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Test : QSA

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Q2

Define

Food Preservatives :

Substance added to food to prevent Spoilage caused by microorganisms or chemical reactions. This increases shelf life.

Examples of Food Preservatives :

Salt, vinegar, Sodium Benzoate.

Methods



## 2. Food Additives:

Chemical Substances added to improve taste, color, texture, flavor, appearance

Examples:

1. coloring Agents : Synthetic dyes, Food colors
2. Flavoring Agents : Improve taste e.g. vanilla
3. Stabilizers : Maintain texture e.g. gelatin, Pectin
4. Nutritional Additives : Vitamins and minerals

## 3 Food Adulteration :

Intentional mixing of cheap, harmful substances to increase quantity, decrease cost and maximize profit

It can

- Spoil quality
- change color
- influence taste
- change pH

#### 4. Food Contamination:

Accidental pollution of food by harmful microorganisms, chemicals or foreign substances.

Example: Pesticides on vegetables,  
Mould on bread.

#### b) Human activities deteriorating Atmospheric Conditions & Control measures

Human activities like use of non-renewable fuel sources, deforestation and industrial emission have deteriorated the conditions of Atmosphere.

Recent statistics of World Bank confirm  $\text{CO}_2$  pollutant concentration have reached 423 ppm.

This has led to rise in global temperature and

## Causes - by Human Activities

2 → Fossil fuel burning

$\uparrow$   $\text{CO}_2$ ,  $\text{SO}_2$ ,  $\text{NO}_2 \Rightarrow$  green house effect, Acid rain, Smog

→ Industrial Emissions

Toxic gases, rise of pollutants in environment.

→ Vehicle Exhaust

Carbon monoxide, hydrocarbons in environment.

→ Deforestation

Reduces oxygen source and concentrates  $\text{CO}_2$ .

→ Agriculture Practice

Methane from livestock, paddy rice, fertilizers.

## Controlling Measures

Controlling measures are dire demanded off contemporary situations. Rising global temperature, global warming, climate change are asking for stringent control measures.

## Controlling Measures

→ Renewable Energy

Solar, wind, hydro.

→ Afforestation / Reforestation

Green belts, tree plantation

→ Emission Control techniques

Scrubbers, filters in factories,  
alternative options

→ Waste management

CO<sub>2</sub> disposable system

→ Legislation

Penalties for violating air  
quality.

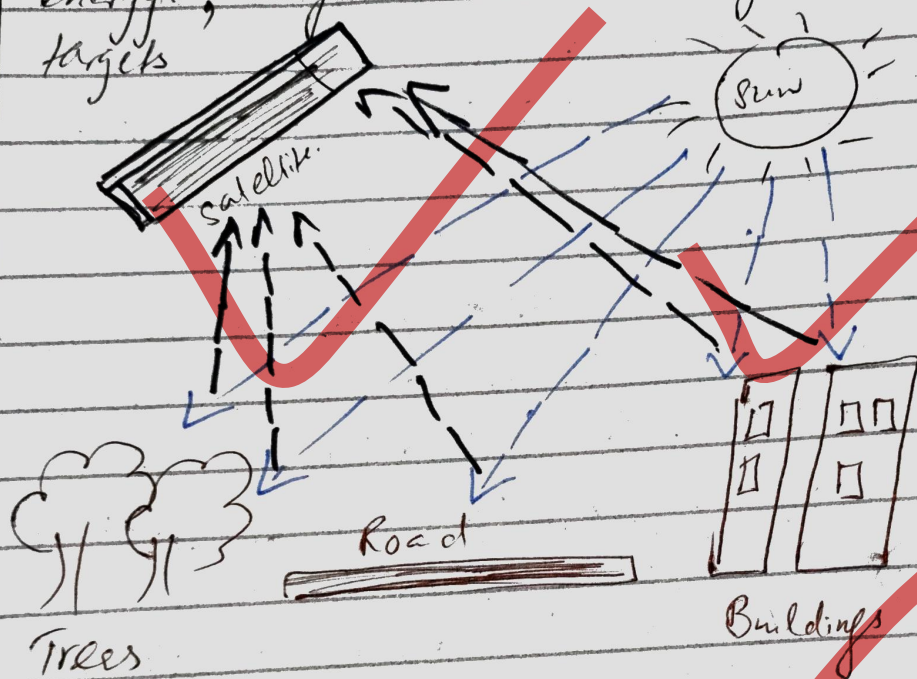
→ Global Commitments.

