

27/10

Question #1:

(A) Explain GHE in the context of Global Warming.

I. What is GHE:

The GHE stands for Green House Effect. It is a natural process that helps maintain Earth's temperature by trapping heat in the atmosphere.

II. Green House Effect (GHE) in the context of Global Warming:

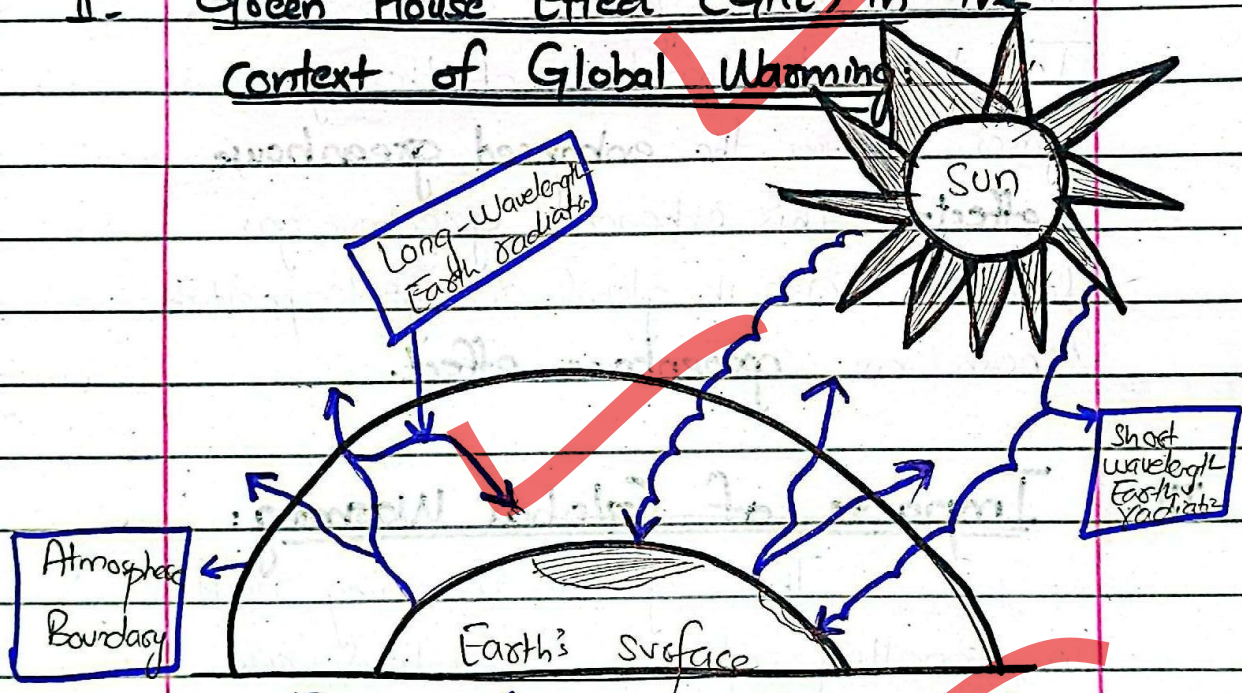


Figure: Global Warming phenomena

Solar radiations from the sun reaches the earth; part of it is reflected back into

the space, while the rest is absorbed by the earth's surface. This absorbed energy is re-emitted as infrared (long-wave) radiations. Greenhouse gases such as Carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and water vapour absorb this outgoing heat. These gases re-radiate heat back towards the earth's surface, warming the lower temperature of atmosphere. Also, human activities like burning fossil fuels, deforestation, industrialization, and agriculture increase greenhouse gas concentration. The increased concentration of these greenhouse gases cause the enhanced greenhouse effect. This enhanced greenhouse gas leads to rise in global average temperature known as greenhouse effect.

III. Impacts of Global Warming:

The global warming results in melting glaciers, sea-level rise, heat waves, altered rainfall patterns and extreme weather events. Thus, while the GHE is essential for life on earth, its human-induced intensification is the

main reason of today's global warming?

