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Question no: 02

Part (a) :-

Greenhouse effect:

The Greenhouse effect occurs when greenhouse gases (GHGs) in the atmosphere trap infeared radiations coming from the Sun preventing it to escape into space. Resultantly, these high energy radiations become trapped in the lower atmosphere, causing an overall increase in temperature an effect known as Global Warming.

i) Greenhouse gases:

The gases of the atmosphere that trigger this effect are known as greehouse gases which include:

- methane - CH_4
- Carbon dioxide - CO_2
- Nitrous oxide - NO_2,
- Chlorofluorcarbons - CFCs

Among all these gases the contribution of CO_2 is considered to be highest in GHE.

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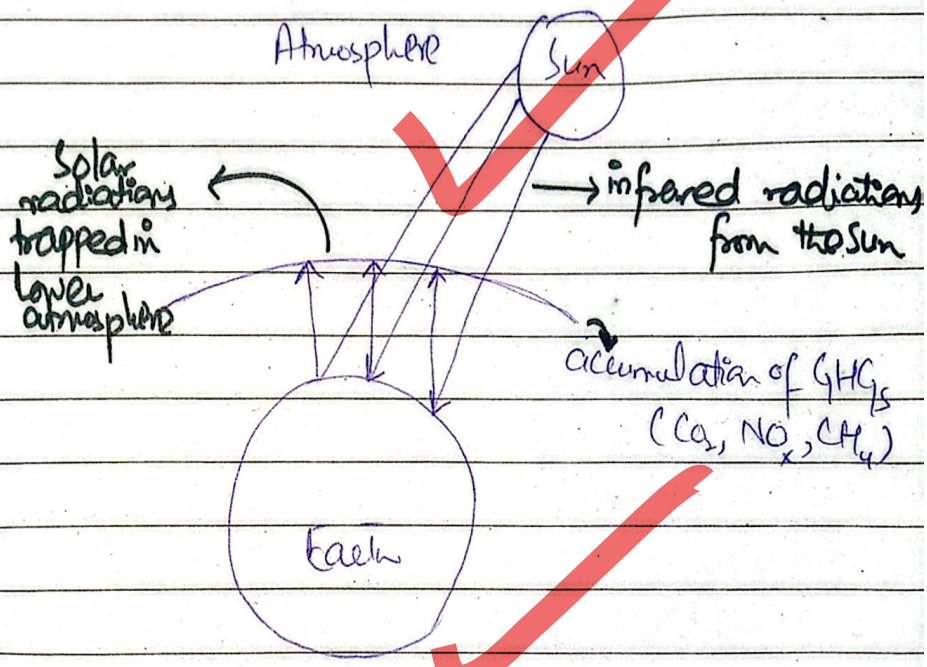
ii) Mechanism of GHE:

Since the Industrial revolution the anthropogenic activities have significantly increased the concentration of greenhouse gases in the atmosphere, thus creating a blanket of gases in the atmosphere that blocs the escape of infrared radiation coming from the sun.



As depicted in the above figure, Solar radiations trapped infared radiations. Greenhouse gases absorb and re-radiate this energy back towards the Earth, causing a significant rise of the lower atmosphere. This press of increase in temperature of atmosphere because of GHGs is termed as **global warming.**

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iii) Link between GHE and Global warming

Increase GHG concentration (CO_2, NO_x, CH_4) → More heat trapped

↓

Rise in global temperature

Thus, global warming is essentially the result of an intensified greenhouse effect.

iv) Consequences of GHE:

- Melting of glaciers and polar ice caps
- Rise in sea level
- More frequent heatwaves and
- extreme weather patterns

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Part (b):

Vitamins:

Vitamins are defined as:

Those organic micronutrients which are required in a very small amount in the human body, but are essential for normal growth, metabolism, immunity and overall functioning of body.

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1) Classification of Vitamins

On the basis of Solubility, Vitamins are classified into two major categories:

Vitamins

↓

on the basis of SOLUBILITY

Fat-Soluble	Water-Soluble
↳ Vitamins that are dissolved or soluble in fats,	↳ Vitamins that are soluble in water
↳ Excess intake may cause toxicity, as stored in liver and adipose tissues	↳ Excess intake is excreted in urine, as are water soluble and not stored in large amount
↳ Examples: Vitamin A, D, E, K	↳ Examples: Vitamin B (complex) and Vitamin C

2) Types of fat-soluble vitamins

a) Vitamin-A

- also called as **Retinol**
- **Function**: Plays a vital role in vision, healthy skin and immune system.

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Source: Carrot, Spinach, milk

Deficiency of Vitamin A causes night blindness.

