

Q. No. 2

(CSS 2017)

A) Environmental pollution Causes

The factors responsible for environmental pollution:

i) Industrialization:

Industries are stationary sources of environmental pollution. Fossil fuels combustion causes the release of various gases such as carbon dioxide, nitrogen oxide, and other. These gases cause air pollution and damage the gaseous composition of atmosphere. Besides, thus, industrial waste, radiations, unwanted sound and heat are produced due to industries which impact various aspects of environment. According to World Bank, industrialization is the primary source of environmental pollution.

ii) Urbanization:

With growing urbanization, environmental pollution is occurring at an unprecedented pace. Urbanization causes air pollution, water pollution, noise pollution and soil pollution. Municipal refuse and wastes are produced mostly from urban centers. Construction create heap of debris which alter the composition of soil and air. It, as a consequence, damages various aspects of environment.

iii) Population explosion:

According to UN, the earth hosts 8 billion people. They produce lot of wastes and degrade

environment through various activities. They exploit resources and overburden the earth's carrying capacity. Carbon footprint is also increased. With rapid population growths, exploitation of resources, industrialization, urbanization and deforestation can be accelerated. It thus causes environmental pollution in various forms.

#### iv) Deforestation:

Growing pace of deforestation has also contributed in environmental pollution. According to environmentalists, Amazon forests are the lungs of the earth. As forests produce and balance the level of oxygen in the atmosphere and reduce the amount of carbon dioxides, deforestation indeed deprives the earth of its lungs which are essential for its respiratory process. Therefore, deforestation is a principle cause of environmental pollution.

#### v) Production of solid waste:

With growing industrialization, urbanization, pollution explosion and exploitation of resources, millions of tons of solid wastes are produced across the world. These solid wastes are inadequately managed and cause environmental pollution in various ways. These organic or inorganic wastes can cause water pollution, soil pollution and air pollution. Thus, production of solid waste at huge volume continues to affect environment.

#### Conclusion:

There are multiple causes of environmental pollution across the world. It includes rapid industrialization, unprecedented urbanization, swelling demography, deforestation and municipal and industrial refuse and effluents. Therefore, it needs to be tackled.

## B) Reasons of water-logging in Pakistan

### i) Water-logging in Pakistan:

Water-logging is a serious challenge in Pakistan. Excessive accumulation of water at agriculture land has created a number of impacts. It has caused poor soil aeration, altered the pH of soil, changed soil temperature, affected the soil nutrients, retarded cultivation, accumulated harmful salt, increased the growth of wild plants, lost cash crop and affected human health. There are various types of waterlogging such as reverse flood water-logging, oceanic flood water-logging, seasonal waterlogging, perennial waterlogging and subsoil water-logging.

### ii) Main causes of water-logging in Pakistan:

#### a) Excessive irrigation:

Excessive irrigation is a major cause of waterlogging in Pakistan. It has damaged the soil quality. There are no check to free flow of water to the agriculture land. Water from rivers or canal are continuously ~~soaking~~ flowing into the land. It has caused water logging in the country.

#### b) Poor drainage system:

Another major cause of water-logging in Pakistan is poor drainage system in the country. As water from river, canal, flush flood or any other source comes to a agriculture land, there is no proper drainage system to remove the excessive amount of water. As a result, it has caused water-logging in the country.

### c) Seepage problem:

Apart from excessive irrigation and poor drainage system, seepage problem is also one of the main reasons of water-logging in Pakistan. Water from a canal, water-reservoir or any other source percolates the soil and enters to the land area nearby. It has thus caused water logging in Pakistan.

### d) Heavy rainfall:

Heavy rainfall is also one of the main reasons of water-logging in Pakistan. Monsoon rains continuously pour down a colossal amount of water in summer season. It causes ~~floods~~ flash flood, thereby it makes ways to land areas where agriculture crops are there. Thus, it not only damages the crops, but it also causes water-logging in the country.

### e) Obstruction of natural flow of water:

Another reason of water-logging in Pakistan is the obstruction of natural way from which water flows. Construction activities, lack of urban planning and mismanagement of water ways have compounded the problem of water-logging in the country.