(B) What are vitamins. Give its types, functions, sources and deficiency disorders.

I. What are Vitamins:

Vitamins are organic micro-nutrients required in small amounts for the normal growth, metabolism, immunity, and overall maintenance of the body. They do not provide energy but act as regulators of biochemical reactions.

II. Types of Vitamins:

Vitamins are mainly of two types:

Vitamins' Types

1. Fat-soluble Vitamins

① They dissolve in fat and are stored in liver and fatty tissue.

- Vitamin A
- Vitamin D
- Vitamin E
- Vitamin K

2. Water-soluble Vitamins

→ Vitamin B-complex
→ Vitamin C
② They dissolve in water and are not stored in large amounts; excess is excreted in urine.

III. Functions, Sources and Deficiency

Disorders of Vitamins:

The following table presents the functions, sources and deficiency disorders of both types of vitamins-

Sr.#	Vitamin	Functions	Sources	Deficiency
1.	Vitamin A (Retinol)	Vision Healthy skin Immunity	Carrots Spinach Milk Egg yolk	Night blindness
2.	Vitamin B₁ (Thiamine)	Carbohydrate metabolism Nerve function	Whole grains Legumes Nuts, peas	Beri beri
3.	Vitamin B₂ (Riboflavin)	Energy production Healthy skin and eyes	Milk Eggs Green leafy	Glossitis
4.	Vitamin B₃ (Niacin)	Energy metabolism Nervous system function	Meat Fish Peanuts Whole grains	Pellagra
5.	Vitamin B₁₂ (Cobalamin)	Red blood cell formation Nerve function	Meat Eggs Milk	Pernicious Anemia
6.	Vitamin C (Ascorbic Acid)	Collagen formation Wound healing Immunity	Citrus fruits Tomatoes Guava Green vegetables	Scurvy
7.	Vitamin D (Calciferol)	Calcium and phosphorus absorption Bone health	Sunlight Fish liver oil Egg yolk	Rickets

8.	Vitamin E (Tocopherol)	Antioxidants Protects cell membrane	Vegetable oil, Nuts Seeds	Muscle weakness Infertility
9.	Vitamin K	Blood Clotting	Green leafy vegetables Cabbage Liver	Excessive bleeding

IV. Conclusion:

Vitamins are essential for maintaining good health and preventing disease. A balanced diet ensures adequate intake of all essential vitamins.

(c) Define optic fibre and describe its importance.

I. What is Optic Fibre:

Optical Fibre is a thin, flexible strand of glass or plastic that transmits information in the form of light signals from one point to another. It works on the principle of total internal reflection, in which light continuously reflects within the fibre core, allowing signals to travel long distances with minimal loss.

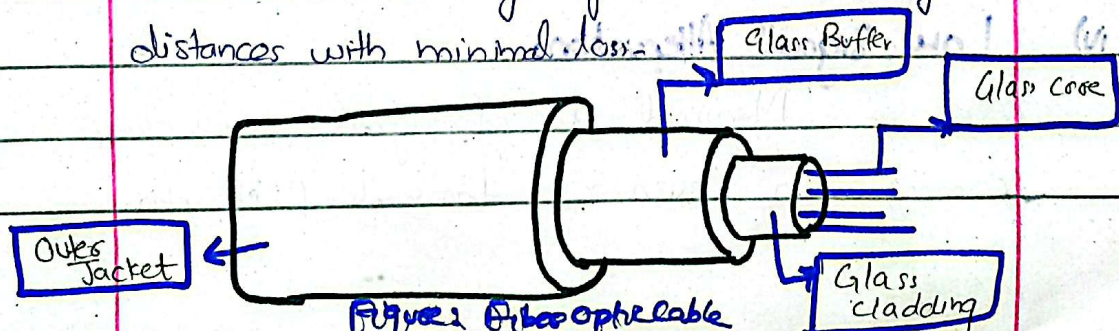


Figure 1: Optical fibre cable

II- Importance of Optical Fiber:

Optical fiber has a major role in modern communication and technology due to their ^{high} efficiency, durability and cheaper cost.