(ii) Vitamin - D

- also called as Calciferol

Function: Vital for bones, teeth and Calcium absorption

Source: Present in fortified milk, fish oil

Deficiency symptoms include
- Rickets (in child)
- Osteomalacia (in adults)

(iii) Vitamin - E

- also called as tocopherol

Function:
- acts as an antioxidant, protect cells from forming radicals owing to sun exposure

Source:

Nuts, Seeds, Vegetable oils

Deficiency symptoms include:

Nerve damage, muscle weakness

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iv) Vitamin-K

Functions in blood clotting

Source: leafy green vegetables

Deficiency: Excessive bleeding, prevents blood clotting

2) WATER-SOLUBLE Vitamins

It includes Vitamin B-complex and Vitamin-C.

a) Vitamin-C

- also called as **Ascorbic acid**
- Functions in immunity, wound healing

Source - Citrus fruits, guava

Deficiency - Scurvy

b) Vitamin-B complex

A group of eight essential vitamins necessary for metabolism and nervous system function.

Part (c):

Optic fibres:

Optical fibres refers to a technology of transmitting data as light pulses along a glass or fibre.

Optic fibres works on the principle of **total internal reflection.**

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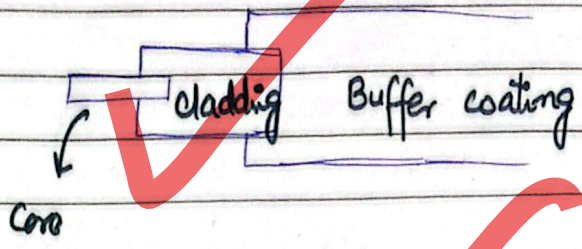
1. Structure of optic fibre:



a. Core:

Core is the central part through which light travels, made up of high purity glass or plastic

b. Cladding:

Cladding sorrounds the core and has a refractive index lower than core so that light travels inside the core

c. Buffer coating

an outer protective layer, made up of silicone and protects the delicate fibre from damage

2. Working principle:

When light enters the core (from low refractive index to high refractive index), its angle of incidence increases to a point that angle of refletion increases upto 90°, resultantly, light

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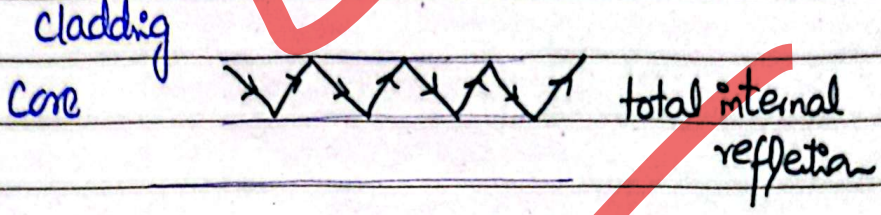
travels within the core without escaping this process is called as total internal reflection.



3. Importance of Optic fibres:

Optic fibres have revolutionized telecommunication due to following reasons;

a. low signal loss

Optic fibres carry signals with minimal dispersion or attenuation as in case of step-index optic fibres, hence used to transmit data for long distance.

b. High speed communication

Optic fibres transmit data at the speed of light, for this reason used in internet and broadband networks

c. Immunity to electromagnetic interference

Optic fibres are not affected by electric noises or lightning, hence no loss of data signals

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Part (d):

Water Pollution:

It is defined as;

Water pollution refers to the introduction of substances into water bodies that degrade water quality and reduce its suitability for agriculture, domestic, industrial and ecological purposes.

(FAO)

In other words,

it is the contamination of water bodies such as water lines, lakes, oceans, and groundwater by physical, chemical or biological substances that degrade water quality.

1. Types of water pollution:

Water pollution is of following types;

a. Physical pollution

In this there is a change in temperature, color and turbidity of water — due to presence of suspended particulate matter in it.

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b. Chemical pollution

The type in which there is a change in the chemical properties of water due to the presence of:

- toxins
- Harmful chemicals like lead, mercury, pesticides, detergents

c. Biological pollution

It occurs due to the contamination of micro-organisms and pathogens.

due to bacteria, viruses, parasites from sewage — biological pollution can occur.

d. Thermal pollution

It is due to discharge of hot water from industries or power plants, resultantly reduces dissolved oxygen in water.

2. Sources of water pollution:

- Untreated sewage and household wastewater
- Industrial effluents containing toxic chemicals, acids, dyes
- Runoff from agriculture, like fertilizers, pesticides, and animal waste

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- Dumping of plastics and garbage into water bodies

4. Controlling measures for water pollution:

a. Sustainable agriculture practices

Reduced use of chemicals, fertilizers, pesticides and shift to organic farming practices.

b. Solid waste management

Recycling and proper dumping of waste materials to landfill systems.

c. Sewage treatment

Proper disposal of domestic sewage and installation of wastewater treatment plants.