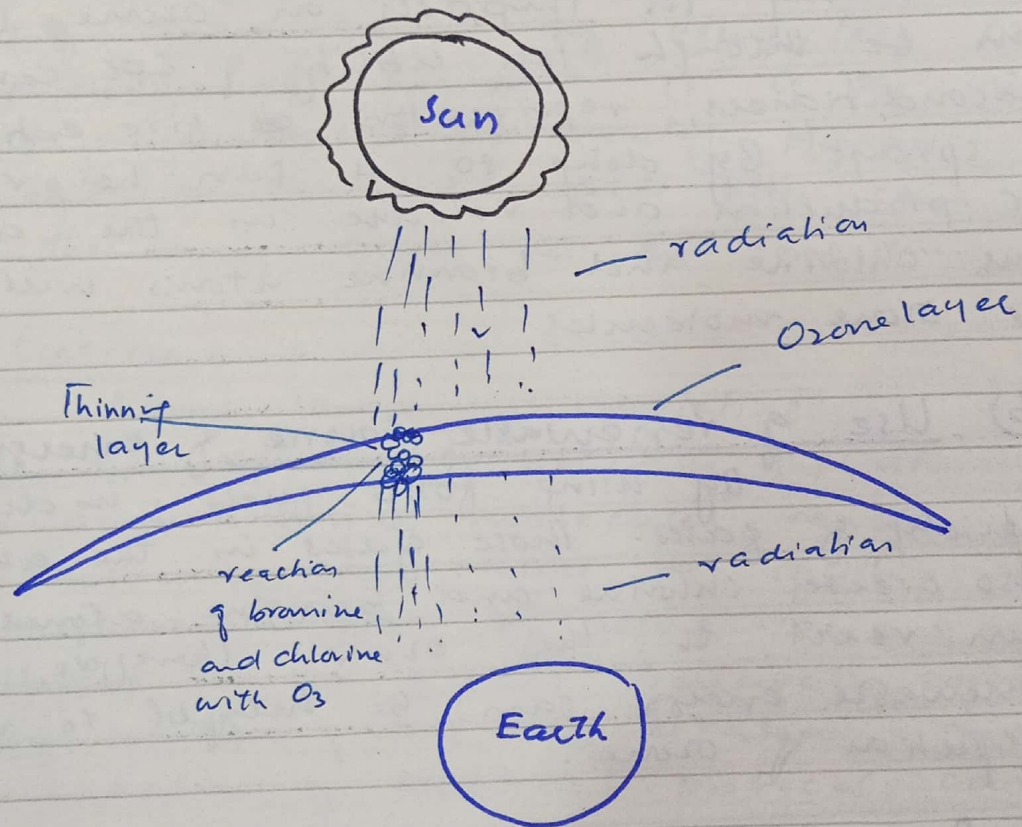
### iii) Conclusion:

Water-logging is a serious challenge in Pakistan. It has a number of reasons such as excessive irrigation, poor drainage system, seepage problem, soil permeability, heavy rain and obstruction of natural ways of water.

## c) Ozone ( $O_3$ ) depletion and how to prevent

### i) What is meant by ozone depletion?

Ozone ( $O_3$ ) is a gaseous layer in the stratosphere. It tends to filter the harmful ultra violet (UV) radiation from sun. As a result, harmful UV radiation does not reach the earth surface. Unfortunately, the recent scientific evidences suggest that the ozone layer is thinning owing to the reaction of various gases like bromine and chlorine atoms.



When Chlorofluorocarbon is released from airconditioners, refrigerators or industries, sun radiation react with the chlorofluorocarbon in the atmosphere. As a result, bromine and chlorine atoms are released which react with ozone ( $O_3$ ) and split oxygen molecules and results in the

thinning of the layer of ozone in the stratosphere. This happens when the chlorine and bromine atoms in the atmosphere come into contact with ozone and destroy the ozone molecule. One chlorine atom can destroy 100,000 molecules of ozone. It is destroyed more quickly than created.

ii) How we can prevent the ozone depletion?

a) Reduction of CFCs:

As Chlorofluorocarbon is the major cause of ozone depletion, its reduction can be helpful in reducing its impacts on ozone layer. It can be through less utility of CFC containing airconditioners, refrigerators or fire extinguisher, or sprays. By doing so, it can help reduce the CFC production and release in the atmosphere. Thus, chlorine and bromine atoms will not split the ozone molecules.

b) Use of renewable source of energy:

By using fossil fuels, industries produce variety of gases. Those gases in the atmosphere also create chlorine and bromine atoms which can react to the ozone. Therefore, use of renewable energy can be helpful to reduce the depletion of ozone.

c) Reforestation:

