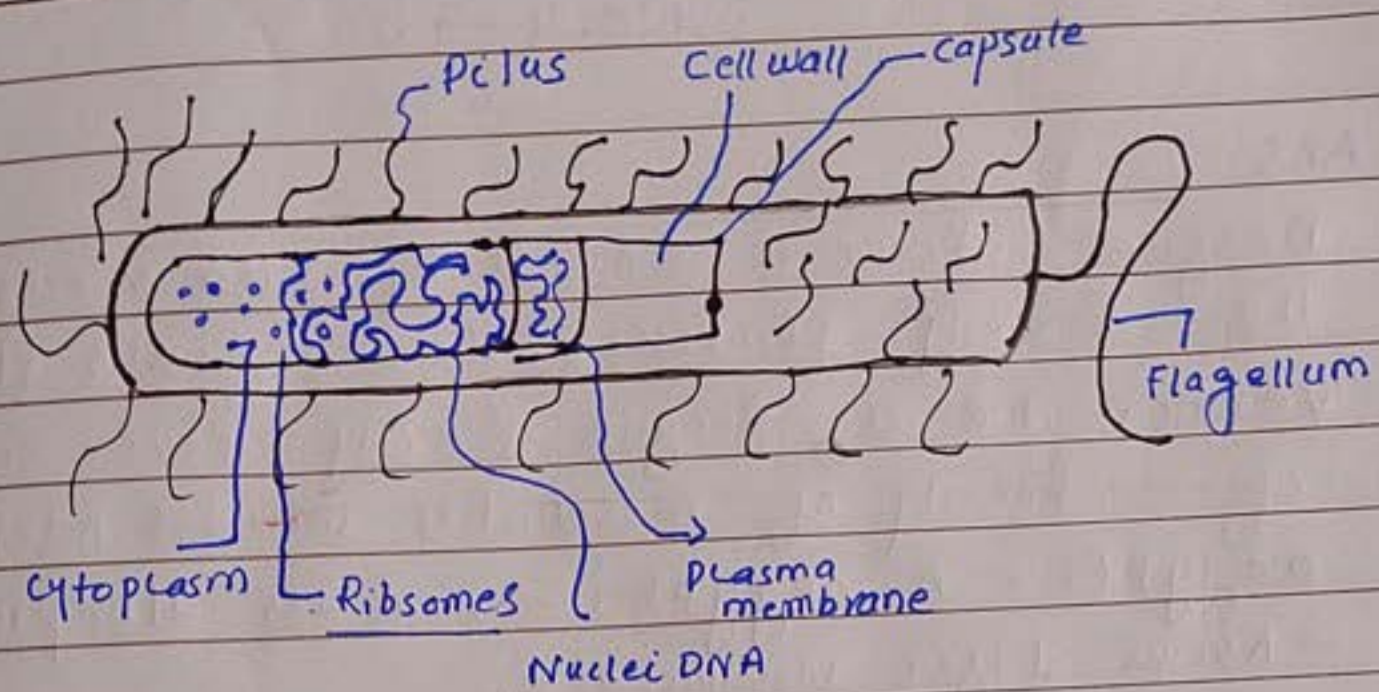
#### 3.1 Toxoid

These vaccines are used to prevent clinical symptoms of diseases that are caused by toxin secretion of bacteria.

During preparation, toxins are chemically treated and converted into toxoid.

#### 3.2; Polysaccharides:

Some bacteria have large amount of polysaccharides (strings of sugar). These polysaccharides enclose bacteria in the form of capsule which gives them extra protection against immunity.



### 3.4 conjugate

This is a new generation of vaccines that has limited number of polysaccharides. In these vaccines, polysaccharides are linked with a carrier molecule.

### 3.5 Heterotypic or Heterologous:

Pr Heterotypic or Heterologous are prepared from the pathogens that cause no disease or mild disease in host organisms.

### DNA vaccines

Such vaccines are injected through genetically engineered DNA. These vaccines allow the cells of host organisms to directly produce antigens which help them to produce immunological response against diseases. These vaccines are belonged to third generation vaccines. They cause a small amount of its cells to produce the introduced gene products. They consist of DNA that codes for specific antigens or protein from a pathogen. The DNA is injected into cells, whose "inner machinery" uses the DNA to synthesize the proteins.

## Q. No. 4 - b

Ans

Dengue fever is caused by RNA virus of the family Flaviviridae & genus Flavivirus. Vector for a dengue family fever consists of family of mosquitoes includes Aedes aegypti - A. aegypti - , Aedes albopictus - Asian tiger mosquito - .

