

Part - II

SECTION - I

Q.2. a) Differentiate between Star and a Planet. Briefly describes the life cycle of a star from a Nebula to a Black Hole.

Ans: Star:

- Star is a massive shining sphere of hot gas.

- A star shines by releasing light produced by nuclear fusion.

- Different heavenly objects revolve around star such as planet, dwarf planet, asteroid, etc.

- Stars revolve around the centre of their galaxy.

Planet:

Planet is a round body in space that orbits a star.

planets do not produce light.

Objects that revolve around planets are called satellites (moon)

Planets revolve around star.

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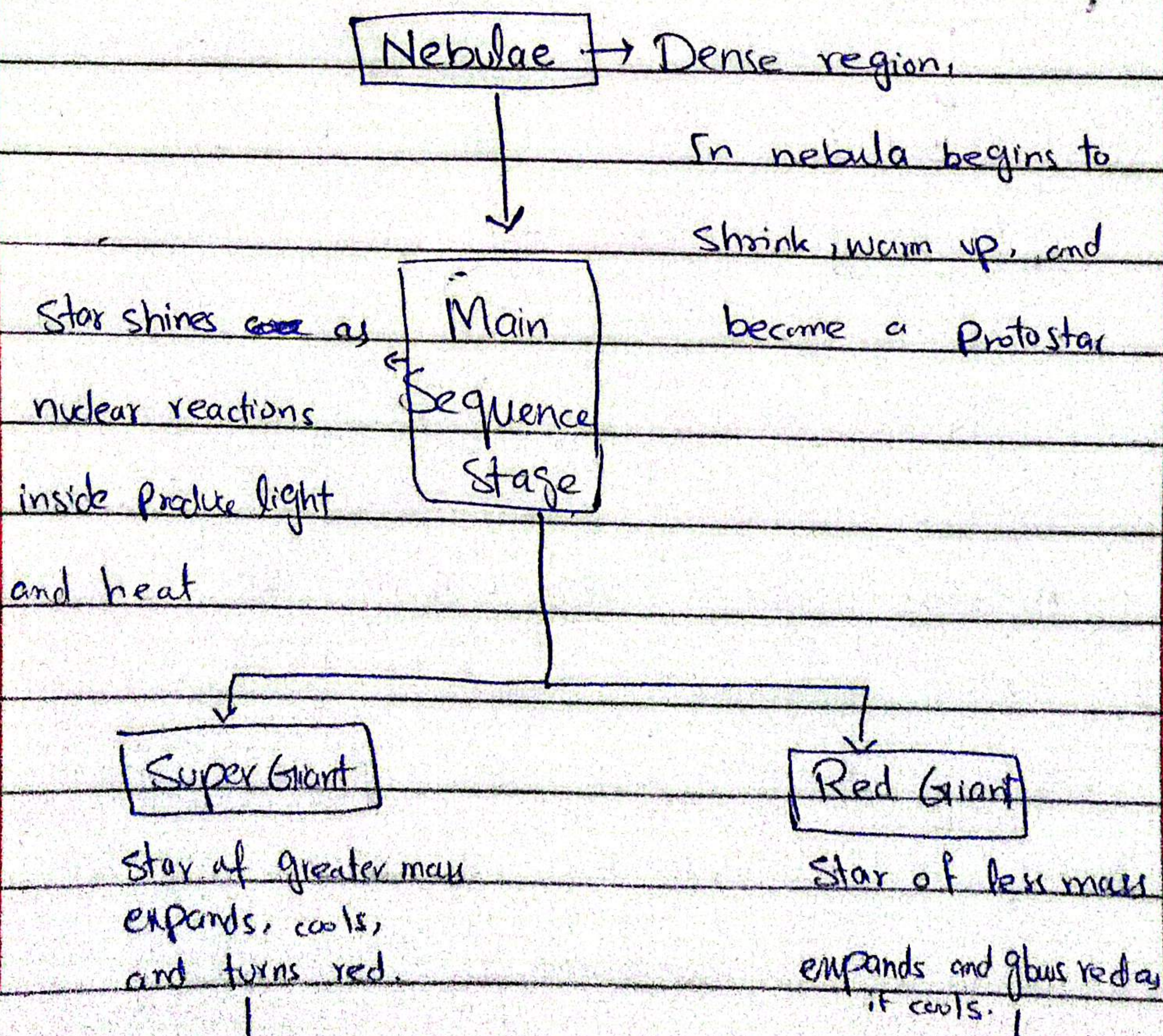
• Stars have very high temperature like sun has a surface temperature of 5500 to 6000°C.

