

**UNIT - I → Action On Atmosphere****Q.1. Long Answer Type Questions****a. What is air pollution and what are its various sources?**

**Ans. Air Pollution:** We know that air is mainly mixture of various gases such as nitrogen, oxygen, carbon dioxide etc. All these gases are present in a particular ratio. If some harmful substance is added to air it results in air pollution. So the addition of unwanted and harmful substances to the air is called air pollution.

The World Health Organisation (WHO) defined air pollution as the presence of materials in such a concentrations which are harmful to man and his environment. The substance that pollute the air is called air pollutant like dust, ash, CO, excess CO<sub>2</sub>, SO<sub>2</sub>, NO<sub>2</sub> etc oxides of nitrogen, lead compounds, CFC's, hydrocarbons, cement and stone dust etc.

**Sources of Air Pollution:****i) Automobile:**

Automobiles are the major contributor of air pollution and causes 80% of total air pollution in cities. These include road vehicles, ships, railways, air crafts etc. These vehicles release many gases into the atmosphere include nitrogen oxide, CO, unburned hydrocarbons, SO<sub>2</sub>, particulate matter and smog.

**ii) Industries:**

Industries are the principle source of air pollution. Various industries consume energy in the form of oil, coal and natural gas. Petroleum refineries are the major source of gaseous pollutants. Other industries like paper, textile, steel industries cotton industry, sugar mull release number of gaseous pollutants like CO, SO<sub>2</sub>, NO<sub>2</sub>, hydrocarbons etc. Cement factories and stone crushers emit plenty of dust into the atmosphere. There are also chemical manufacturing industries which emit acid vapours into the air.

**iii) Thermal Power Stations:**

There are number of thermal power stations in our country which play a significant role in polluting air. Most of the thermal power plants burn coal for generating electricity. The burning of coal at thermal power stations produce

mainly CO, SO<sub>2</sub>, NO<sub>2</sub>, particulate matter etc which enter into atmosphere and pollute it.

**iv) *Nuclear Power Plants:***

The nuclear power plants are radioactive material for generating electricity. So nuclear power plants always release a little radioactive ray which increases the radio activity in the atmosphere and pollute it.

**v) *Agricultural Resources***

These include insecticides, herbicides, fungicides, pollen grains, crop residues etc. These chemicals and substances enter in our atmosphere and result in air pollution.

**Q.2. Describe the major pollutant of air?**

The major pollutants of air are of two types: **Gaseous Pollutants and Particulate matter.**

**a. Oxides of Sulphur:**

These include SO<sub>2</sub> and SO<sub>3</sub>. These are produced by burning of fossil fuels like coal in thermal power plants. Both these gases damage the marble buildings like Taj and other plants and animals. High concentration of SO<sub>2</sub> causes disappearance of chlorophyll, plasmolysis, metabolic inhibition and ultimately death. They may cause respiratory diseases like Asthma in man. Oxides of Sulphur (SO<sub>2</sub> and SO<sub>3</sub>) later form acid rain. This causes acidity of water bodies and soil. These acids also cause irritation of eyes, nose and throat. H<sub>2</sub>SO<sub>4</sub> also attacks exposed metal surfaces like steel rail track.

**b. Oxides of Nitrogen:**

These include NO and NO<sub>2</sub>. These are released by automobiles and chemical industries as waste gases and also by burning of materials. Oxides of nitrogen (NO and NO<sub>2</sub>) later form acid rain which affects both flora and fauna in both terrestrial and aquatic ecosystems. They also have corrosive action on metals. NO<sub>2</sub> irritates eyes and lungs. NO like CO lowers the oxygen carrying capacity of the blood.

**c. Oxides of Carbon:**

These include CO and CO<sub>2</sub>. CO<sub>2</sub> is not toxic but its increased concentration in the atmosphere has disastrous effect on the flora and fauna. It is produced in large quantities when animals respire. CO<sub>2</sub> is also formed by decaying of organic matter

and combustible fuels.  $\text{CO}_2$  also increases in atmosphere due to deforestation.  $\text{CO}_2$  causes nausea, discomfort and headache. It also results in greenhouse effect.

CO is colourless, odourless and tasteless gas produced by incomplete combustion of coal, oil and coal tar. A common source of CO is automobile exhaust. CO combines with haemoglobin and reduces the oxygen carrying capacity of haemoglobin. This can lead to the headache, high blood pressure, difficulty in breathing unconsciousness and even death.

#### **d. Hydrocarbons:**

Hydrocarbon are compounds of hydrogen and carbon. These are formed by incomplete combustion of fuel in automobiles petroleum refineries, burning of crop residue etc. They cause cancer in human beings, regular coughing and blockage of respiratory tract. High level of methane have narcotic effect on humans. They react with nitrogen oxides to form Peroxyacetylene Nitrate (PAN) which is very toxic. PAN is a photo chemical oxidant and is formed in presence of sunlight. PAN causes irritation of eyes and throat and cause respiratory diseases. In plants hydrocarbons cause aging and breaking + - of tissues and shedding of leaves.

#### **e. Fluorine:-**

Burning of coal for domestic and industrial purpose releases fluorine in the form of hydrogen fluoride (HF). These are formed from industries which manufacture steel, aluminium, brick, tiles and fertilizers. HF also comes from volcanoes, Fluoride pollution affects natural vegetation. Cattle feeds on such plants develop fluorosis characterized by swollen knee bones, tooth decay and general ill health.

#### **f. Lead:-**

It is produced from automobiles industries (Plastic and paint). It damages muscular, nervous, circulatory systems and also damage liver brain and intestines.

#### **Particulate Matter:**

An aerosol is any system of solid particles or liquid droplets suspended in a gaseous medium. For convenience, we generally describe all atmospheric aerosols whether solid or liquid as particulate matter. This includes dust, mist, smog, ash, soot, smoke, pesticides, CFC etc. Particulate pollutants are added to air by industries and automobiles and by operations like blasting, grinding, mixing etc. Some particulate matter is added to air by living organisms. It comprises pollen, spores, cyst and bacteria. Particulate matter often cause occupational lung disease

like silicosis by silica, pneumoconiosis by coal dust, byssinosis by textile dust etc. CFC cause ozone depletion. Particulate matter in the atmosphere reflects solar radiations preventing a part of it from reaching the earth. This causes decrease in temperature.

**Q.1. What are the various harmful effects of air pollution?**

**Ans.** Effects of air pollution:

- i. It causes various respiratory diseases in man like Asthma, lung cancer, bronchitis, occupational lung disease etc.
- ii. Lead can damage circulatory, muscular excretory and nervous systems of man and leads to death.
- iii. Carbon monoxide cause head ache, nausea, high B.P, unconsciousness and even death.
- iv. Particulate matter settles over vegetation, block stomata and reducing photosynthesis.
- v. Acid rain damages buildings and other monuments. It also cause water and soil pollution.
- vi. A various air pollution like CO<sub>2</sub> cause green house effect.
- vii. Air5 pollutants like CFC cause ozone layer depletion.
- viii. Particulate matter results in reflected solar energy.
- ix. It causes extensive leaf fall and also decrease fruit yield
- x. It cause obstruction of vision of pilots and have caused air craft accidents.

