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General Science and Ability

Part-II

Section-I

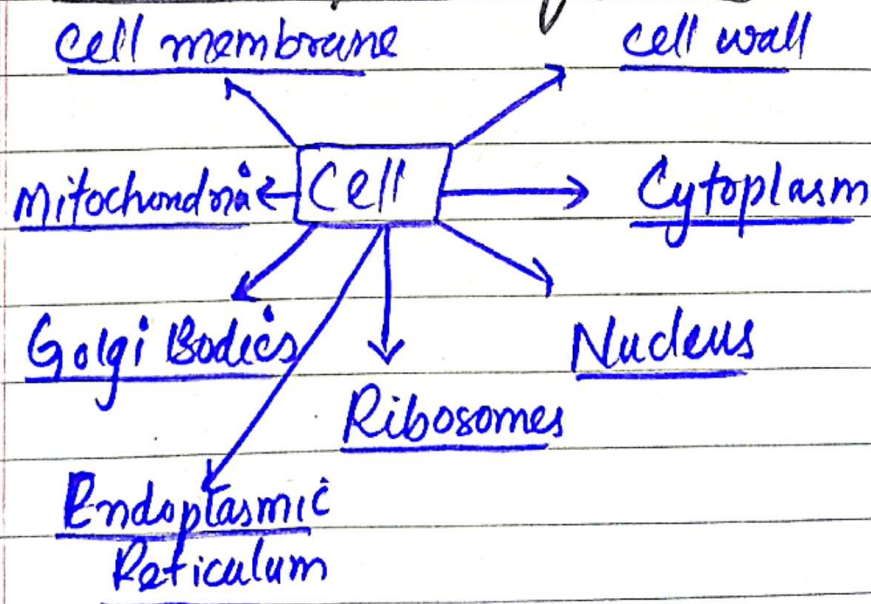
Question NO 02

part (a)

I. Cell : A Basic Unit of Living Body

Cell is the basic structural and functional unit of living organisms.

II. Main components of a cell:



1. Cell wall : A protective wall

Cell wall is the primary wall

in the plant cell. It is made up of protein, fats and carbohydrates. Its main function is to protect, transfer and allow material. It also gives shape to plant.

2. Cell membrane : A primary membrane in Animal cell

Cell membrane is the primary membrane in animal cells. It is also known as plasma membrane. It is made up of cellulose and phospholipid bilayer. Its main function is to protect, transfer and allowed material inside the cell.

3. Mitochondria : A Power house of the cell

Mitochondria is the power house of cell. It releases energy to the cell in the form of ATP. It is present in the liquid part of cell called cytoplasm.

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4. Cytoplasm: A liquid part of cell

Cytoplasm is the part start from cell membrane or cell wall to the nucleus. It comprises of liquid and other organelles. All the organelles reside in this part of the cell.

5. Nucleus: A central part of cell

Nucleus present in the centre of the cell. It is the main part of the cell. It comprises of DNA, chromosomes and rDNA. It is the most sensitive part due to having genetic material, therefore, bounded by double membrane.



III Difference between Prokaryotic and Eukaryotic cell:

<u>Prokaryotic cell</u>	<u>Eukaryotic cell</u>
(1) Nucleus is Absent	Nucleus is present
(2) Small in size	Large in size
(3) No membrane-bounded organelles	Membrane-bounded organelles
(4) Circular DNA, float freely	Linear DNA, hold with Nucleus
(5) Unicellular	Multi-cellular / Unicellular
(6) Bacteria, Amoeba	Animal, plants, Fungi cells

IV Cell response to External Stimuli:

Cell membrane is responsible for the external stimuli.

Receptors in cell membrane detect signals (light, chemicals etc)

Cells respond by activating signal transduction pathways, leading to changes in gene expression; enzyme activity

Example Nerve cells responding to stimuli by generating impulses

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Cell maintenance & Homeostasis:

Transport mechanisms such as diffusion, osmosis, active transport regulate internal environment

Feedback systems maintain balance of pH , temperature, water and nutrients

Example Human cell maintain pH 7.4 and $37^{\circ}C$ temperature.



Question 02 part (d)

I. Air Pollution:

Air pollution is also called as Atmospheric pollution. It refers to the degradation of environment by adding unwanted materials to it.

According to WHO:

"The atmospheric pollution is all about the situation in which

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outdoor atmosphere contains materials (pollutants) in such a concentration that it becomes harmful for human health, plant and animals and environment as a whole."