i) Large Bandwidth Capacity:

Optical fiber has large bandwidth capacity which helps in carrying a vast amount of data simultaneously.

ii) High-Speed Data Transmission:

Optical fibres can transmit data at a very high speed, making them useful for internet, telephone and cable TV services.

iii) Long Distance Communication:

Optical fibre allow transmission over long distance with very low signal loss compared to copper wires.

iv) Low Signal Attenuation:

Minimal loss of signal ensures clear communication even over thousands of kilometers.

v) Lightweight and Secure:

Optical fibre are thinner, lighter, and more secure, making data interception difficult.

II- Conclusion:

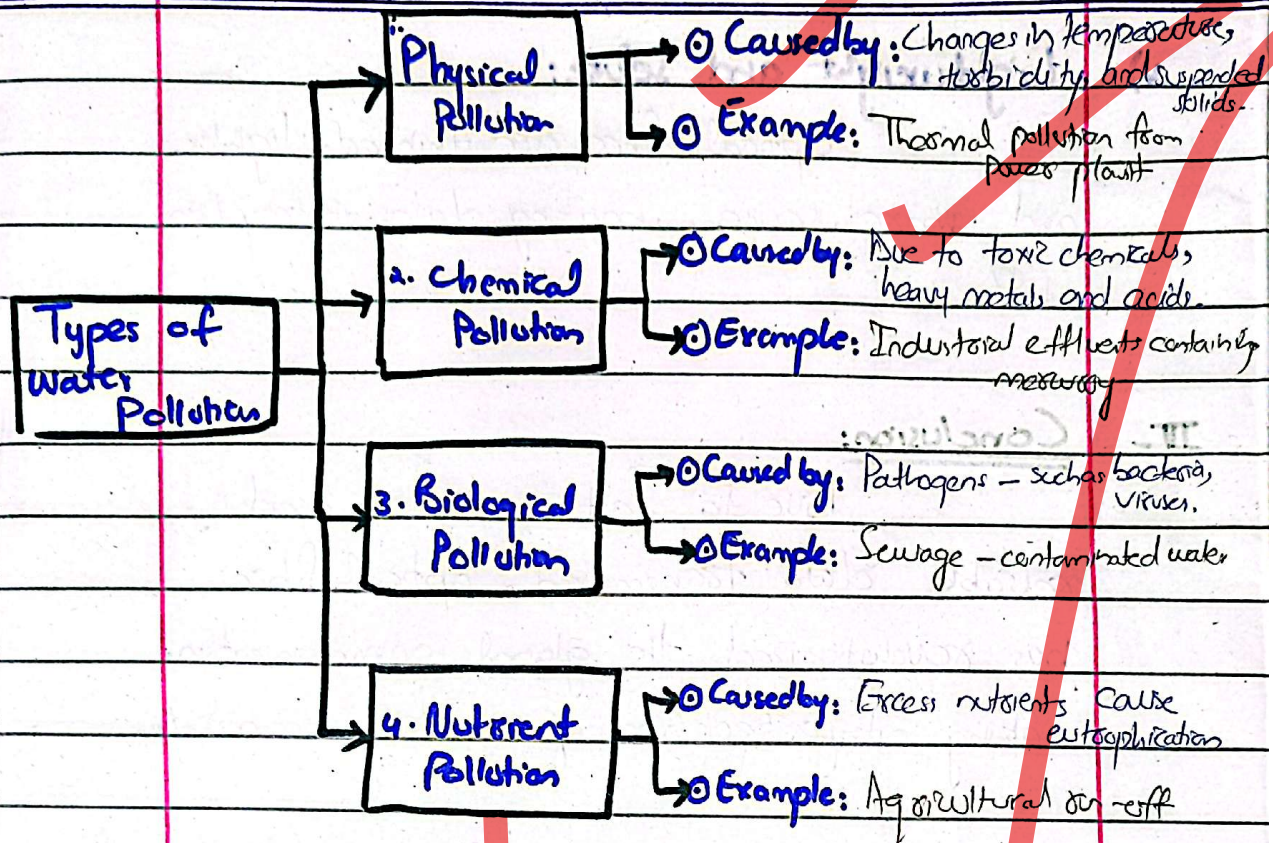
Due to fast, secure, and reliable data transmission, optical fibre has revolutionized the global communication, making it a backbone of modern communication.