Planets derive energy and heat from sun, therefore, the ones near to sun are hotter.

• Examples are Sun, Proxima Centauri, Antares and Pistol Star.

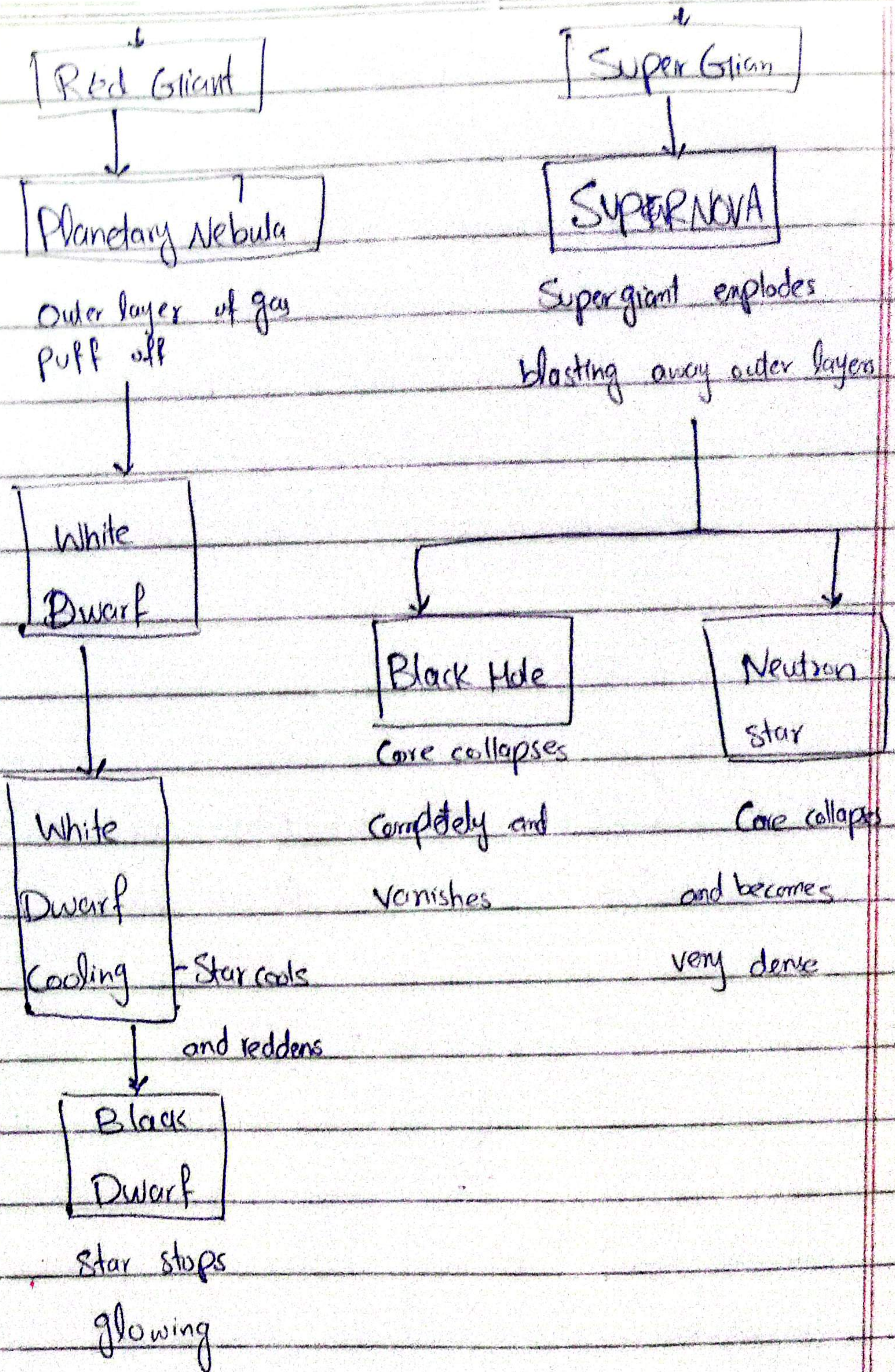
Examples are Earth, Venus, Mars, Jupiter etc.