**Q.2. What are the various methods (equipment or devices) to control the air pollution?**

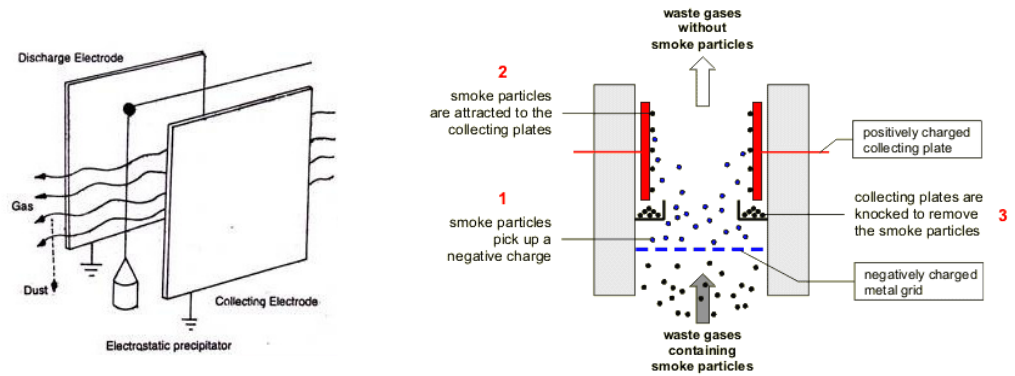
**Or**

**What are the various methods to control particulate matter?**

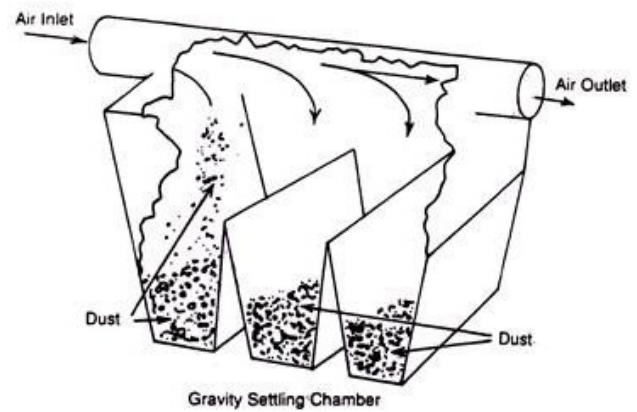
**Ans.** There are a number of methods which help in controlling atmospheric pollution. These are:

- i. **Electrostatic precipitators (ESP):-** these are commonly used to remove the particular matter from the polluted air used in power plants, paper mills, cement mills etc. It is based on electrostatic attraction. The polluted air is passed through an array of wires charged to high positive voltage (1000000 volts). During the process moving particles attain positive charge and are attracted to a negatively charged collector plate. In this way the particles are separated before entering into the atmosphere. An ESP can remove particulates as small as 1 micron. It

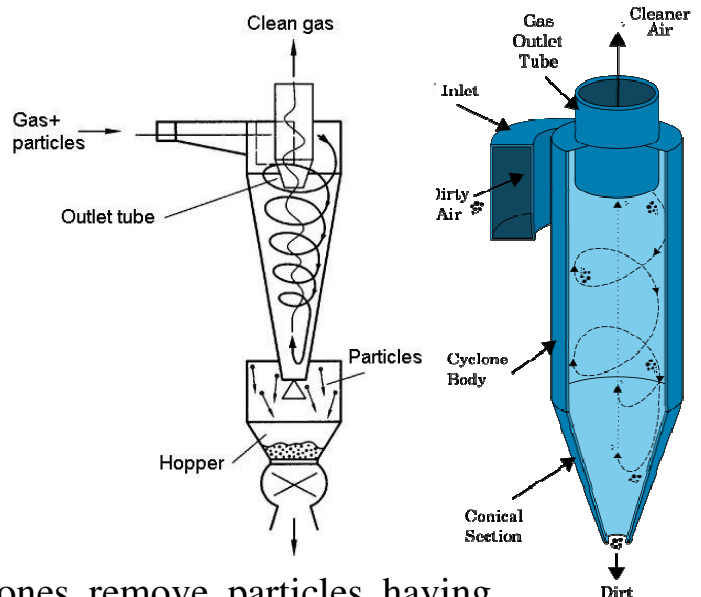
mainly removes fly ash from the combustion gases of fossil fuels like coal and petroleum. ESP has 99.9 % efficiency.



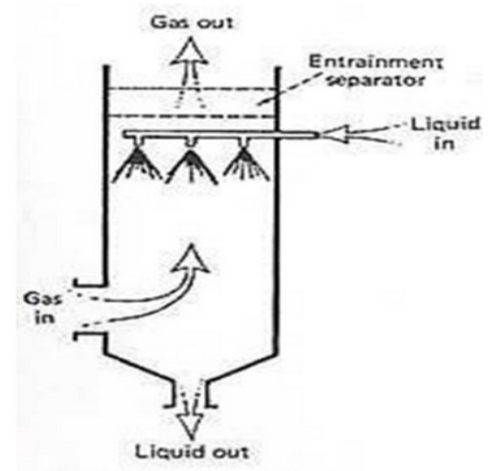
**ii. Gravity Setters:** These are oldest, cheap and simple type of particulate collector. These are large chambers in which the large sized particulate matter settles to the bottom due to the gravity. Through gravity setter, particle size between 400 – 1000 micron in diameter are readily collected.



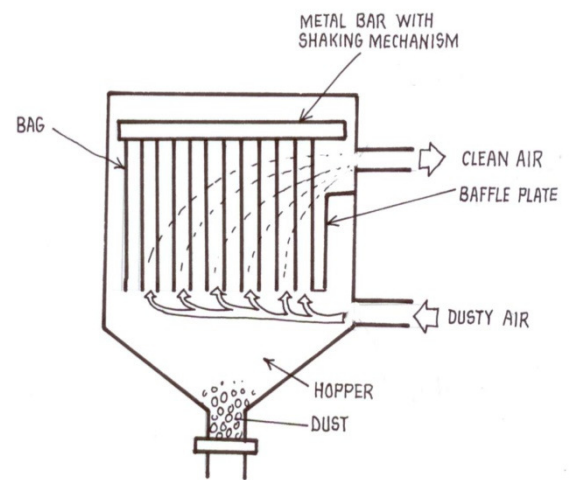
**iii. Cyclone Separator:** It consists of a cylindrical shaped separator. It works on the principle of centrifugal force. As the gas enters the cylinder, it takes helical path. During this path suspended particles move outwards to the walls and then fall in to a hopper at the bottom due to gravity where they are collected. The cleaner air leaves the cylinder from an outlet at the top of it. Cyclones remove particles having diameter 20 micron and has 95% efficiency.



**iv. Wet Scrubbers:** in this method, the gases that are emitted from combustion processes are passed through a pouring water in a tank. The toxic gases are dissolved and hence separated. It mostly separates dust and other particles from the air. Due to water, dust particles drop. It is used to separate  $\text{SO}_2$ . The dust laden water is treated and is often recirculated.



**v. Bag filter or Porous filter:** It is the most efficient method for removing suspended particulate. It can remove particles less than 0.5 micron diameter, this method contains long narrow bags made of fabric which are suspended upside down in a large enclosure. Particulates are deposited on the inner surface of bags which are removed by shaking and the dirty gas leaves through the pores of bags.



### Q.3. What are the various methods used for controlling gaseous pollutants?

**Ans.** Various methods used for controlling gaseous pollutants are as follows:

- i. Condensation:** in this method vapours are separated before entering into the atmosphere. Condensation is done in petroleum refining, manufacturing of ammonia and chlorine solutions etc. Here vapours come in close contact with cool surfaces and condense to form liquid.
- ii. Combustion:** In this process, oxidizable gaseous pollutants are burnt completely at high temperature for a sufficiently long time in the presence of adequate turbulence. It is used in photochemical, fertilizer, paint industry etc.
- iii. Absorption:** In this technique, gaseous pollutants are absorbed in suitable absorbent material. It is used for  $\text{SO}_2$  basic aluminium sulphate etc. It depends upon the amount of surface contact between gas and liquid and contact time.

**iv. Adsorption:** This technique is brought about by aspirating the air or gas to be sampled through adsorption columns containing silica gel activated carbon. It is applied to control toxic gases, vapours etc.

**Q.4. Do you agree that drastic reduction by emission of air pollutants are urgently needed to protect human health as well as natural and manmade environment.**

**Or**

**Discuss urgency to control air pollution?**

**Ans.** A number of air pollutants are releasing into the atmosphere from various sources like automobiles, industries, thermal power plants, agriculture etc. These pollutants create a number of environmental problems like acid rain, global warming, ozone layer depletion which in turn cause human health problems and damages the natural environment. It is because of this reason that there is urgent need to control atmospheric pollution (drastic reduction emission). To protect the environment it is necessary to check the concentration and deposition of air pollutants to reduce critical loads. To minimize the pollutants in the atmosphere it is urgent to adopt following measures:

- i.** Use renewable source of energy instead of fossil fuels.
- ii.** Use clean fuels (L.P.G)
- iii.** Apply best technology to arrest the pollutants in the industries before releasing.
- iv.** Plant more and more trees (CO<sub>2</sub> pollution)
- v.** Proper inspection and maintenance of vehicles.
- vi.** Sustainable development.