(d) Define water pollution- Give its types, sources and controlling measures.

I- What is Water Pollution:

Water pollution is the contamination of water bodies - such as rivers, lakes and oceans - by physical, chemical, or biological substances that degrade water quality and make it harmful for human use, aquatic life and the environment.

II- Types of Water Pollution:



III. Sources of Water Pollution:

The sources of water pollution are:

- Domestic Sewage:** Untreated household waste water containing organic matter and pathogens.
- Solid Waste Dumping:** Plastics and garbage disposed into rivers and lakes.
- Thermal Discharge:** Hot water released from power plants.

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IV. Controlling Measures of Water Pollution:

Following controlling measures need to be adopted to control water pollution-

- i) **Proper Solid Waste Management:** Prevent dumping of waste into water bodies.
- ii) **Eco-friendly Agriculture Practice:** Reduce excessive use of fertilizers and pesticides and promote organic farming.
- iii) **Treatment of Sewage and Industrial Effluents:** Install and operate waste water treatment plants before discharge.

V. Conclusion:

Water pollution threatens all species of life, whether they are human, aquatic animals or other. Therefore effective control requires strong governance, scientific treatment methods and public participation.

Question #2:

(A) Define the following.

I. Food Preservative:

Food preservatives are the substances added to the food to prevent spoilage caused by micro-organisms, oxidation, or chemical reactions thereby extending shelf life and maintaining food quality.

II. Food Additives:

Food additives are the substances that are intentionally added to food to improve taste, color, texture, flavor or appearance and to enhance stability during processing and storage.

III. Food Adulteration:

Food adulteration is the deliberate addition or substitution of inferior, harmful, or unnecessary substance in food, or the removal of valuable components, which reduce food quality and safety.