## Dengue Prevention measures:

- Try to live in air-conditioned room or well screened houses. As, mosquitoes carrying dengue fever cannot exist in cool temperature, specifically below than  $48^{\circ}\text{F}$ . The dengue virus is mostly activated from dawn to dusk, some it also bites at ~~nights~~ nights.
- While going out side, specially dengue infested areas, whole body should be covered. so, wear shirts with long sleeve, pants, shoes and socks.
- Use mosquitoes repellent products to ~~skin~~ clothes, socks and bed nettings. For skin, use repellents that have minimum 10pc concentration of Dheet (diethyltoluamide) which is an active ingredient in mosquitoes repellents.

- Mosquitoes carrying dengue virus usually grow in moist and watery areas. So, in order to prevent their growth, remove unnecessary water from surroundings.

- Recent discovery confirmed that there are also some mosquito repellent plants and that discovery was also published in dawn article. As per Dawn article findings, these plants include lavender, mint, Rosemary and others. So, in order to decrease the population of dengue mosquitoes, these plants can also be grown on road sides, parks etc.

## ONOS-a

### Liver:

Liver is a vital organ in all vertebrates and in some other living organisms. As a chemist has ability to understand the structure and properties of a substance and to reproduce them into larger quantities, in same way liver functions. Considering the importance of liver's functions, it has following properties:

- It manufactures thousands of essential proteins, hormones, and fluids, which are transported throughout body for use and elimination.

- It uses iron for the manufacturing of red blood cells, glycogen to regulate blood glucose (sugar) levels, and essential vitamins and minerals.
- It captures unhealthy cells like bacteria, cancerous cells, dying and dead cells and other microorganisms, sending them through a type of detox and killing center, pass them on to be eliminated from the body. This process is called detoxification.
- Regulate iron absorption, metabolism and also regulates our body hormonal balance and blood pressure.

5-6

### cholesterol:

Belonging to the family of macromolecule, cholesterol is waxy and fat like substance which weighs about 800 Dalton. Stereoid cholesterol is made up of from the family of steroid, specifically from 'sterol molecule'; a lipid molecule and biologically synthesized by all animal cell. Moreover, cholesterol travels in blood's stream in the form of packets called lipoprotein. These lipoprotein are made up of fats inside and protein outside.

## Importance of cholesterol:

Importance of cholesterol can be understood by its functions which it performs inside the body of living organisms; there are main four functions of cholesterol:

### 1. Structural constituent;

It is an essential contributor in the structural constituent of cell membrane and lipoprotein.

### 2. Precursor of steroid:

It works as a precursor of different steroid such as:

- Glucocorticoids
- Mineral corticoids
- Androgens (male sex hormones)
- Estrogen (female sex hormone)
- Progesterone

### 3. Precursor of Bile acid and emulsify dietary acid.

### 4. Precursor for vitamin: D, essential for calcium and phosphate.

## Effect of High Cholesterol level

- High cholesterol level is a condition in which body possess too much cholesterol in blood that becomes a reason behind coronary disease, commonly known as high cholesterol.

Q.No.6. — a

Ans.

Remote sensing technology refers to the science of collecting information about the earth. This information can be collected from various sources such as aircrafts, and satellites. In the process of remote sensing, data is collected by detection of the energy that is reflected from the surface of the earth.

Remote sensing can be Active and passive. While operating, passive remote sensing ~~has~~ <sup>uses</sup> passive internal stimuli system to collect information and transfer it to the stations. on the other hand, Active Remote Sensing system: external stimuli system; which ~~can~~ mainly comes from the active energy of the sun.

Talking about its uses, remote sensing technique plays an important role while collecting data about oceans circulation and ocean currents and to see its reducing effects on sea store. Likewise, it is used to study proportion of gases in environments; all environmental activities are measured through remote sensing technique. It is also helpful for advance agricultural productions.

## Techniques of Remote sensing

### 1. Satellite Remote sensing:

This technique ~~directly~~ uses sensors which digitally captures the image by using a camera device which is similar to a television camera. After collecting information, these satellites send them in the form of electrical signals to the stations found on earth.

### 2. Optical and infrared Remote Sensing:



Optical Remote sensing uses optical sensors which detect solar radiation which are reflected or scattered from the earth. Images are appeared in the form of photographs taken by high speed cameras.

### 3. Microwave Remote Sensing:

In this method, electromagnetic radiation are used to collect information of various objects like surface of earth, ocean, atmosphere, plane and mountain, and then sent to the station.