**Q.5. What is role of government (National and Local) in controlling air pollution?**

**Or**

**What steps are taken by the Government of India to curb air pollution?**

**Ans.** Environment is a life giving system. Keeping the importance of environment in view, the government has come forward both at national and international level to play a role in controlling air pollution.

**i. Role of government at National Levels:**

Government of India has implemented various acts like air prevention and control of pollution Act 1981 and the environment protection Act 1986.

Besides the various acts government of India undertook a number of measures to control air pollution. Some measures are:

**a. Guidelines for sitting of industries:**

Government prescribed guidelines for locating industries in that places so that its harmful effects on the environment and quality of life can be lowered.

**b. Inspection and Maintenance:**

Proper periodical inspections and maintenance of vehicles is an important step to control emission of vehicle. This measure helps to reduce 30 – 40% pollution loads generated by vehicles.

**c. Education:**

Government plays an important role in educating common people about the importance of environment and the ill effects of environmental pollution. Govt. Has recently introduced environmental science as a compulsory subject in higher secondary classes. Through education, people get aware how to control air pollution.

**d. Development of pollution prevention technologies:**

Industries are encouraged to use various technologies to reduce generation and emission of pollutants. These technologies include clean technology and eco – friendly technology.

**e. Use of clean fuels:**

Government stresses to use clean fuels (L.P.G) in automobiles so that atmosphere is saved from the pollutants. Moreover government implemented the directive to supply diesel with 0.05% sulphur only.

**ii. Role of Local Government:**

Air pollution comes from local sources also therefore, state government and Municipal government plays following roles to control air pollution.

- a.** The first and the most things that local government does is the enforcing ban on sale of banned fuels like bituminous coal.
- b.** The local government run educational programmes in the state.
- c.** The state government has introduced recently environmental science as a compulsory paper at higher secondary level at undergraduate level (IInd Year).
- d.** Local government has taken steps to organising and conducting research into the causes and prevention of air pollution.



- e. State government also directs industries to use various devices to control particulate matter and gaseous pollutants.
- f. The state boards for prevention and control air pollution have been created in every state in our country. They inspect the air quality from time to time in the state and take proper steps to reduce pollutants.

**Q.6. Give your comments on ‘we cannot afford clean air’ it costs too much, what are the cost implications of controlling air pollution?**

**Ans.** Many a time, arguments are against pollution controls – we cannot afford clean air, it costs too much. People cannot pay more costs of electricity. Similarly buying a vehicle, buyer cannot accept the cost of too many emission control devices on new vehicle price. Industrial owners cannot afford to put expensive equipment to control air pollution. People cannot pay directly but pay in the form of ill health and property damage. Developing countries like India appear to bear a very high level of these costs.

**Q.7. What are the various roles of environment organisations in controlling air pollution?**

**Or**

**How can environmental organisations contribute to check air pollution?**

**Ans.** There are number of international national organisations which play a significant role in controlling air pollution. The various environmental organisations are: Environmental Protection Agency, European Economic Community, Earth Scan, UNESCO, WCED etc. The responsibility of these organisations is to control air pollution through:

- a) To educate people about the importance of environment and the ill effects of environmental pollution.
- b) To develop a sense of social responsibility among factory owners in controlling air pollution.
- c) To promote clean development mechanism to prevent and reduce pollution level.
- d) To motivate industries to take up initiatives to control pollution.
- e) Provide support to local and national government in policy formation in combating air pollution.
- f) They create environmental ethics and positive attitude among people towards environment.

**Q.8. Discuss the role (responsibility of industries) to limit the air pollutants emitted from their chimneys?**

**Or**

**Discuss responsibility of industries to control atmospheric pollution?**

**Ans.** Industries are the major source of environmental pollution. Following measures help in controlling pollution from industries.

- a) The pollutants generated in various industries like steel and textile industries must be arrested before entering into the atmosphere. This can be done by proper equipment.
- b) There are industries where harmful wastes produced are converted into harmless and useful by-products.
- c) Industries should be located away from the locality so that people may not be exposed to harmful gases.
- d) One of the responsibilities of industries is to extend the durability of its products.
- e) Industries should use clean fuels for combustion.
- f) Poisonous wastes like organic wastes should be buried in the well-protected areas.
- g) Adoption of least polluting technology which reduces the generation of pollutant formation.
- h) They should have tall chimneys, which can reduce pollution at ground level.
- i) Every industry should have green belts around it.

**Q.9. What are the various functions of central and state pollution control boards for control of air pollution?**

**Ans.** Function of central pollution board: Central board performs a number of functions in controlling air pollution which are as follows:-

- a) To advise central government and state boards about improvement in the quality of air and issues related to air pollution.
- b) To provide technical assistance and guidance to state boards and industries.
- c) To plan and inspect the execution of nation-wide programme for prevention, control of air pollution.
- d) To utilize the services of mass media in educating general people about causes, consequences, prevention and control of air pollution.
- e) To plan and organize training of persons in the field of air pollution.
- f) To establish laboratories for air sample analysis.
- g) To lay down standards for quality air.

**Function of state pollution board:**

There are state pollution boards in every state of our country. These boards perform following functions in controlling air pollution:

- a) To advise state government on matters concerning air pollution.
- b) To plan programmes for prevention and control of air pollution.
- c) To collect information related to causes, prevention and control of air pollution.
- d) To seek guidance and training of persons from central board.
- e) To inspect air quality in air pollution control area from time to time.
- f) To take steps to reduce air pollution.

**Q.10. Discuss development pollution relationship (equation)?**

**Or**

**As countries develop their economy grows, so does the probability for a conflict with the environment and resource use. Discuss.**

**Ans.** In last century rapid industrialization has sped up the economic growth and improved the living standards all over the world. However, there is concern that economic growth causes environmental degradation and affects human health. It has been observed that pollution levels are decreasing in highly developed countries, as a result of continuing economic growth is stagnant or declining.

Economists claim that the relationship between growth (per capita income) and environmental pollution follows an inverse U shaped pattern. Some economists are of the opinion that economic growth leads to environmental degradation upto certain point after which further economic growth actually decreases pollution. This is not always true. Economic development leads to increase in the use of sophisticated technology which is made from the material which contains or generates toxic substances in the course of manufacture. Clean technologies can only reduce toxicity burden to some extent. But they cannot totally eliminate them unless it is recycled by making use of most sophisticated technology which will not allow any toxicity in land, air or water. The technology will convert it from waste to commodity and then back again from commodity to waste in a continuous infinite cycle.

Relationship between economic growth and the environment could be categorized into following effects:

**a) Scale effect:**

It shows an inverse relationship between output and environmental quality. More output means more resource use and waste generation.

**b) Composition effect:**

Agriculture and services sectors generate less pollution than industrial sector under developed countries have more agricultural base than developed countries. Developed countries have larger share of services as compared to developing countries. The composition effect implies that the relationship follow an U – pattern.

**c) Technological effect:**

Technological change leads to efficient use of resources and more effective institutional arrangements. These together induce changes in production technology resulting in cleaner and safer environment.

**d) Abatement Effect:**

The abatement effort directly results from people's preferences towards the environmental quality. If people are poor, they struggle for more and more material needs and in the process degrade the environment. Thus people must have a certain level of material wealth for their preferences to change towards cleaner environment.