II Main Sources of Air Pollution:

Natural Sources

Human Sources

(i) Volcanic eruption

(ii) Dust storm

(iii) Forest Fires (wildfire)

(iv) Pollen and microbial spores

(i) Combustion of fossils

(ii) Transportation

(iii) Agriculture

(iv) Household

(v) Industry

(i) Natural Sources

① Volcanic Eruptions

Natural source of air pollution, increase concentration of harmful gases in atmosphere. such as Carbon dioxide and methane.

② Dust storms:

Extreme dust storms bring unnecessary materials and gases

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and rise the concentration of harmful gases and dust in the air, leads to Atmospheric pollution.

③ Wildfires:

Wildfire is a natural phenomenon, also rise the harmful gases due to combustion of wood, plants in forests. It directly rise CO_2 .

(ii) Human Sources

① Combustion of fossil fuels:

Human are excessively burns fossil fuel for energy production that leads to Air pollution due to carbon emission and other harmful gases in the Atmosphere.

② Transportation:

Transportation is also one of the main cause of air pollution. Engines produce CO_2 and add them

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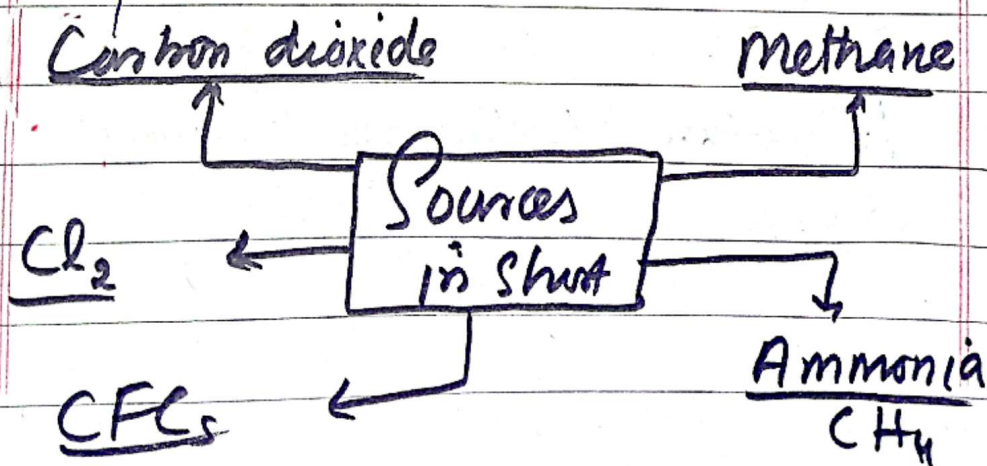
in the air, that also leads to atmospheric pollution.

③ Agriculture: Use of fertilizers

Agriculture is also the main culprit of air pollution. The excessive use of fertilizers that produce and release ammonia in the air, leads to Air pollution.

④ Household activities:

Wood stoves, use of chemical sprays, burning of wood, fire plastic for kitchen purpose increase the concentration of harmful gases i.e. CO_2 , ammonia, methane that leads to air pollution.



III Effects of air pollution:

Air pollution affects humans
Animals, plants, and environment

① Effects on Human beings

Humans are the residents
of the world inside the atmosphere.
Therefore, Air pollution affects
them directly.

① Air pollution directly affects
lungs, throat, respiratory system
and increase risk of diseases
linked to Respiratory system.
i.e. Asthma, Bronchitis.
Lung Cancer

② It also produces cardiovascular
problems in humans i.e.
hypertension and stroke etc

③ Premature deaths due to chronic
exposure to air pollution

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② Effects on Environment

Acid rain is the direct result of atmospheric pressure.

Ozone depletion cause due to harmful gases in the atmosphere.

Global warming risks increase because of combustion of fossil fuels.

Smog formation is a dangerous phenomenon cause due to air pollution.

Damage to crops and biodiversity lost due to acid rain that is directly cause by air pollution.

IV Air pollutants :

Air pollutants are harmful substances in the atmosphere. These pollutants originate from natural sources as well as from human activities.