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Question no: 03

Balanced diet:

It is defined as;

The diet that provides all essential nutrients — carbohydrates, proteins, fats, vitamins, minerals, fibres and water in correct proportions to maintain

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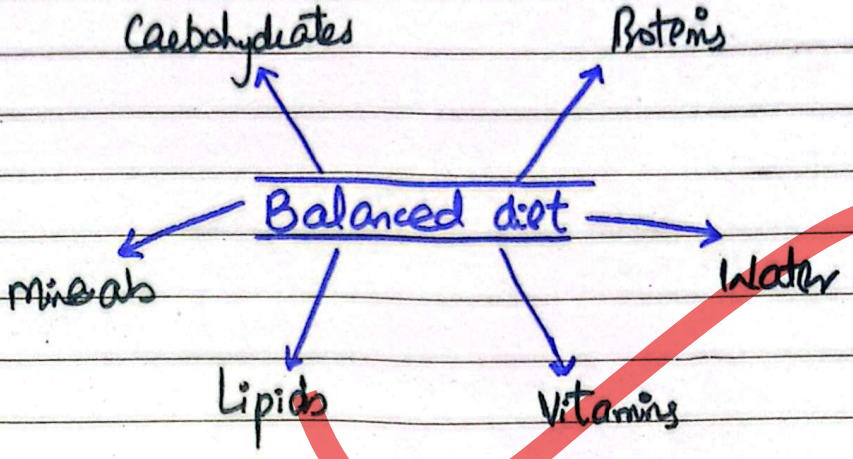
Health and well being is termed as a balanced diet!



1. Importance of balanced diet:

a. Ensures proper growth and development

A balanced diet supports physical growth, brain development and tissue repair, especially important for children and young adults.

b. Provides energy

Carbohydrates and fats supply energy required for daily activities, as fats contain 9 calories per gram of energy and carbohydrates contain 4 calories per gram of energy.

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c. Strengthen immune system

A balanced diet strengthen immune system as Vitamins (A, C, E) and minerals (Zn, Fe) enhance immunity and protect the body from infections.

d. Prevents nutritional deficiencies

Adequate intake of balanced diet prevents diseases such as anemia, rickets, scurvy, and night blindness.

e. Maintains healthy weight

Balanced intake of nutrients helps to prevent obesity and undernutrition.

3. Disorders due to Imbalanced diet:

An imbalanced diet may result from deficiency, excess or improper proportion of nutrition leading to various disorders.

a. Vitamin deficiency disorders

Vitamin A - deficiency causes night blindness

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Vitamin C → Scurvy
Vitamin D → Rickets (children)
Osteomalacia (adults)

b. Protein - deficiency disorders

Protein malnutrition results in muscular atrophy or waste weight loss.

Kwashiorkor → Edema muscle loss
Marasmus → Severe weight loss, weakness

c. Mineral deficiency disorder

	Iron	Iodine	Calcium
Function	Important for haemoglobin	better functioning of thyroid gland	Strong bones and teeth
Deficiency	Anaemia	Goitre	Osteoporosis

d. Disorders due to excess intake

Obesity → Due to excess intake of fats

Coronary diseases → Blockage of heart vessels due to deposition of fats

Diabetes mellitus → Excess sugar intake results in rise in blood sugar level

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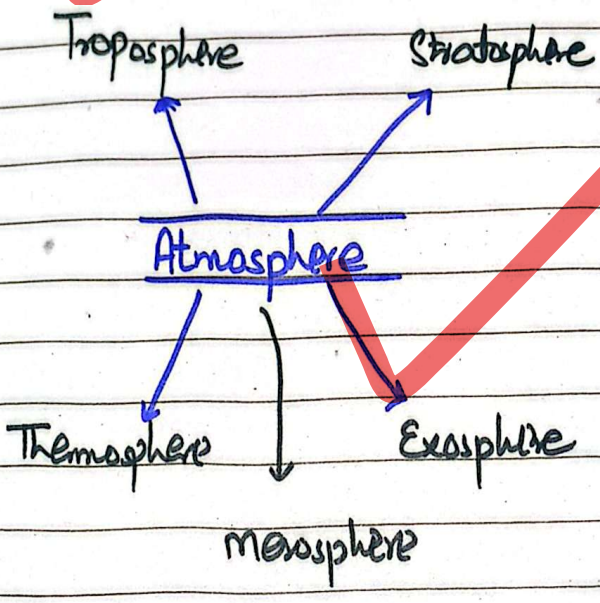
Part (c):

Strata of atmosphere:

Atmosphere:

The atmosphere is a thick envelope of gases surrounding the Earth, is divided into 5 main strata (layer) of atmosphere; based on temperature variation with height.



1. Troposphere

Troposphere is the lower layer of atmosphere that extends from 0km from the surface of Earth upto 18km at equator.

Contains about 75% of atmospheric mass, and its temperature decreases

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with increase in altitude.

functions to support life and enables water cycle.

2. Stratosphere :

It extends from 12km upto 50km. It is the layer that contains ozone layer that protect us from harmful ultraviolet radiations. Its temperature increases with increase in altitude.

3. Mesosphere :

It extends from 50km – 80km. One of the coldest layer of atmosphere as its temperature decreases sharply. It prevents the meteors from reaching the surface of the Earth.

4. Thermosphere

It extends from 80km – 500km. Its temperature is very high as it contains the ionosphere. This layer is responsible for radio communication and produce auroras.