**Q.11. Discuss economic capacity of developing countries to deal with pollution?**

**Or**

**It is right time to develop or protect environment in developing countries? Justify your opinion.**

**Ans.** Large scale industrialization has harmed the environment beyond repair. The urgency to protect the environment is more for the developing countries than for the developed countries. Industrialized countries did not pay and heed to the environment before they reach the heights of their development. Developing countries face great environmental emergencies which threaten health, economy and supply of some raw materials. Attempts are being made to compensate the damage done to the environment by making the countries to pay for the quantum of damage done by them. Developing countries fear that they will be asked to make a disproportionate contribution towards protecting the global environment. They argue that 30% of world's population lives in developed countries but they consume 70% of the resources.

Environmental problems in a region are of two kinds – those resulting from poverty, hunger and under development and those arising from the negative effects of development. If the negative effects are known. They can be mitigated by adopting

agricultural practices appropriate to the fragile environments, by installing pollution abatement equipment in factories and by recycling the wastes.

It is a fact, without the forms of energy like oil, gas, petroleum, coal etc. Industrialization would not be possible. Environmental problems such as acid rain, green house effect, ozone depletion and general degradation of the quality of environment are due to excessive use of energy. As the countries during initial phase of industrialization tend to use more energy, it is a significant problem for them. Multinationals and every large national company need to find a way to address this situation.

**Q.12. What is role of multinationals?**

**Or**

**What is Corporate Environmental responsibility of countries? How does it help them and the society?**

**Ans.** The role of multinationals in controlling pollution can be defined through corporate social responsibility (CSR) under CSR, companies integrate social and environmental concern in their business operations and their concern with on a voluntary basis. There should be a development but without the degradation of environment. In other words there should be a sustainable development.

There was a time when large business considered corporate environmental responsibility (CER) as a good will gesture. Now CER has moved from an option to a mandate for multinationals as well as smaller business enterprisers. A number of firms have engaged themselves in recycling and minimizing the wastes and in this way protect the environment from degradation. Many forms have come forward and adopted voluntary environmental management system like EMAS (Eco Management Audit System) and ISO (International Organization of Standardization) 14000. Many companies or firms indicate that these activities help in better performance and can generate more profits and growth. In one way there is better working environment which leads to more productive work force besides efficient use of resources. It is good for both business as well as environment.

In short environment affects all of us. It is every body's responsibility and duty to live in harmony with environment and save it from various problems.

**Q.13. What is the role of legislation in controlling air pollution?**

**Ans.** Legislation plays an important role in controlling air pollution. Various acts like Air (prevention and control of pollution) Act, 1981 and EPA (1986) have been enacted to control air pollution which are described below:

## **Air (prevention and control of pollution) Act, 1981**

India being a signatory to the U. N conference on Human Environment held in Stockholm (Sweden) in June 1972, where the participants decided to take steps for the prevention and control of pollution. Accordingly the parliament of India enacted the air (prevention and control of pollution) Act, 1981 for prevention and control of air pollution. The main postulates of this Act are:

- a) The act provides for prevention and control of air pollution.
- b) In this Act, air pollution has been defined as any solid, liquid or gaseous substances (including noise) in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment.
- c) Noise pollution has been inserted as pollution in this Act in 1987.
- d) Pollution control boards at central and state level have the regulatory authority to implement the air Act.
- e) The Act has provision for ensuring emission standards from automobiles. The state government is empowered to issue instruction to the authority in charge of registration of vehicles.
- f) The Act has provision for defining the constitutions, powers and functions of pollution control boards, funds, accounts audit, penalties and procedures.
- g) The Act has provision under which the state government may declare an area within the state as air pollution control area and can prohibit the use of any fuel other than approved fuel in the area causing air pollution.

## **Environmental Protection Act (1986)**

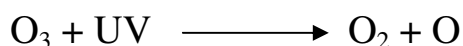
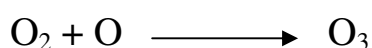
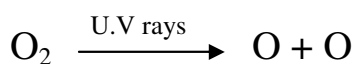
The environmental protection act 1986 is legislated as an urgent need for the enactment of a generalization on environment protection because the existing laws generally focus on specific pollution or hazard substance. Salient features of environmental protection Act are as follows:

- a) The government has given the power to collect samples of air, water and soil as evidence of the offences under the act.
- b) The central government has been authorized to take all appropriate measures to prevent and control pollution and to establish an effective machinery to achieve this object.
- c) There is special procedure prescribed for handling hazardous substances. Those who go against the Act has penalty of imprisonment upto seven years or fine up to one lakh or both.

- d) Central government has powers to appoint officers and prescribing their powers and functions and to give direction of environmental pollution under section 3 to 6 and 25.
- e) Both supreme courts and high courts laid down important legal doctrines and expressed a new, even revolutionary meaning to the constitutional provisions to protect environment through social vision.

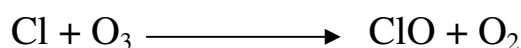
#### Q.14. Describe Ozone Layer Depletion?

**Ans.** Ozone is a gas forms a layer in the stratosphere of atmosphere which acts as an ozone shield (Umbrella) which protects the earth's biota from harmful U.V rays. This protective covering of ozone is also called ozonosphere or ozone layer. This layer lies between 15 – 60 kms above the earth's surface. Ordinary , the molecule of oxygen has two oxygen atoms ( $O_2$ ) while ozone has three atoms ( $O_3$ ). Ordinary oxygen absorbs U.V rays with below wave length  $2.4 \times 10^{-7}m$  (less than 242m). This provide energy to split the molecule into highly reactive oxygen atom. Once released an oxygen atom combines with an intact oxygen molecule to form ozone. This process not only produce ozone but also filters U.V rays. Ozone is acted upon by U.v rays and converts it into molecular oxygen ( $O_2$ ) and vacant oxygen. Hence through through making and breaking process of  $O_2$  and  $O_3$  . the U.V rays are made harmless because their energy is dispatched as heat. About 99% U.V rays are absorbed or screened out in the ozone layer.

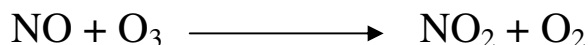


Hence there is an equilibrium concentration of ozone. This equilibrium is disrupted by reactive atoms of chlorine, bromine etc which destroy ozone molecule and result in thinning of ozone layer which is called as ozone hole. First ozone hole was discovered in Antarctica by Dr. Joe – C. Farman et al (1985).

Besides  $CFCL_3$ , other ozone depleting substances are carbon tetrachloride, halons, hydrochlorofluoro carbon,  $CO_2$ , Methane, oxides of nitrogen etc.



A single chlorine atom converts one lakh molecules of ozone into oxygen. Nitric oxide (NO) and other gases released by jets directly react with ozone to form oxygen.



### **Q.15. What are the various consequences of ozone layer depletion?**

**Ans.** Various consequences of ozone layer depletion are given below:

**a. Skin Cancer:**

Ozone depletion results in skin cancer in human beings. In Australia which is near the area of ozone hole (Antarctica) every second middle aged person suffer from skin cancer while in old aged, it is 100%.

**b. Blindness:**

It causes blindness in terrestrial animals and cataract in man.

**c. Mutations**

Due to U.V rays, the DNA (Chromosome) get damaged and results in mutations.

**Immune System Damage**

Due to U.V rays, the immune system (defence mechanism) of the body gets suppressed and person becomes vulnerable to diseases.

**d. Food Shortage:**

Due to ozone layer depletion, U.V rays can damage the photosynthetic cells of plant and hence there is reduction in crop productivity.

**e. Global Warming:**

Due to depletion of ozone layer, the temperature around the world may rise even up to 5.5°C.

**f. Death of Aquatic Life:**

It destroys aquatic flora, which intern damages the aquatic fauna like fish shrimp crabs, amphibians, salamander etc.

### **Q.16. What are the various causes of ozone (O<sub>3</sub>) layer depletion?**

**Ans.** Following are some important causes of ozone layer depletion (OLD);

**a. Combustion of fossil fuels and organic matter:**

Combustion of fossil fuels release ozone depleting substance like nitric oxide (NO). Moreover decomposition of organic matter by microbes plenty of hydrocarbons (mainly methane) is discharged into atmosphere and pollute the stratosphere.