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Air pollutants

Primary pollutant

These are the pollutants that emitted directly into the air from source

Example

CO_2 , CO

CO_x , SO_4

CFC_s , CH_4

Cl_2

Secondary Pollutants

They formed in the atmosphere by chemical reactions of primary pollutants

Examples

$\text{SO}_3 + \text{H}_2\text{O} = \text{H}_2\text{SO}_4$

$\text{NO}_2 + \text{H}_2\text{O} = \text{NH}_3$

$\text{O} + \text{O} + \text{O} = \text{O}_3$

IV Way forwards through which Air pollution can be reduced :

Individual
level actions

Collective
level
actions

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1. Individual level actions:

- ① Use public transport
- ② Cycling, walking prefer over cars
- ③ Planting trees, avoid cutting trees
- ④ Avoid burning of fossil fuels at home or woods at home.
- ⑤ Using clean cooking fuels instead of biomass or coal.

2. Collective level Actions:

- ① Strict enforcement of laws and fines
- ② Promoting renewable energy solar, wind, hydro instead of coal, fossil fuels.
- ③ Developing Green urban infrastructure
- ④ Waste management and Recycling process encourage
- ⑤ International cooperation on climate and air quality treaties must be implemented

Part-II Section I

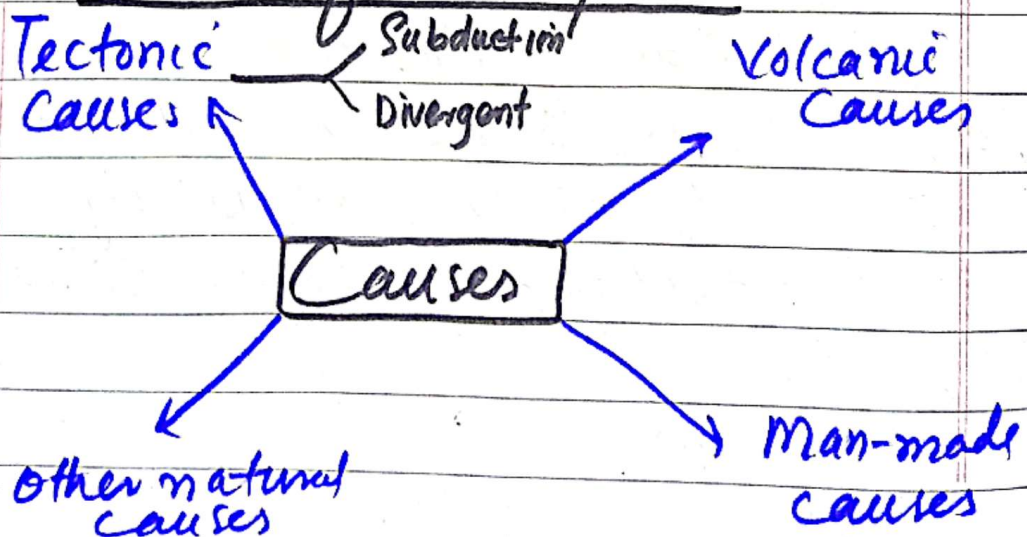
Question NO 04

Part (b)

I. Earthquake: A natural disaster

An earthquake is a natural disaster or a sudden shake of the Earth's surface caused by the release of energy stored in rocks due to tectonic forces.

II Causes of Earthquake:



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(1) Tectonic causes of Earthquakes:

Movement of lithospheric plates

(i) Subductive zones

This occurs where one tectonic plate is forced underneath another into the mantle. The immense pressure can cause powerful earthquake.

2011 tohoku earthquake in Japan is an example of subductive / convergent.

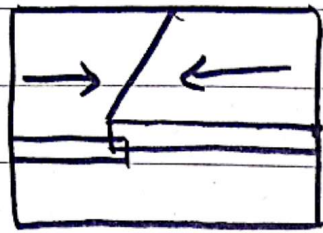
(ii) Divergent Boundaries

These occur where tectonic plates are moving apart magma rises to fill the gap and create fractures. as it pull apart, causing earthquake.

The mid atlantic Ridge is an example of divergent boundary.

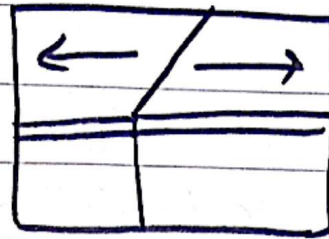
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Convergent
cause

Crashing

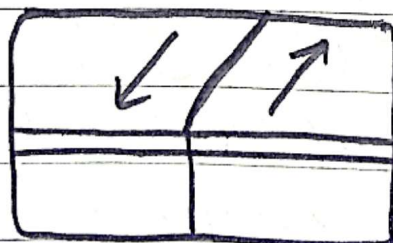


Divergent
cause

pulling apart

(iii) Convergent Boundaries:

When two plates come together, the point of colliding impact, colliding plates may bend down into a deep seafloor trench. Volcanoes often form parallel to convergent plate



Convergent cause

Sideswiping

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2. Volcanic causes:

Explosive volcanic eruption cause localized tremors.