Planting more trees can help reduce the amount of harmful gases in the atmosphere. Increasing forest cover will be helpful in filtering the harmful gases of atmosphere which can damage the ozone layer. The more plants are grown, the less impacts will be created for ozone.

d) Minimize the use of car:

The best transport option in urban is bicycle or walking. The less use of car results in reduction of harmful gases which are critical to ozone. As the use of cars is reduced, the combustion of fossil fuels also decreases. So, it helps repair ozone layer.

e) Implementation of Montreal protocol in spirit and letter:

An international treaty - Montreal protocol - was signed by world leaders to repair the damaged ozone layer by using less ozone depleting substance. In fact, it is the most successful environmental treaty. However, its implementation in spirit and letter can help repair the ozone layer in the long run.

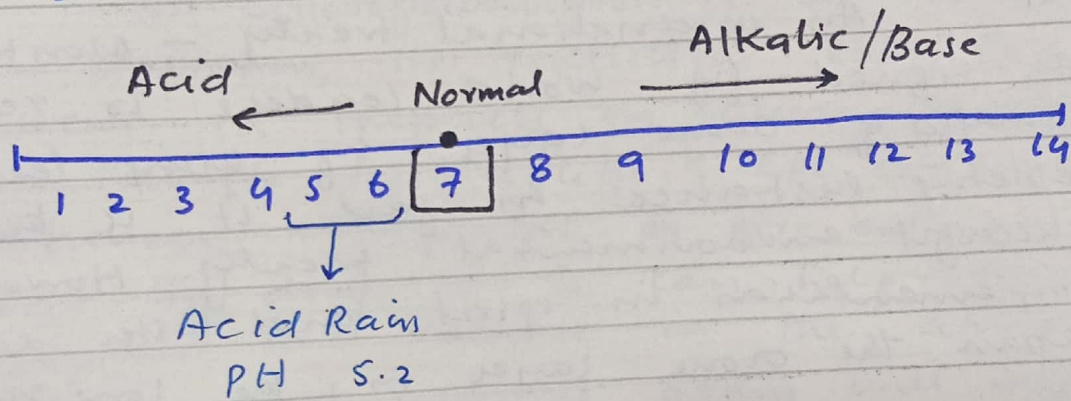
iii) Conclusion:

Ozone layer is depleting. It is due to the release of CFCs in the atmosphere. Chlorine and Bromine molecules react with ozone molecules and cause its splitting in the stratosphere. Therefore, by using various ways like stopping the use of CFCs, use of renewable source of energy, less use of cars, reforestation and implementation of Montreal protocol can be helpful in repairing the ozone layer in order to prevent harmful UV radiation of the sun from reaching the earth.

(D) Acid Rain and how it is produced and its dangers

i) What is Acid Rain?

Acid rain is rain, mist, or sleet that has been made acidic by certain air pollutants. Acid rain is a type of acid deposition, which can appear in many forms. Wet deposition rain, sleet, snow or fog that has become more acidic than normal. It can be estimated with the help of pH scale.