**b. Excessive use of nitrogenous fertilizers:**

Microbial action on nitrogenous fertilizers produce nitrous oxide which enter into the atmosphere. Due to action of high energy radiation's nitrous oxide is converted into nitric oxide which is an important constituent that destroy the ozone layer.

**c. Excessive use of chlorofluorocarbons:**

$\text{CFCl}_3$  are used as coolant in refrigerators and are considered most damaging pollutant of stratosphere. They remain in the atmosphere as long as 150 years.  $\text{CFCl}_3$  are acted upon by high energy radiations to yield chlorine atom which reacts with ozone and break it. A single atom of chlorine can destroy 1,00,000 ozone molecules.

**d. Supersonic transport Rockets and Shuttles:**

Supersonic jet liners, military jets and Rockets in atmosphere release oxides of carbon nitrogen, and sulphur, hydrocarbons and particulate matter. Ammonium perchlorate used in rockets as oxidant release a lot of chlorides which then deplete ozone layer.

**e. Volcanic Eruption:**

It is a natural one due to frequent volcanic eruption, large quantities of waste gases and other pollutants which are often thrown out with force to reach high up in the atmosphere especially chlorine.

**f. Nuclear Tests:**

Surface nuclear explosions produce large quantities of gases, dust, soot and debris with enormous which carries much of material straight into the atmosphere and damage the ozone layer.

**Q.17. Give an account on Montreal Protocol.**

**Ans. Montreal Protocol:**

The protocol was established in 16<sup>th</sup> September 1987 to protect the ozone layer. Twenty seven industrialized countries signed on the protocol and agreed to reduce the production and consumption of CFC to reduce half the level of 1986. It was also agreed to phase out the CFS's and other ozone depleting substances by the end of 20<sup>th</sup> century. The Montreal protocol is an international programme was created to help the developing nations to phase out ozone depleting substances and to adopt alternative. Moreover there is prohibition and restriction of trade of ozone depleting substance like CFC, halons etc. between parties and non parties. Till date more than 175 countries has signed the Montreal Protocol. Under 1987 Montreal Protocol, the production of CFC's has been banned in developed countries but developing countries are allowed to produce CFC's till 2010.

**Q.18. Perhaps the single most successful international agreement date has been the “Montreal Protocol”. Do you agree? Discuss.**

**Ans.** The ozone layer is very important layer in the atmosphere as it protects us from damaging U.V rays. Its depletion is a threat to world (living beings). Due to various activities of man, it is depleting. To protect the protective ozone layer, Montreal protocol was finally agreed on 16<sup>th</sup> of September 1987 at the headquarters of the international Civil Aviation Organisation in Montreal.

The Montreal protocol was really a successful international agreement. It was the best agreement towards the protection of ozone layer. If Montreal protocol agreement has not been agreed, the ozone layer depletion has not been found only in Antarctica but in the every spot of the world. The protocol sets the elimination of ozone depleting substances like CFC as its final objective. The protocol came into force on first January 1989 and 29 industrialized countries signed on the protocol. In the Montreal protocol, phasing out of CFC and other ozone depleting substances by the end of 20<sup>th</sup> century has been agreed.

**Q.19. The Montreal protocol may thus be the fore runner of an evolving global diplomacy through which nations accept common responsibility for stepwardship of the planet. Comment.**

**Ans.** Ozone layer depletion is a world wide threat. So in order to combat this threat global cooperation is must. If major countries do not participate, the efforts of others will be almost useless. For this, Montreal Protocol should prove to be the lasting model of international cooperation. In the field of international relations, there will always be uncertainties – political, economic, scientific and psychological. The treaty showed that even in real world of ambiguity and imperfect knowledge, the international community is capable of undertaking difficult cooperative actions for the benefit of our grandchildren. Thus the Montreal protocol may thus be the fore runner of an evolving global diplomacy through which nations accept common responsibility for stepwardship of the planet earth.

**Q.20. If scientists say ozone layer recovery may not be detectable for as many as 45 years, then how is policy to stop the depletion of the ozone layer called a success? Comment.**

**Ans.** The policy to stop ozone layer depletion is really a success, though the fruit bearing of the success may take 15 – 45 years to be realized. The efforts of the scientists taken to know the causes of the ozone layer depletion and the ways to minimize or rather to stop the depletion are a remarkable piece of work. It has

sensitized the scientific community, the media and the legislatures to take steps in this direction. The common masses have also become aware of the process of depletion and the consequences. So a number of steps have been taken and protocols signed to stop ozone layer depletion. Though it may take 15 – 45 years to realize the recovery but at the same time the ozone layer may be protected from depletion further during the 45 years.

**Q.21. Do you agree that Montreal protocol convention report was an unprecedented document? Discuss.**

**Ans.** Montreal Protocol is a best step towards the protection ozone layer. Before Montreal Protocol, ozone layer depletion occurred at a faster rate. Due to Montreal Protocol reduction on the use of ozone depleting substances took place. The ozone depleting substances (ODS) like CFC is under control due to the Montreal Protocol an unprecedented international agreement. The protocol required the support and participation of scientists, industrial representatives, policy makers and environmentalists. It is very important precedent that demonstrates how these sectors can work together and can be very productive.

Another important precedent, the protocol; includes procedures for periodic revisions of its terms. The agreement was modified and strengthened first in London in 1990 and then again in Copenhagen in 1992 leading to complete ban of CFC production by industrialized countries by the end of 1995. The revised agreement provided by developed countries called “Multilateral Fund” helps developing countries to adopt and develop ozone friendly technologies.

**Q.22. What is Remote Sensing (Satellite imagery) and what is the role of Remote Sensing in Environment?**

**Ans.** Remote sensing is the science and technique of acquiring information about an object or a surface feature from measurement made from a distance without being any physical contact with the object. Remote sensing is thus the principal method of operation by which the earth's surface, other planets, atmosphere, universe as a whole as being observed, measured and interpreted from a distance. In short remote sensing is the soul of all space programmes.

Remote Sensing began on the ground in 1839 and then moved into air in 1860 and in space 1957. Remote sensing can be done through aeroplanes or with the help of satellites. It is one of the areas of rapidly advancing technology and is very useful in ecosystem and environment monitoring. Information on environment conditions, forests, deserts, glaciers, water bodies can be collected from photographs and images.

These photographs or images can be evaluated qualitatively and quantitatively. The procedure of inferring relationships by visual examination is called photo interpretation, whereas the procedure of making photographic measurements is called as photogrammetry. Remote sensing is either active or passive. In active remote sensing system, there is own energy sources to illuminate the object while as in passive remote sensing system there is no energy source of its own.

### **Role of Remote Sensing in Environment:**

Remote sensing plays number of roles in the environment. Some of the roles are as:

- a. Remote sensing provides information about various agriculture resources that may have effect on the crop production. These information are crop types, crop condition and crop yield estimation.
- b. It plays an important role in soil and agriculture, town and country planning, in detecting of depletion of forests and forest cover.
- c. It is very beneficial in engineering, geology, geomorphology and hydro morphology.
- d. It is useful in making a complete systematic analysis of landscape.
- e. Remote sensing is used for detection of air pollution and its effects.
- f. It is important in mapping and monitoring of water pollution.
- g. It is useful in monitoring environmental effects of human activities like autrophication.
- h. It is used in the determination of water depth of water bodies.
- i. It is useful it he assessment of grass and forest fire damage.
- j. It has a significant role in the determination of soil condition.

### **Q.23. What are the major application of remote sensing in Agriculture-forestry and land use?**

#### **Ans. Application of remote sensing in Agriculture forestry:**

- a. It determines vegetation vigor.
- b. It determines crop and timber types.
- c. It helps in assessment of grass and forest fire damage.
- d. It determines soil condition.
- e. It determines biomass.
- f. It determines vegetation stress.

#### **Application of remote sensing in land use:**

- a. It helps in mapping of fractures.

- b. It helps in mapping of water boundaries.
- c. Separation of urban and rural categories.
- d. Classification of land use.
- e. Mapping of transportation networks.
- f. Categorization of land capability.