Life Cycle of a star from a Nebulae to a Black Hole:



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A star spends 90% of its life in the Main Sequence stage:

During this phase the protons of hydrogen are converted into atoms of helium.

This reaction is exothermic; it gives off

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more heat than it requires and so the core of a main-sequence star releases a tremendous amount of energy. The sun is expected a star in this stage and expected to live 10 billion years.

2.1b) What are Semiconductors? Explain the difference between n-type and p-type semiconductors and list two of their modern applications?

Ans. Semi-conductors:

A semi conductor is a material that conducts current, but only partly. The conductivity of semiconductor is somewhere between that of an insulator, which has almost no conductivity, and a conductor, which has almost full conductivity. Most semiconductors are crystals made of materials including chemical elements like and compounds such as silicon, germanium, selenium, gallium arsenide, zinc selenide and lead telluride.

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The process of deliberately introducing other elements into a crystal is called **doping**.

The element introduced by doping is called a **dopant**.

By carefully ~~use~~ controlling the doping process and the dopants that are used, silicon crystals can transform into one of two distinct types of semiconductors:

N-Type:

When dopant is an element that has five electrons in its valence layer.

Phosphorus is commonly used for this purpose.

It is a negative type semiconductor due to which it behave like negative charge.

Applications

1. Metal-Oxide-semiconductor Field-Effect Transistor (MOSFET) uses N-Type semiconductor.

P-Type:

When the dopant has only three electrons in the valence shell.

The dopant such as boron has only three electrons in the valence shell.

It is a positive type semiconductor due to which it behave like a positive charge.

Applications:

1. Complementary Metal-Oxide-semiconductor (CMOS) uses P-type semiconductor.

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2. Solar cells : P-type and N-type layers captures photons and generate current (photovoltaic effect)
 3. Sensors (MEMS) = P-type silicon used in accelerometers, gyroscopes, and pressure sensors in cars, phones, and medical devices.
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Q(4) Define Global Warming. Explain the mechanism of the Green-house Effect and list three major green-house gases.