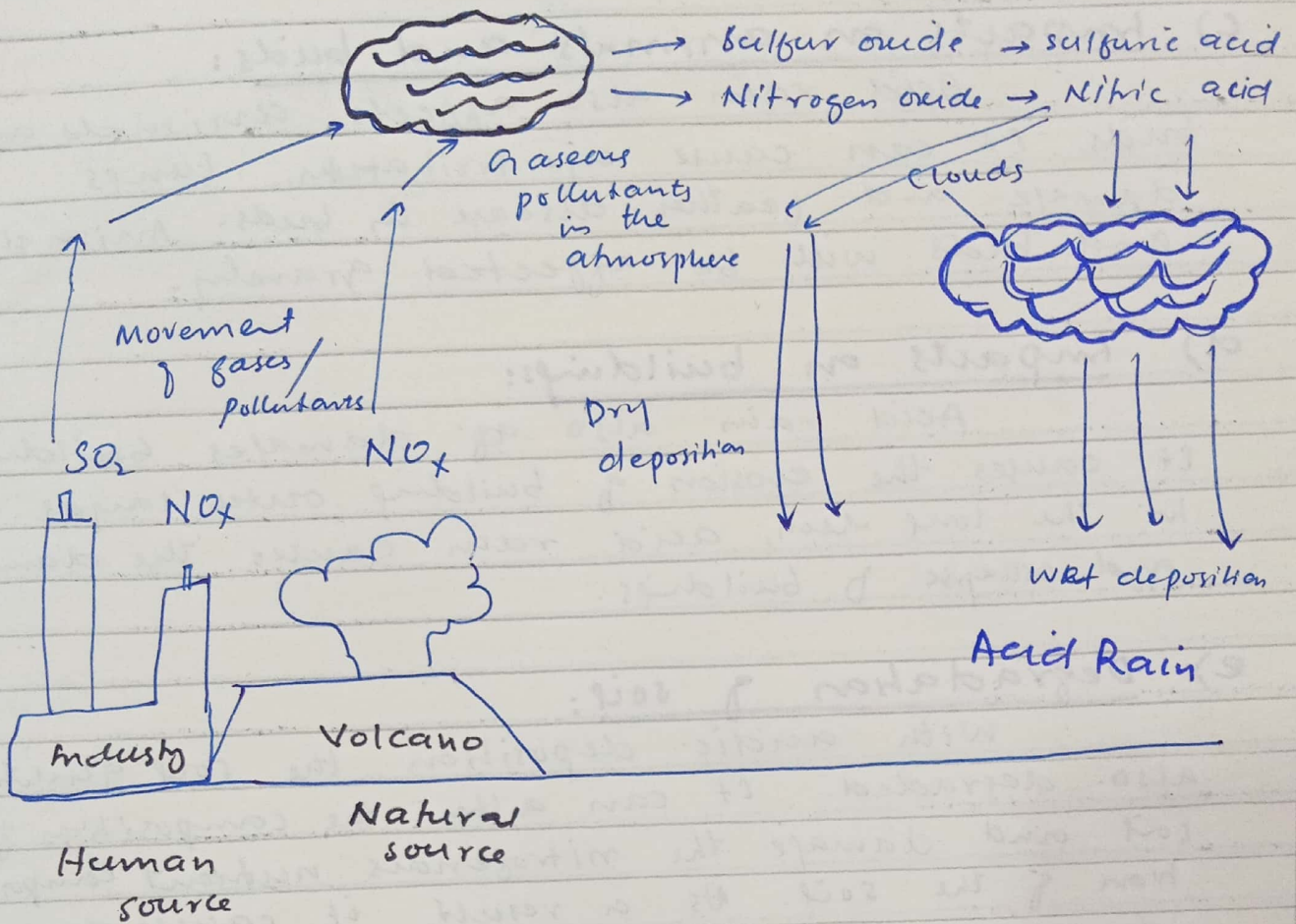


ii) How Acid Rain is produced?

Acid rain is caused by a chemical reaction that begins when compounds like sulfur dioxide and nitrogen oxides are released into the air. These substances can rise very high into the atmosphere, where they mix and react with water, oxygen, and other chemicals to form more acid pollutants known as acid rains.

Acid rain results when sulfur dioxide ( $\text{SO}_2$ ) and nitrogen oxide ( $\text{NO}_x$ ) are emitted into the atmosphere. The  $\text{SO}_2$  and  $\text{NO}_x$  react with water, oxygen and other chemicals to form sulfuric and nitric acids. Then, these mix with water and other materials before falling on earth.





### iii) Dangers of acid rain:

#### a) Impacts of human health:

Acid rain caused various health implications. It can damage human skin, eyes and lungs as it entered into the body through inhaling. It can cause eye irritant and respiratory diseases.

#### b) Impacts on plants:

Acid rain also affects plants. It can damage the leaves of plants with acid deposition. Sulfuric acid and nitric acid can damage leaves of plants and the process of photosynthesis will be affected.

in the process.

### c) Impacts on animals and birds:

Acid rain also affects animals and birds. It can cause eye irritation, lung damage and feather disease in birds. Animals and birds will be affected gravely.

### d) Impacts on buildings:

Acid rain also damages buildings. It causes the erosion of building outer layers. In the long run, acid rain causes the damage and collapse of buildings.

### e) Degradation of soil:

With acidic deposition the soil quality also degraded. It can alter the composition of soil and damage the nitrogenous nutrient composition of the soil. As a result, it causes damage to crops.

### f) Impacts on agriculture crops:

Acid rain also affects agriculture crops. A number of crops are sensitive to acidic deposition, for nitric acid and sulfuric acid can damage the leaves and roots of crops.

### g) Threat to aquatic life:

With excessive acidic deposition, aquatic life is also threatened. Acidic water pH of 7 and below can cause damage to various aquatic life.