Align with COP Conference  
of Party agendas

## 3 Remote Sensing.

Collection of information  
about Earth's surface without direct  
contact, using satellites, drones or  
air craft.

Remote Sensing is science of gathering information about earth from distance. It works by detecting and measuring energy, reflected or emitted from targets.



Methods :

- Aerial Remote Sensing  
(Using drones & taking photographs)
- Satellite-Remote Sensing  
(Using sensors on satellite to collect data)
- Ground-Based Remote Sensing  
(Using radars or cameras on ground)

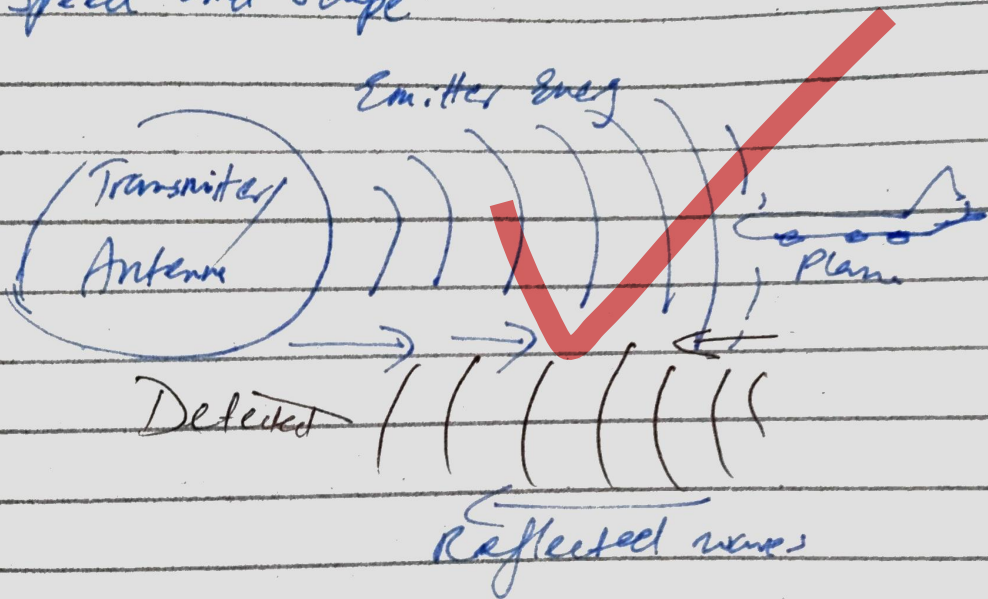
Optical Remote sensing use visible, near infrared and short-wave infrared sensors to form images by detecting solar radiation reflected from targets on ground.

Uses in Environment Science.

- Monitoring climate change & global warming
- Detecting deforestation & land-use changes
- Observing air & water pollution
- Disaster management (floods, earthquakes)
- Studying water pattern & soil moisture
- Ocean currents

## a) Working of Radar.

Radio Detection and Ranging detects object using Radio waves. Radar send out pulses of radio waves that bounce off objects, then measuring the time it takes for the echoes to return to a receiver, allowing it to calculate distances of objects, direction, speed and shape.



Working Steps

1- Transmission

Radar emits radio waves towards target

2- Reflection: Reflected waves hit the object and reflect back

3- Reception

Reflected Rays received by Radar Antenna

↳ Calculation Time delay between transmission & reception gives distance, speed and position.