### Resolutions and its types

Resolution is the ability of remote sensing devices to how much they can magnify an object. Resolution devices are of two types:

#### • Radiometric resolution

Radiometric resolution refers to the number of levels that a sensor can record spectral information. It ranges from 0-255 to 0.65, 535. These numbers can be <sup>of</sup> integers or whole value.

#### • Geometric resolution (Spatial resolution)

Geometric resolution (spatial information) refers to the smallest area to record radiometric spectral information. It is usually measured in the form of pixels. Pixel measuring size of thematic mapper sensor on Landsat 7 is 30 m which relates an area of 30 x 30 m on earth's surface. It has a lot of variations, and defined as low, moderate and high.

Q. No-6 — b

Hydrologic cycle:

The hydrological or water cycle is a continuous physical process of which forms a continuum of water movement. The first step of <sup>the</sup> whole cycle is the evaporation of water from the surface of earth. As a result, the moisture air - containing - water vapors gets lifted up in the air where it is converted into water droplets in the form of clouds. As a result, the same water comes down on the surface of the earth in the form of precipitation. The ~~gets~~ water gets absorbed by the land, scatters in the forms of rivers, lakes and ponds, and also again get evaporated into the air. This circle keeps itself carrying on, again and again. During this process, the water is being converted from liquid state to gaseous and from gaseous state to liquid.

### Importance;

This water cycle is very important for living beings on earth, when it comes about their survival. It causes solubilisation and several other chemical reaction, like photosynthesis, hydrolytic digestion of polymeric nutrients etc. It is important for the working of macromolecules, as a good ionizer, transport of material. It is a cause of water reaching plants, animal. It also moves things like nutrients, pathogens and sediments in and out of aquatic ecosystems.

### QNO 7 - a.

#### Tsunami and its generation;

Tsunami is a wave train; or series of waves

generated by a body of water due to impulsive disturbance of displacement of waves in vertical column. Earthquake, Landslides, expulsion, volcanic eruption and the impact of cosmic bodies, such as meteorites, can generate tsunami.

### characteristics:

- Size of the heights of tsunami can vary it is variable from inches to feet.
- when there is temporarily rise in the heights of tsunami, it remains for the shorter period of time, at sea-shore, which is usually known as 'Run up'.
- Generally, it appears in the form of wave like structure.
- About 80% of tsunamis appeared in the Pacific-ocean.
- velocity of the tsunamis depends upon the dept. of the water.

7-6

### Earthquake;

one of the most frightening and destructive phenomena of nature is severe earthquake and its implications. An earthquake is the sudden and rapid shaking of earth caused by certain shaking and breaking of tectonic plates which are located in interior part of the earth. originating from the interior part of the earth, when these waves reach at the surface of earth, they become destructive.

## Richter scale;

Earthquake are measured using observations from seismograph. These earthquakes are measured on the local magnitude, also referred as the Richter scale. The epicenter is the point on the earth's surface that is directly above the hypocenter or focus, the point where an earthquake or seismic under ground explosion originates.

## Earthquake of 2005;

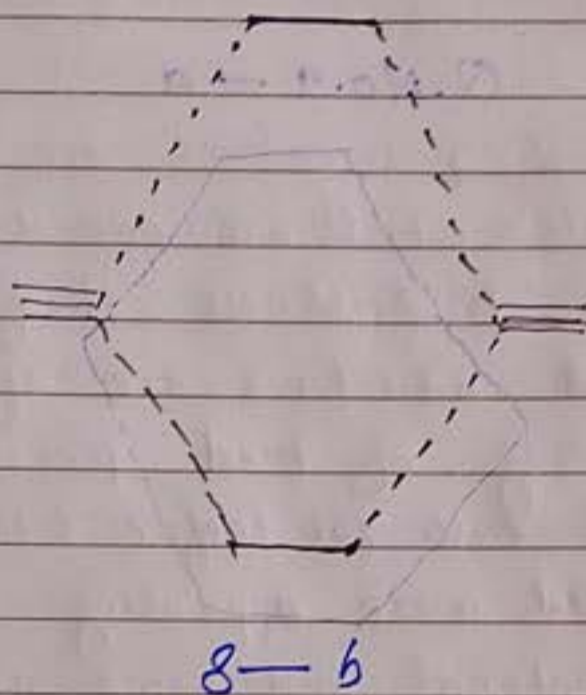
The 2005 earthquake occurred on the Pakistan territory of Azad Kashmir which was centered near the city of Muzaffargarh, and also affected the Pakistan's province of Khyber Pakhtun Khwa and the Indian occupied Kashmir. It was recorded with the magnitude of 7.6 on Richter scale.