**Q.24. What are the major applications of remote sensing in geology and water resources?**

**Ans. Applications of remote sensing in geology:**

- a. It recognizes rock type.
- b. Mapping of major geology units.
- c. Mapping land forms.
- d. Search of minerals.
- e. To determine regional structure.
- f. Mapping igneous intrusions.

**Application of remote sensing in water resources:**

- a. Determination of water depth.
- b. Measurement of turbidity in water.
- c. Measurement of glacier features.
- d. Determination of water boundaries.
- e. Determination of snow boundaries.
- f. Inventory of lakes.

**Q.25. What are the applications of remote sensing in oceanography and marine resources and environment?**

**Ans. Application of remote sensing in oceanography and marine resources:**

- a. Detection of marine organisms.
- b. Study of waves
- c. Determination of turbidity.
- d. Mapping shore line changes.
- e. Mapping of ice for shipping.
- f. Study of eddies.

**Application of remote sensing in environment:**

- a. Detection of air pollution and its effects.

- b.** Monitoring of water pollution.
- c.** Monitoring effects of human activities and environment.
- d.** Determination of effects of natural disaster.
- e.** Monitoring surface mining and reclamation.

**Q.26. Why do more bands in a remote sensing satellite system give better discrimination between the different features?**

**Ans.** The remote sensing data usually consists in measuring reflected or emitted radiation from different parts of EMS. A multi spectral or multiband data consists of radiation collected over sets of electromagnetic that individually extend over intervals of continuous wave lengths within some part of the spectrum. The images produced on these data are called multi band images. These multi band images give better discrimination between the different features because the radiation in each band will vary depending on the reflectance or emittance response of the various features or materials that are different within an interval and different when other bands are examined.

**Q.27. What is remote sensing? Why is remote sensing most often practiced from platforms such as airplanes and aircrafts?**

**Ans.** Remote sensing is the science and technique of acquiring information about an object or a surface feature from measurements made from distance without being any physical contact with the object.

Remote sensing is most often practiced from platforms such as airplanes and aircrafts because atmosphere cannot affect them and orbit can be well defined. Moreover airplanes and aircrafts whole earth or any portion of earth is covered and is interpreted and measured properly.

**Q.28. What do you understand by DN value?**

**Ans.** In remote sensing, the detectors sense many different wave lengths in the electromagnetic spectrum. These detectors record the reflected and emitted rays in the form of numbers known as digital numbers and each image is constructed from these numerical values called DN values, which correlate with intensity of the reflected or emitted radiation averaged for spectral band. Each digital number represents a small square area on ground. This small square is called as picture ground or pixel on the image. A remote sensing instrument with a pixel size of

30 meters would have an area of 30 sq. mts. on the ground. We usually assign a DN value of 0-255 in whole number increments.

**Q.29. How do large and small scale images look like?**

**Ans.** The look of the image formed by remote sensing system ultimately is determined by its scale and spatial resolution. By scale we mean the relationship of the size of the image to the area covered on ground and by spatial resolution we mean the detail and clarity of the image.

A large scale image possesses something big in it but covers a small area on the ground. It can give more effective and detailed information but of a single or few things. On the other hand a small scale image has a number of small things in it but covers a large area on ground. It gives us information about a number of things though not so detailed and demarked.

**Q.30. What are the main differences in polar orbiting and geostationary satellite?**

**Ans.** Space borne platforms have given a more concrete edge to the effectiveness of the process of remote sensing keeping in view the use of polar orbiting and geostationary satellite. The entire earth or any part of the Earth can be covered at specific intervals and imagery obtained can be real time. The polar orbiting satellite covers the entire earth through successive orbits. These are mainly used for the remote sensing of earth's terrain and the ceiling height for polar orbiting satellite is 900km.

On the other hand the geostationary satellite is used to continuously monitor the position of earth. The ceiling height for geostationary satellite is 36000km.

**Q.31. Why are the term remote sensing and GIS synonymous? How is GIS useful for decision makers and planners?**

**Ans.** The remote sensing data consists of receiving and measuring reflected and for emitted radiation from different parts of EMS. Thus the remote sensing techniques measure the interaction of Earth's surface with electromagnetic energy from the sun and therefore are inherently a form of geographic information. Thus the use of GIS to store and display remote sensing information is so common that the terms remote sensing and GIS are almost synonymous.

GIS provides an exceptional means for integrating timely remote sensing data with other spatial types of data. The GIS approaches stores, integrates and analysis information that has a practical value. In many fields concerned with decisions making in resource management, environmental control and site management. Thus it is indispensably helpful for decision makers and planners.

**Q.32. Describe the properties of multispectral data.**

**Ans.** The multispectral data consists of radiation collected by complex detectors over sets of electromagnetic radiations that individually extend over intervals of continuous wave lengths within some part of spectrum. Thus data is then processed through computers to produce an image. So the most important properties of multispectral data are as:

- a. Multispectral data is versatility of data as collected over the different regions of EMS.
- b. The images so obtained from this data are multi band images which adds to clarity and authenticity of information.
- c. These images show notable differences form one band to next as the radiation from point to point will vary depending on the reflectance or emittance response of various features.

**Q.33. Summarize the remote sensing process. Explain how the information is recorded in digital form by an operating remote sensing satellite system?**

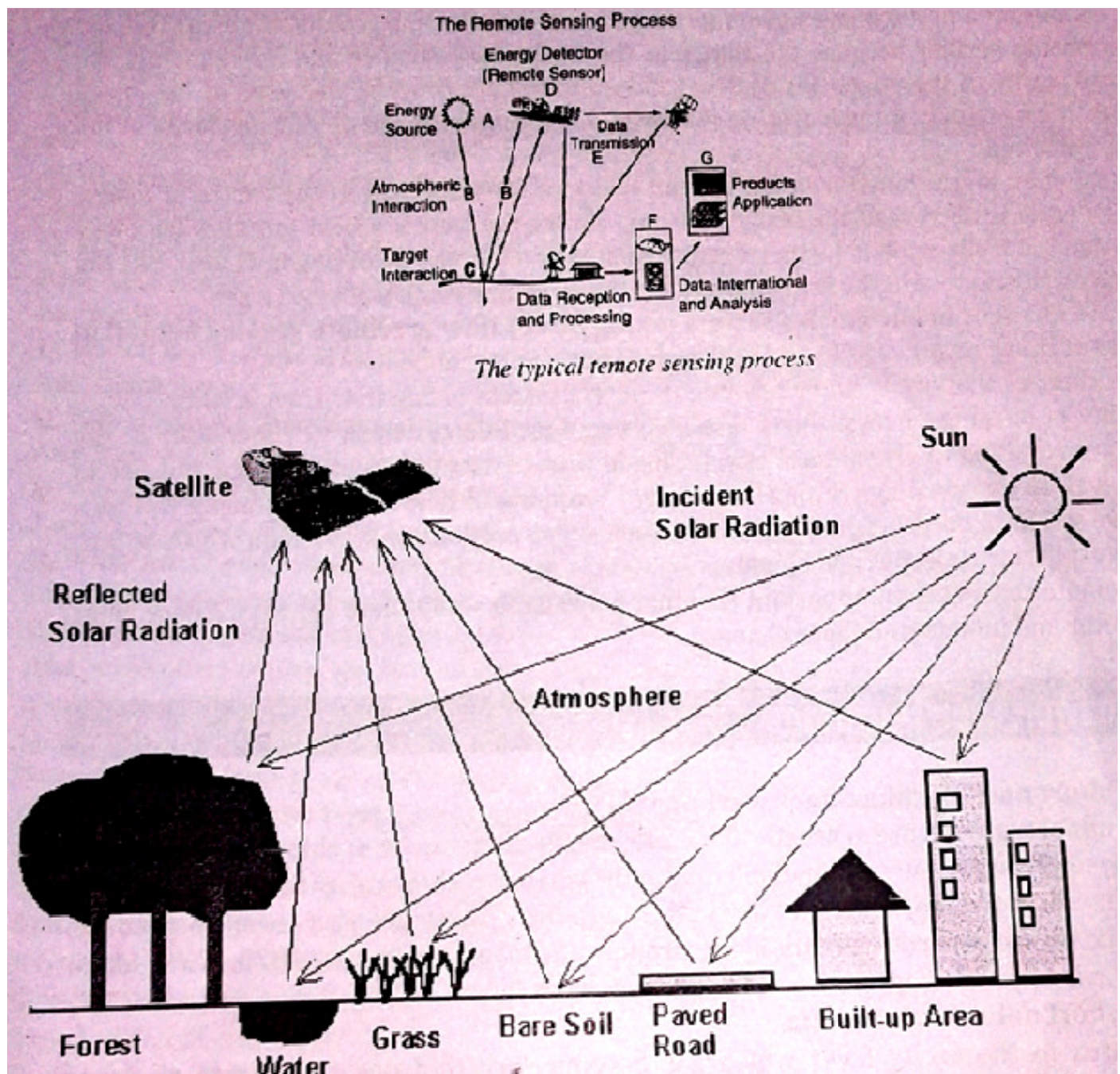
**Ans.** Remote sensing is the science and technique of obtaining information about an object, area through measurements made from a distance.