Types of Radar

↳ Pulse Radar  $\Rightarrow$  Send short bursts of Radio waves

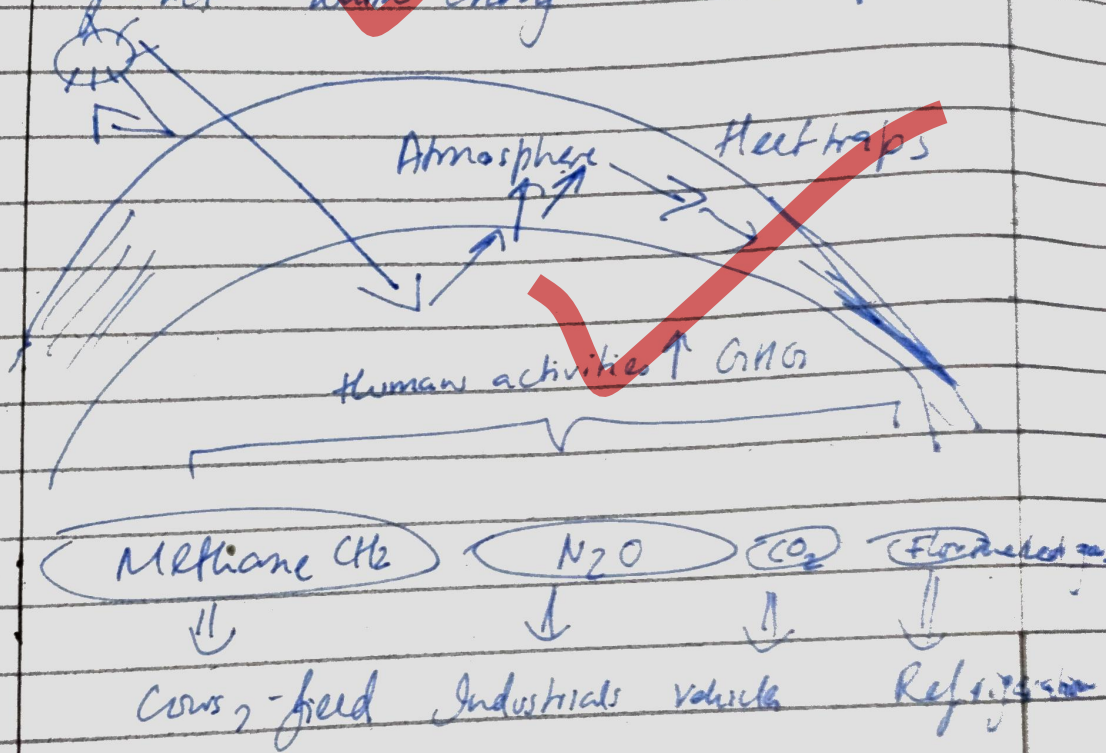
↳ Continuous wave radar  $\Rightarrow$  Emit continuous waves, measure doppler shift

↳ Doppler radar: Measure speed of moving objects

↳ Weather Radar  $\Rightarrow$  Monitor rainfall, storms, cloud movement.

# Q1: GHE

Green house Gas is the natural process by which certain gases in Earth's atmosphere trap heat from sun, keeping planet warm enough to sustain life



Solar Radiation reaches Earth

Earth absorbs Infrared heat

Green house gases ( $CO_2$ ,  $CH_4$ ) trap heat

Excess traps more heat  $\Rightarrow$  global warming

Extra production of greenhouse gases from fossil fuel (oil burning)

- Agriculture lands
- Animals
- Industrialization
- Transport/vehicles
- Refrigerators

Results in More heat trap

↓  
Increase global warming

- ← Glacier melt
- ↓ Floods
- ↓ Heat stroke
- ↓ Droughts
- water stress

Impacts of Global Warming and Climate change

## b) Vitamin

Vitamins are organic micronutrients required in small amounts for normal growth, metabolism and health. They cannot be synthesized in sufficient amount in body.

### Two Types

Fat Soluble



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

Water Soluble



- o Vitamin C
- o Vitamin B1
- o Vitamin B2
- o Vitamin B3
- o Vitamin B5
- o Vitamin B6
- o Vitamin B7
- o Vitamin B9
- o Vitamin B12

### 1) Vitamin A: (Retinol)

Type: It is fat soluble

Source: Liver, carrots

Function: Required for eye vision

Deficiency: Night Blindness

1. Vitamin E : Tocopherol  
Source : Nuts, fish oil, oil.  
Function : make collagen, skin cells.  
Deficiency : Aging, Hemolytic Anemia
3. Vitamin D : Calciferol  
Source : Sun, Codfish  
Function : Bone Mineralization  
Deficiency : Ricket, malacia.
4. Vitamin K (Mandione)  
Source : leafy vegetable, colon (gut)  
Function : make clotting factors.  
Deficiency : Bleeding unstopable.
5. Vitamin C (Ascorbic Acid)  
Source : Citrus, Guava  
Function : Immunity, Antioxidant  
Deficiency : Scurvy.
6. Vitamin B1 (Thiamine)  
Source : whole grains, legumes  
Function : Energy metabolism, Nerve cell  
Deficiency : Beri Beri

7. Vitamin B2 (Riboflavin)  
 Source : Meat, Milk  
 Function : Skin health  
 Deficiency : Skin lesion, cracked lips, cheilosis.