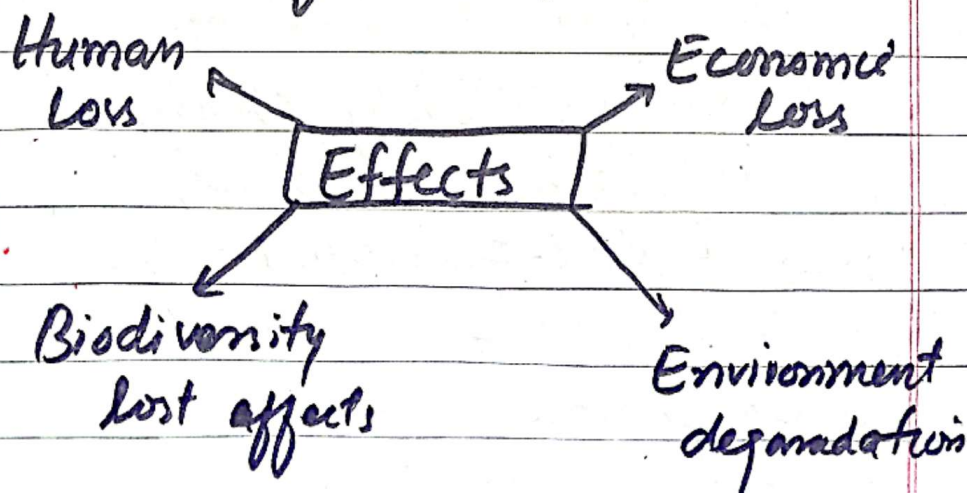
3. Man-made causes:

Reservoir-induced seismicity (large dams), mining, drilling nuclear explosions etc cause earthquake.

4. Other natural causes

Landslides or collapse of underground cave cause earthquake.

III Effects of Earthquake



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① Human loss due to Earthquake

Due to collapse of infrastructure i.e buildings, houses, school loss lives in majority cases. Because earthquake shake the surface of the Earth 2005 Baluchistan Earthquake lost 73000 people in a single day.

② Economy losses due to Earthquake

Destruction of building, houses, businesses and industries hit economy hard.

High cost of reconstruction needed after earthquake destruction

③ Environment degradation:

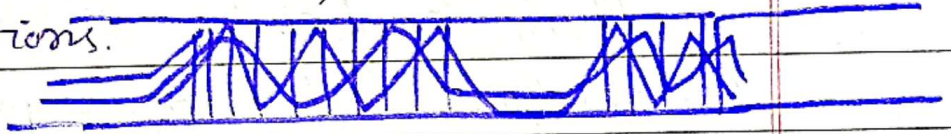
Biodiversity changes due to earthquake waves, migration, deforestation, fires volcanic eruption destruct lands. Environmental pollution rise due to destruction

IV Types of Seismic waves

- ① Primary waves (P-waves)
- ② Secondary waves (S-wave)
- ③ Surface waves (L-waves)

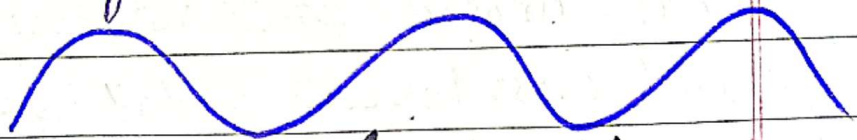
① Primary waves: (P-waves)

These are longitudinal or compression waves. They move fastest through solids and liquids. Arrive first at seismic stations.



② Secondary waves - (S-wave)

These are Transverse waves moves up and down and travel only through solids.



③ Surface waves (L-waves):

These waves travel along Earth's surface, cause maximum destruction on earth surface.

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Seismograph

moment
magnitude
scale
(MW)

Measurement of
Earthquake

Richter scale

Modified Mercalli
Scale (MMI)

VI

Earthquake-Resistant construction
and preparedness role in
reducing effects on Earth

Using earthquake resistant-
construction and highly preparedness
strategies can reduce the risk
and affect of earthquake.