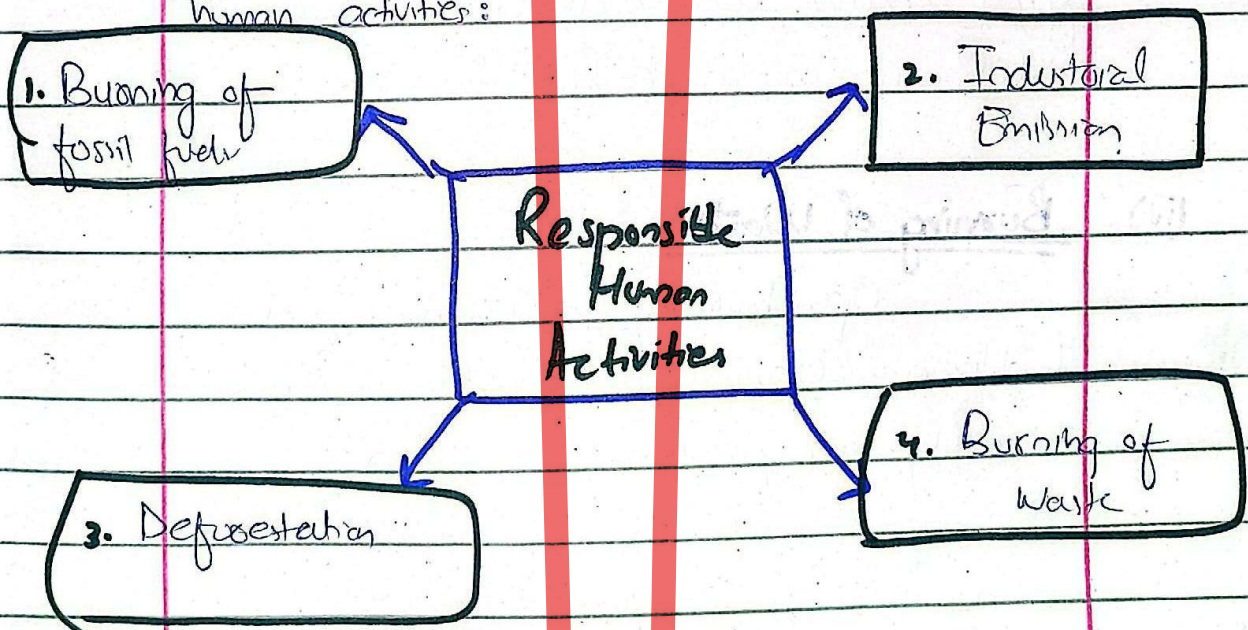
IV. Food Contamination

Food contamination refers to the unintentional presence of harmful substances such as micro-organisms, chemicals or foreign materials, in food to make it unsafe for the consumption.

(13) How human activities deteriorated the atmospheric conditions and propose controlling measures.

I. Deterioration of Atmospheric Conditions due to Human Activities:

Deterioration of atmosphere conditions is mainly caused by the following human activities:



(i) Burning of Fossil Fuel:

Extensive use of coal, oil, and gas in power plants, industries and vehicles release large amount of CO_2 , SO_2 and NO_x leading to air pollution and global warming.

(ii) Industrial Emission:

Factories emit toxic gases, particular matter and chemicals which degrade air quality and contribute to acid rain.

(iii) Deforestation:

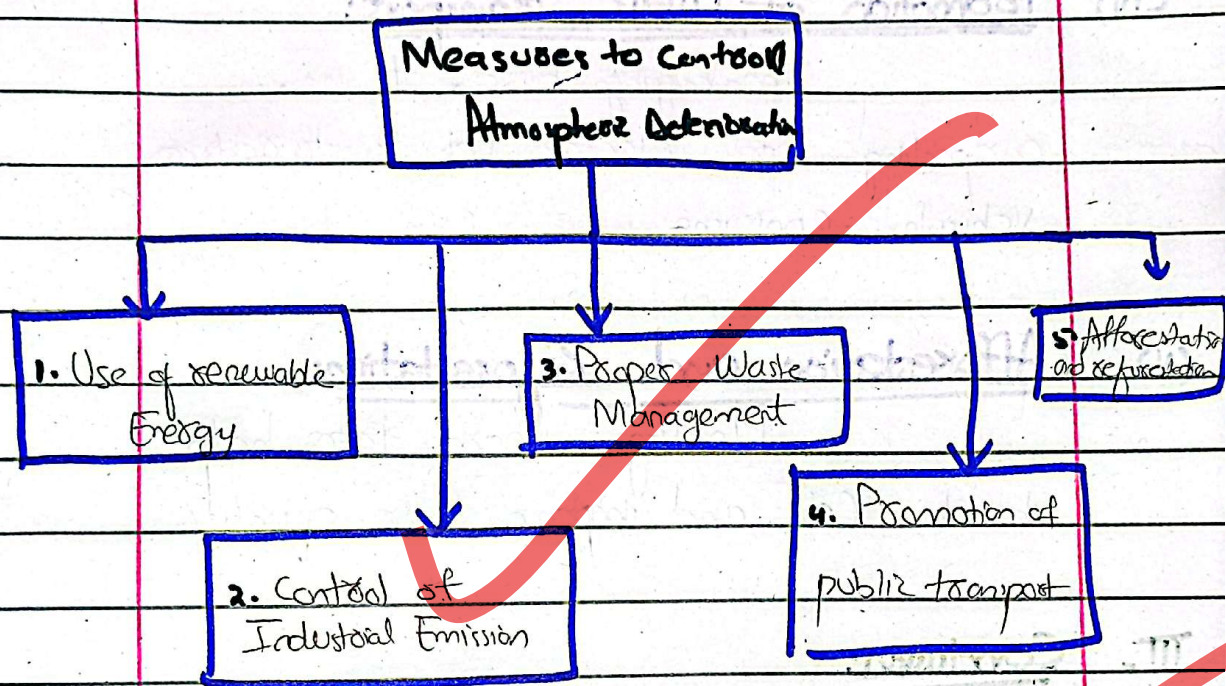
Larger scale of cutting of forests reduce CO_2 and ultimately cause disturbance in the carbon balance.