8. Vitamin B3 (Niacin)  
 Source : Fish, meat, nut  
 Function : Energy metabolism  
 Deficiency : Pellagra

9. Vitamin B5 : (Pantothenic acid)  
 Source : Meat, grains.  
 Function : Energy metabolism  
 Deficiency : Fatigue

10. Vitamin B6 (Pyridoxine)  
 Source : Meat, Banana, potatoe  
 Function : Neurotransmitters  
 Deficiency : Microcytic Anemia

11. Vitamin B7 : (Biotin)  
 Source : Egg yolk, dairy  
 Function : Hair & nail growth  
 Deficiency : Alopecia

12. Vitamin B9 (Folic Acid)  
Source : leafy vegetables.  
Function : RBC formation  
Deficiency : Pernicious Anemia, Megaloblastic Anemia

13. Vitamin B12 (Cobalamine)  
Source : Meat, eggs  
Function : RBC formation  
Deficiency : Pernicious Anemia

## Q. OPTIC Fibres.

Optic fibres are thin, flexible, transparent fibres made of glass or plastic that transmit light signal using principle of Total Internal Reflection.



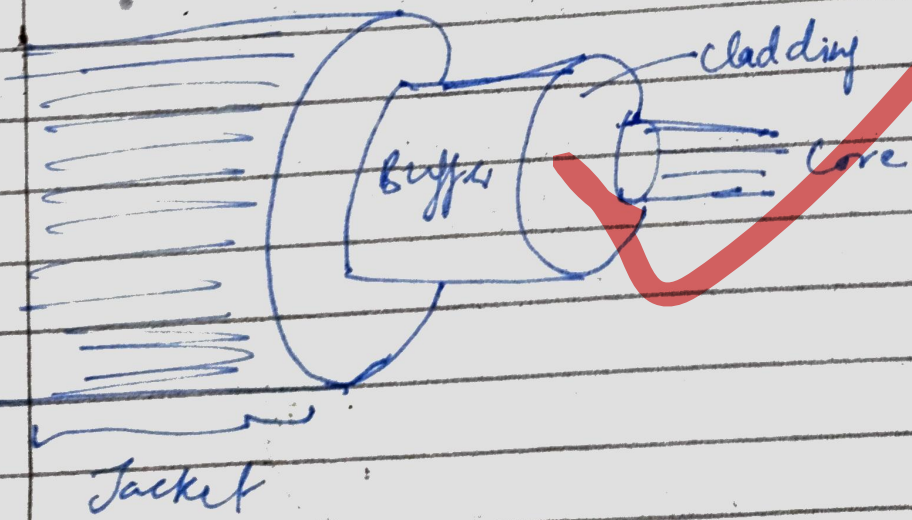
Light is reflected back into core, keeping it contained and guiding it along fiber.

## Components of Fibre Optic

- 1- Core : Central part carries light
- 2- Cladding : surrounds core reflection
- 3- Buffer coating : Protects cladding
- 4- Jacket : outermost protective layer

## Types:

- Single Mode : For long distances
- Multi mode for shorter distances
- Hollow core : Newer types where light travels via air with low latency.



- Working
- ① light conversion
  - ② Transmission

## Advantages:

- Low Signal Loss
- High Bandwidth
- High Speed

## Uses

- Telecommunication
- Medical Imaging
- Sensors
- Industrial use
- Military & Security use

## d) Water pollution

Introduction of harmful substance into water bodies, making it unsafe for humans, animals and aquatic life.

## Sources

- Industrial Effluents
- Agriculture Runoff
- Oil Spill
- Domestic Sewage & Garbage

## Types

Chemical Pollution: Heavy metals, pesticides, Acid rain into water

Biological Pollution

Bacteria, Algae blooms in water

Physical Pollution

(Plastic waste, oil spill in water)

## Controlling Measures

- 1- Waste-water Management: waste should not be discharged into rivers. Instead disposal system should be regulated.
- 2- Use of Ecofriendly fertilizers: Fertilizers which are natural should be encouraged and seepage should be controlled.
- 3- Public awareness and sanitation program

People should be aware of proper sanitation and consequences of polluting water

Legislation & Monitoring :

Laws should be formulated to prevent industrial discharge of toxic chemicals into water bodies.

Cleanup programs.

Removing plastics and physical substances with artificial intelligent robot. Should be initiated.

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