In modern era, remote sensing consists of receiving and measuring of reflected and emitted radiations from different parts of EMS. The use of complex detectors have refined and improved the process of remote sensing as in comparison to aerial cameras. The complex detectors sense different wave length regions of EMS. Thus the multispectral data consists of radiation collected over sets of EMS that individually extend over intervals of continuous wave lengths within some part of spectrum. Each interval makes up a band. These data re utilized by computer based processing images of scenes.

In an operating remote sensing satellite system, the detectors sense the target scene as reflected or emitted radiation in different bands of spectrum in digital



form. Thus digital information is then send to data reception and processing centre located either in space or at ground. The processed information is then analyzed and then product is rendered in the form of an image.



**Q.34. Why do different features have different spectral signatures? Illustrate this with an example?**

**Ans.** The band to band response in terms of magnitude or intensity of radiation of any point can be connected to form the spectral signature for a given feature. Different features have different and distinct spectral signatures depending up on the response of the target in terms of reflectance or emittance in different bands of EMS. e.g. During our remote sensing study if our target is a mountain or a lake. The components of mountain are the vegetation and the rocks while in a

lake the components are water and some aquatic vegetation. The response of these two target scenes in terms of reflectance of radiation will be different depending up on their composition. The reflected radiation in the form of photons strikes the plate in a remote sensing system converting photon energy to voltage. Each band of this radiation will have some voltage value. This voltage is a measure of reflectance from the target composite.

**Q.35. What is scale and spatial resolution? How the two things determine the view of a picture or image? Illustrate this with an example?**

**Ans.** A scale is defined as the relationship of the size on the photo to the area covered on the ground and the resolution is means the detail and clarity of the image.

As this area in the image covers more area on the ground, it means that the scale is getting smaller because the things in the image look smaller and consequently the detail and clarity of the image get declined. On the other hand, when the scale of the image increases, it covers only a small area on the ground. Consequently the detail and clarity of the image is enhanced.

E.g. if an image taken from an aircraft shows a farmer's field in the centre of image, when the scale is decreased the image not only shows the farmer's field but also the other fields around it. If the scale is further decreased, it may show the adjoining huts also. But the detail and clarity is more in the first image when the scale was comparatively larger.

**Q.36. How are changes in our Earth's system taking place? How is remote sensing helpful in the study of these changes at local level and global level?**

**Ans.** The changes that are taking place in our Earth's system is due to human activity. One of the activity is burning of fossil fuels and deforestation. Due to which CO<sub>2</sub> increases in the atmosphere resulting in greenhouse effect. This in turn results in climatic change and rise in the sea level. In marginal agricultural areas over cropping of land and overgrazing can turn productive soil in to deserts (desertification). Such soil is prone to wind erosion which in turn affect atmospheric properties and climate.

Remote sensing is an important tool that helps us to study these changes. Hence helps as to monitor and understand these changes.

## **SHORT ANSWER TYPE QUESTIONS**

### **Q.37. Write a short note on chlorofluorocarbons (CFC)?**

**Ans.** Chlorofluorocarbons are synthetic chemicals mostly compounds of chlorine, fluorine and carbon. These are stable, non-flammable and non-corrosive chemical with a peculiar trade name Freon. These are not toxic and are easy to produce. These are also cheap to produce. These are mostly used as refrigerants, spray propellants, foams etc. during 1970, it was found that the CFCs are linked to destruction of protective ozone layer.

### **Q.38. Write a short note on ozone hole.**

**Ans.** The area in the ozone layer which has become very thin due to reaction of ozone depleting substances constitutes the ozone hole. The ozone hole was first discovered by Joe-C-Farman in 1985 in Antarctica. In October 21, 2006, the area of ozone hole was 29 million square kilometers. The ozone hole has also been recorded in the Northern Latitudes. Ozone holes allows harmful U.V rays to reach the earth which affect the flora and fauna.

### **Q.39. Why ozone layer is important for us?**

**Ans.** Ozone layer acts as a protective layer present in the stratosphere of atmosphere. It absorbs harmful ultraviolet rays (U.V rays) coming from the sun. hence prevent these rays from reaching the surface of earth. If these harmful U.V rays reach the earth, they would damage the all life forms (plants and animals) on the earth by causing lethal effects like mutation, skin cancer, blindness etc.

### **Q.40. What is a pixel?**

**Ans.** The image on a photographic film depends on the relationship of the size on the photo to the area covered on the ground and the detail and clarity of the image. Each digital number represents a small square area on the ground. This small square area is called as pixels on the image.

### **Q.41. Write a note on IRS.**

**Ans:** IRS satellite system were launched into a polar sun synchronous orbit. India launched first civilian remote sensing satellite in IRS-IA in March 1988 marked the beginning of a successful journey in the course of the Indian space programme. India subsequently launched IRS-IB, IRS-IC and IRS-ID in August

1991, December 1995 and September 1997 respectively. The latest IRS P6 also called Resources Sat-1 was launched in October 17, 2003. It provides continued remote sensing data for integrated land, water, management and agriculture and its related applications.

**Q.42. How is energy generated on the Sun?**

**Ans.** The sun is the main source of energy on the Earth. The sun produces energy in the form of heat and light. The sun is a mass of hot gases that generates energy due to nuclear fission and fusion reaction. The sun explodes at a temperature of over 25,000 degree Fahrenheit.

**Q.43. What are atmospheric window?**

**Ans.** Atmospheric windows allow some ultraviolet rays, infrared energy and thermal energy from the sun to reach the surface of earth.

**Q.44. State the principal of conservation of energy and show it in a simple formula form.**

**Ans.** The principal of conservation of energy is that the “energy can neither be created nor destroyed” or in other words. “The total energy of an isolated system remains constant”.

Formula:  $E_L = E_R + E_A + E_T$

$E_I$  = Incident energy

$E_R$  = Reflected energy

$E_A$  = Absorbed energy

$E_T$  = Transmitted energy

**Q.45. Write down the wave length range of multispectral and pan data of IRS ID.**

**Ans .** The wave length range of multispectral data of IRS ID is 23.5m and that of pan data is 5.8m.

**Q.46. What do you know about plate forms?**

**Ans.** There are three categories of plate forms which are as:

- a. Ground borne plate form:** It consists of the photographic cameras that are commonly used for photography.
- b. Air borne plate form:** It consists of ballon based and air craft based form.
- c. Space borne plate form:** The are now used and are not affected by atmosphere. These can cover any part of earth or entire earth.

**Q.47. What are the harmful effects of ozone layer depletion (OLD)?**

**Ans.** Harmful effects of ozone layer depletion are:

- a.** It causes skin cancer in human beings and animals.
- b.** It damages our immune system.
- c.** It results in mutations hence cause various abnormalities.
- d.** It results in loss of eye sight (blindness) in animals.