(iv) Burning of Waste:

Open burning of chemical and fertilizers release methane (CH_4) and N_2O causing air pollution.

II- Proposed Controlling Measures For Atmospheric Deterioration:

Following are the proposed controlling measures for atmospheric deterioration:



(i) Use of renewable energy:

By shifting from fossil fuels to solar, wind and hydropower greenhouse gas emission will be reduced.

(ii) Control of Industrial Emission:

Installation of filters, scrubbers, and emission control technologies in industries.

(iii) Proper Waste Management:

Recycling and scientific disposal of waste instead of open burning-

(iv) Promotion of Public Transport:

Encouraging buses, trains, carpooling, and electric vehicles to reduce vehicular emissions

(v) Afforestation and Reforestation:

Planting more trees help absorb CO_2 and improve air quality-

III. Conclusion:

Human activities have significantly deteriorated atmospheric conditions, leading to air pollution and climate change.

However, sustainable practices, clean energy use, and strong environmental policies can effectively control and improve atmospheric quality-

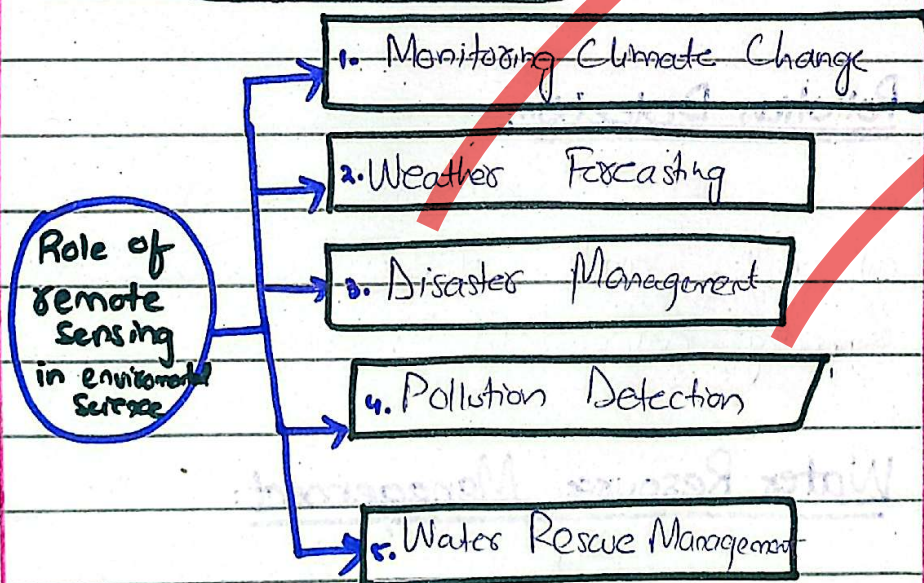
(c) Define Remote Sensing. How

Remote Sensing Can help in environmental science?

I. What is Remote Sensing:

Remote sensing is the science and technology of collecting information about earth's surface and atmosphere without direct physical contact, by using sensor mounted on satellites, aircraft or drones. These sensors detect and record or emit electromagnetic radiation from objects, which is analyzed to identify and monitor various features and processes.

II. How Remote Sensing helps in Environmental Science:



(i) Monitoring Climate Change:

It helps track changes in global temperature, greenhouse gas concentration, ice melt and sea level rise.

(ii) Weather Forecasting:

It provides real time data on clouds, storms, rainfalls, and cyclones, improving weather prediction.

(iii) Disaster Management:

It is used to monitor and assess floods, earthquakes, landslides, droughts and volcanic eruptions for early warning and damage assessment.

(iv) Pollution Detection:

It detects air pollution, oil spills, and water contamination supporting environmental regulation.

(v) Water Resource Management:

It helps in monitoring

water quality, surface water distribution, ground water potential and glacier dynamics.