## Q.No. 8. (a)

Water molecules form hydrogen bond with each other and are strongly polar. This polarity allows it form separate ions in salts and strongly bond to other polar substances such as alcohols and acids, in order to dissolve them. The bonding angle of the two hydrogen atom is almost 105 degrees rather than 180 degrees which would make the molecule symmetrical. This causes it to be dipolar, which gives it a positive and negative side allowing the formation of hydrogen bonds between adjacent molecules.

In the water molecule  $1b_1$  is the highest occupied orbital which is non-bonding and highly localized on the oxygen atom  $2a_1$  is the next lowest orbital

which can be considered as a non-bonding orbital, having a lobe pointing away from the two hydrogens.



### Gamma Rays:

The term gamma ray was first introduced by British Physicist Ernest Rutherford in 1903 while studying the emissions of radioactive nuclei. Gamma-rays are a form of electromagnetic radiations produced from the radioactive decay of atomic nuclei. They consist of high energy photons. Gamma rays have generally shorter wavelength, shorter than a few tenths of angstrom ( $10^{-10}$  meter) and gamma-ray photons have energies that are greater than tens of thousands of electron volts (eV).

### Applications of Gamma Rays;

Due to high penetration power and energy, gamma-rays are used

- to treat cancerous tumor by destroying its DNA.
- to detect heart and brain abnormalities
- to sterilize medical instruments
- used by engineer to detect the cracks of

- buildings and machines (heavy)
- used to ~~the~~ kill bacterial germs in food industry like yeast etc.
- used in the development of atomic bombs.

### Q.No.9 - a

Food additives and preservatives are substances such as antioxidants which are added to processed food to enhance its freshness, shelf life, flavour or texture. Food additives are often added during the processing of food products, to keep the product fresh for longer times and to make the food more appealing. Some food additives are natural and some are chemical. Natural food additives include herbs and spices which are added to enhance flavour, vinegar is used to preserve and pickle food, salt which is added to enhance flavour or preserve meat. Some additive substance are found in food dairy and after it have been processed, but were not initially added to the food on purpose, such substance are called indirect substances food additives. Indirect food additives are present in small amount in the final product. Food additives, preservatives and antioxidant are added to food for several important reasons. Emulsifier are added to food while processing in order to prevent liquid products from separating. Stabilizer and thickeners are added to provide an even, uniform texture to food products. Anticaking agents are added to allow substances to move freely

certain food additives are added to change acid-base balance of foods to get certain flavours. Leavening agents are added to help change bake goods such as cakes or biscuits to help them rise. Many foods are enriched to provide vitamins, minerals and other additional nutrients. Examples of some commonly fortified foods include milk, flour, cereal, salt, milk, and margarine. A daily intake of these foods help to up any nutrients that might be lacking in person's diet.

Q.No. 9 - b

Ans:

The greenhouse effect is a natural process by which the atmosphere absorbs some of the sun's energy, warming the surface of earth which is enough to support life. A greenhouse gas is any gaseous compound in the atmosphere that is capable of absorbing infrared radiations, thereby trapping and holding heat in the atmosphere.

By increasing heat in the atmosphere, green house gases are responsible for the green house effect, which ultimately leads to global warming.

World has been discussing the effect of global warming on the climate of the earth and to reduce the effect but there is a brighter side that we can say greenhouse is a blessing for our planet. Some of these blessing have been discussed below:

**Enhanced Green House Effect and Global warming**

The enhanced green house effect simply

refers to the greenhouse gases such as carbon dioxide and chlorofluorocarbon which are emerged due to human activities. The green house effect has following effects:

- Helpful for warming the surface of earth;

By trapping the solar radiation at night, greenhouse gases keep the temperature warm which is important for the survival of living beings.

- Realized the humanity to change their energy dependence;

As greenhouse gases are the main cause of warming the temperature, so, it has realized the countries to shift their energy dependence from non-renewable energy resources.

- Increasing level of  $\text{CO}_2$  may increase the production of crops;

Plants need  $\text{CO}_2$  to increase their production and it keeps them alive and fresh. High amount of carbon dioxide in the atmosphere would help plants to increase the production of food.

- Sign of relief for the people who are living at northern and southern poles.

People who are living away from the equator mostly face winter season throughout the whole year. As the due to the greenhouse effect has increased, the temperature in the polar region has also increased. This would help them to cultivate crops and enjoy the variety of seasons.