**Q.48. What do you know about satellite sputnik-1?**

**Ans.** The sputnik-1 satellite was launched by the Soviets on October 4, 1957. It was about the size of a basketball and weighs about 83.6 kg. There is a full scale engineering test model of the first sputnik which is displayed at the national air and space Museum in Washington. It was the very first artificial satellite in the world.

**Q.49. How can you control air pollution at source?**

**Ans.** To control air pollution at source is the most effective method. This can be done by switching to the process which generate the least amount of pollutants as by products. This can be done through raw material substitution (use of pure raw grade materials) operational changes (washing of coal before pulverization) modification or replacement of process equipment or effective use of equipment.

**Q.50. Write a note on dilution (as a method to control air pollution).**

**Ans.** Dilution method can be accomplished by the use of tall stacks (maximum high 30 metre according to EPA). Dilution methods avoid pollutants from ground level as pollutants released from tall stalks disappears in the atmosphere easily. It helps in reduction the harmful effects of pollutants at the ground level. It is only a short term measure.

**Q.51. How the ozone layers getting affected and what will be the consequences of its depletion on human health?**

**Ans.** Ozone layer getting affected by human activities like nuclear tests, use of refrigerator, burning of fuels and using rockets etc. Its consequences on human health will be:

- a. It may lead to skin cancer.
- b. It may lead to blindness.
- c. It may lead to mutations.

## **SHORT ANSWER TYPE QUESTIONS**

**Q.1. What is corporate social responsibility (CSR)?**

**Ans.** Corporate social responsibility is a concept whereby companies integrate social and environmental concern in their business operations and their interaction with their stakeholders on voluntary basis.

**Q.2. What is the meaning of Corporate Environment Responsibility?**

**Ans.** Corporate Environmental Responsibility is a concept in which companies and firms integrate environmental concern in their business. CER has an aim of sustainable development and minimization of pollution and waste.

**Q.3. What do you mean by costing urgency?**

**Ans.** Costing urgency means need for immediate action to control any problem e.g. various air pollutants are generated from various sources. These are causing an alarming threat to man and nature. So there is need for immediate control or there is costing urgency to control these pollutants.

**Q.4. Name two cleaner fuels?**

**Ans.** The cleaner fuels are natural gas and higher grade coal.

**Q.5. Define Satellite Imagery.**

**Ans.** Satellite Imagery: It consists of photographs of earth or other planets made by means of artificial satellites.

**Q.6. What is an image?**

**Ans.** An image is a picture created by a camera on a photographic film called photograph or by remote sensing detector and displayed on a screen or on a paper.

**Q.7. What is a digital number? (DN)**

**Ans.** The sensitive instruments that records the reflected rays in the form of numbers which are called as digital number.

**Q.8. What do you mean by GIS?**

**Ans.** GIS stands for geographic information system. It is an approach store that integrates and analyzed information that has a practical value in many fields concerned with decision – making.

**Q.9. What is black and white photography?**

**Ans.** Cameras that take photo or pictures in black and white colour by using suitable films constitute black and white photography.

**Q.10. What is multispectral photography?**

**Ans.** When data in different sub region of a band is obtained separately for a comparative study, and more useful information can be extracted that can obtained from a single photograph covering the entire band.

**Q.11. What is multispectral photography?**

**Ans.** When data in different sub region of a band is obtained separately for a comparative study, and more useful information can be extracted that can obtained from a single photograph covering the entire band. This is called as multispectral photography.

**Q.12. Where do CFC molecules dissociate?**

**Ans.** Stratosphere.

**Q.13. Why are the CFCs called as the “Miracle Compound”?**

**Ans.** CFCs is called as miracle compound because of their chemical stability and inertness that has made so many daily conveniences a reality.

**Q.14. Which layer of the stratosphere shields the Earth's surface from U-V rays?**

**Ans.** Ozone layer.

**Q.15. When was the Montreal protocol signed and why?**

**Ans.** September 1987 to protect ozone layer.



**Q.16. Which waves disassociate CFC molecules?**

**Ans.** Short waves of UV light in the stratosphere would disassociate CFC.

**Q.17. What are the two most current, major international issues in economic development?**

**Ans.** Global warming and ozone layer depletion.

**Q.18. What does scale effect depicts?**

**Ans.** Scale effect depicts and inverse relationship between economic output and environmental quality.

**Q.19. What is the significance of ISO 14000?**

**Ans.** ISO 14000 has a great role in environmental management.

**Q.20. Who has coined the term sustainable development?**

**Ans.** WCED.

**Q.21. When and by whom promimal and distal remote sensing began?**

**Ans.** Promimal remote sensing began in 1938 by Dagurre and Neipce and distal remote sensing in 1960 as balloonists by Honore Fahrenheit.

**Q.22. What is the temperature of the sun in degree Celsius?**

**Ans.** 13871.111 degree Celsius.

**Q.23. Which is the world's first operational remote sensing satellite? When was it launched?**

**Ans.** World's first operational remote sensing satellite is ERTS. It was launched in 1972.

**Q.24. What are the different plate forms on which sensors are mounted to take a photograph?**

**Ans.** Ground borne, air borne and space borne.

**Q.25. Which is the cleanest fossil fuel?**

**Ans.** Natural gas.

**Q.26. What is the mandatory minimum stack height according to EPA, 1986?**

**Ans.** Thirty (30) metre.



**Q.27. What is the principal of electrostatic precipitator?**

**Ans.** Electrostatic attraction

**Q.28. Which factor determines the efficiency of venture scrubber?**

**Ans.** Relative velocity between the droplets and the particulates determine the efficiency of venture scrubber.

**Q.29. What is the principle behind cyclones?**

**Ans.** The principle behind cyclones is centrifugal force.

**Q.30. Which are the factors considered while selecting the air pollution control device?**

**Ans.** Factors like particulate characteristics (shape, density, size, reactivity etc.) air-stream characteristics (pressure, temperature viscosity) are considered while selecting the air pollution control devices.

**Q.31. Which is the most suitable adsorbent for recovering organic solvent vapours?**

**Ans.** Activated carbon.

**Q.32. Which technique is used for controlling gaseous air pollution in petroleum refineries?**

**Ans.** Condensation.

**Q.33. How can we reduce CO and hydrocarbons?**

**Ans.** Combustion technique.

**Q.34. Which act has been enacted for regulating air pollution in India?**

**Ans.** Air (prevention and control of pollution) act 1981 and environment protection act (EPA) 1986.

**Q.35. Who prescribes the standard for different pollutants industries that contribute to air pollution?**

**Ans.** Any undesirable change in the physical chemical and biological composition of air is called air pollution.

**Q.36. What is air pollutant?**

**Ans.** Any substance that cause air pollution is called air pollutant e.g. CO<sub>2</sub> , CO, NO<sub>2</sub> etc.

**Q.37. What is ozone layer?**

**Ans.** Ozone layer is a layer present in the stratosphere of the atmosphere lies between 15 – 16 kms above the earth's surface made up of ozone gas. It protects us from harmful U.V. rays. The substances that deplete the ozone layer are called ozone depleting substance e.g.,  $\text{CFCl}_3$ ,  $\text{CO}_2$ ,  $\text{CH}_4$ , oxides of nitrogen etc.

**Q.38. What is ozone hole?**

**Ans.** There are some reactive atoms like chlorine and bromine which destroy ozone molecule and results in thinning of ozone layer which is called as ozone hole first discovered in Antarctica.

**Q.39. What is remote sensing?**

**Ans.** Remote sensing is the science and technique of acquiring information about an object without being any physical contact with the object under study.

**Q.40. What is particulate matter?**

**Ans.** Any solid or liquid droplets that are suspended in a gaseous medium is called particulate matter e.g., dust, ash, soot, pollen grains etc.

**Q.41. What is a sensor?**

**Ans.** The various devices used in remote sensing are called sensors.

**Q.42. What are critical loads?**

**Ans.** Critical loads can be defined as estimates of the exposure to one or more pollutants above which bad effects on plants, animals and eco system may be experience.