III. Conclusion:

Remote sensing plays a crucial role in environmental science by enabling large scale, continuous and accurate monitoring of natural resource and environmental change. Thus, it will support sustainable environmental management and policy making.

(A) Explain the working of RADAR.

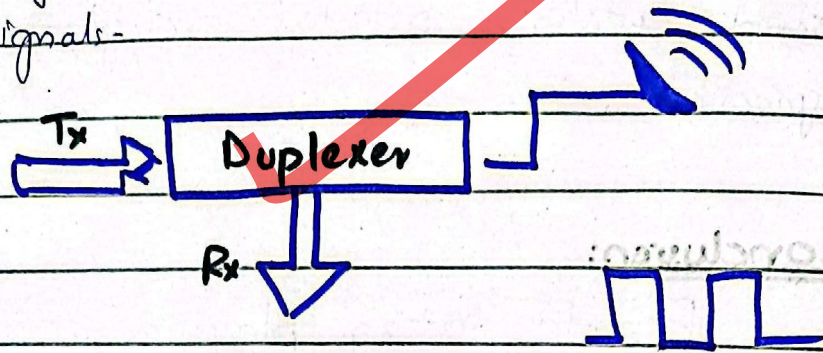
I. What is RADAR:

RADAR stands for Radio Detection and Ranging. It is a system used to detect the presence, position, distance, speed and direction of objects by using radio waves.

II. How RADAR Actually Works:

RADAR works on the principle of reflection of radio waves and the time

delay between transmitted and received signals-



III- Working Mechanism of RADAR:

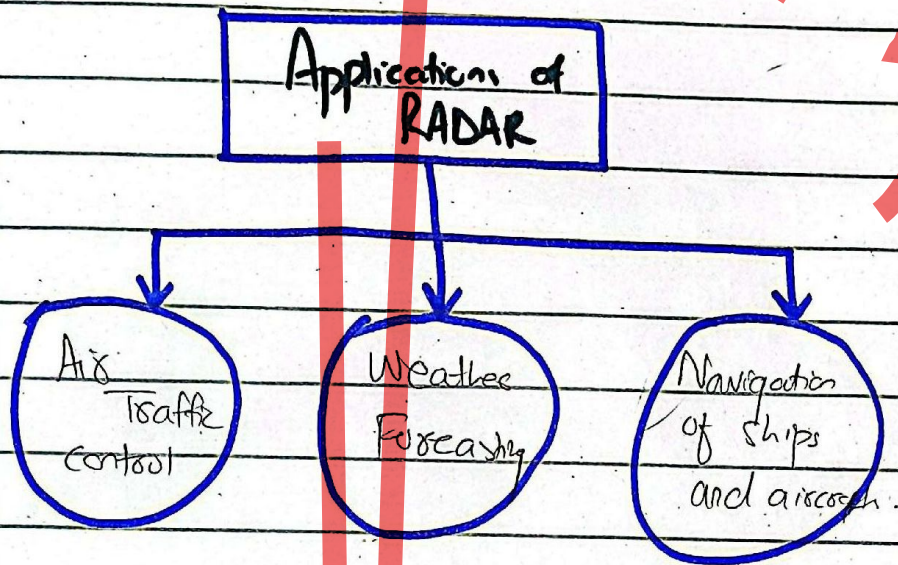
A radar transmitter generate short pulse of high frequency radio waves. They are emitted into the space via transmitting antenna. When the radio waves strike an object, they are reflected back as echoes. The reflected signals are received by a receiving antenna. A receiver and processor measures the time interval between transmission and reception of the signal. The distance of object is calculated using formula-

$$\text{Distance} = \text{Speed of radiowaves} \times \text{Time delay}$$

→ The direction of object is determined from the orientation of antenna-

→ The speed of object can be measured by Doppler effect, which analyzes change in signal's frequency.

IV. Applications of RADAR:



V. Conclusion:

RADAR is an essential technology that uses radio-waves to accurately detect and track objects over long distances. So, they play a vital role in navigation, defense, and meteorology.