For instance use of shock
absorbing material in building,
base isolation and reinforced concrete
and cross bracing in tall structure
can highly reduce the destruction
rate. Japan construct earthquake
resistant construction to reduce
risk and destruction

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Preparedness measures such as early warning system, public awareness campaigns and earthquake drills to prepare people to tackle the situation. Moreover, Emergency response teams and disaster management planning play pivotal role in reducing the risk of loss. In simple words preparedness and engineering measure are the key solution to reduce the risk of loss and destruction during earthquake.

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Section I

Part (d)

I. Water Pollution: Degradation of water

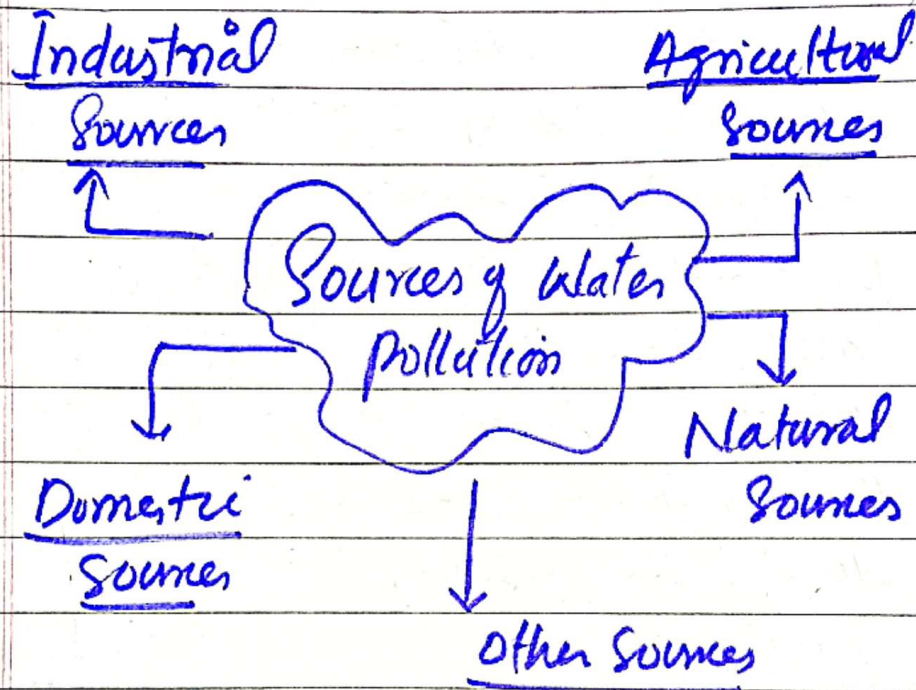
Water pollution is the contamination of water bodies, when pollutants are directly or indirectly discharged into water bodies without

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adequate treatment to
remove harmful compounds
known as water pollution

II. Main Sources of water Pollution:



① Industrial components added in water

Industries are used to
discharge chemicals, heavy metals
and toxic waste into water.

For example, dyeing, oil refineries,
microplastics etc

② Agricultural products:

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fertilizers and pesticides runoff in water. Besides, the waste of animals and sediments from soil erosion further pollute water.

③ Domestic role in polluting water:

Sewage, detergents, household wastes i.e plastic, non-biodegradable materials, fossils of cooked meals added in water.

④ Natural Sources:

Volcanic eruption, storms, floods and rains i.e acid rain pollute water and add harmful chemicals in it.

⑤ Other source i.e Ocean transportation

Ships in the oceans spill oil in water cause water pollution.

III Effects of water pollution on inhabitants, environments

(i) Effects on inhabitants:

Water pollution causes various disease in humans, and animal, i.e. Cholera, dysentery, typhoid, hepatitis and diarrhoea. As water is the main source of drinking, therefore polluted water produce water borne diseases in humans.

Toxic contaminants cause cancer, neurological problems and reproductive disorder.

(ii) Effects on environment

Aquatic animals, oceanic plants are disturbed due to water pollution because of their direct interaction. It leads to loss of biodiversity in rivers, lakes, and oceans.

IV Prevention and Control of water pollution: Strategies and Recommendation

Multiple strategies and recommendations are necessary to adopt for the prevention and control of water pollution.

- Avoiding excessive use of fertilizers and chemicals
- Industries installation must be far away from rivers, lake and oceans.
- Reducing plastic usage.
- Strict law must impose for the protection of water pollution
- Promoting organic farming and sustainable agriculture.

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