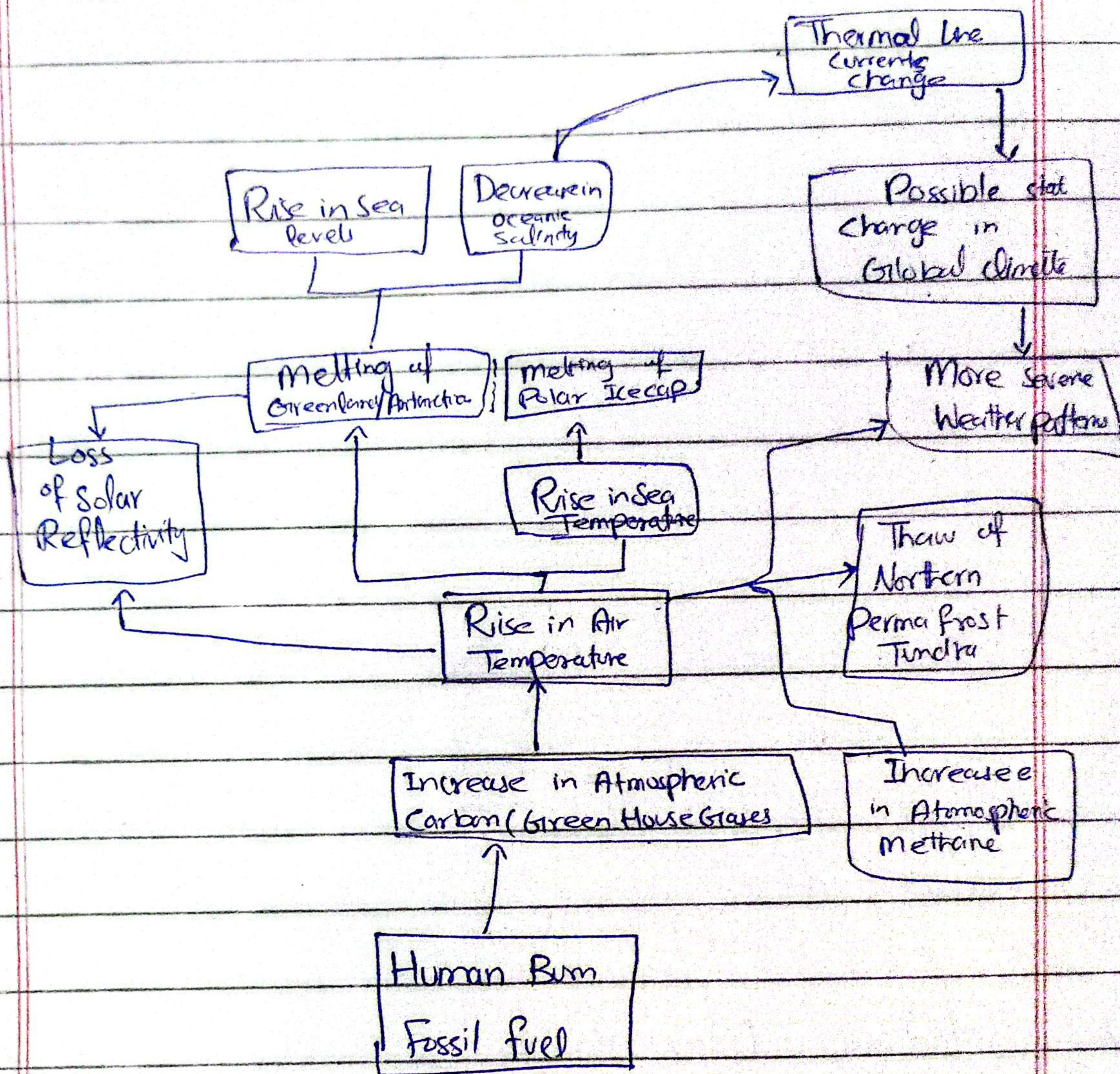
Ans: Global Warming:

The term global warming refers to a gradual increase in Earth's average temperature primarily caused by human activities like burning of fossil fuels releasing heat-trapping greenhouse gases like CO_2 in the atmosphere, leading to climate change, extreme weather, rising sea levels, and ecosystem disruption.

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Mechanism of greenhouse effect:



3 Major Greenhouse gases:

1. Nitrous Oxide N_2O
2. Tropospheric Ozone O_3
3. Hydrofluorocarbons HFCs

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Q1.d. What is Tsunami? Explain the mechanism natural processes that trigger a tsunami and the potential impact on coastal areas.

Ans: Tsunami:

Tsunami is a Japanese word meaning "harbour wave" and used as the scientific term for a class of abnormal sea wave that can cause catastrophic damage when it hits a coastline.

A tsunami is a series of waves caused by a rapid displacement of a body of water. Almost 80% of tsunamis occur within the Pacific Ocean "Ring of Fire".

Natural Process that triggers tsunami:

Tsunamis can be generated by an under-sea earthquake, an undersea landslide, the eruption of an undersea volcano, or by the force of an asteroid crashing into the

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ocean.

The most frequent one is the earthquake undersea. When the ocean floor is uplifted or offset during an earthquake, a set of waves is created similar to the concentric waves generated by an object dropped into the water.

Potential impact on coastal line:

- Shipwrecks can be left ashore when tsunamis hit. This can cause major pollution
- Animals can be washed up to shore and die.
- Tsunamis can also flood the land near the shore, leaving crops damaged and the community to suffer.

Q4.

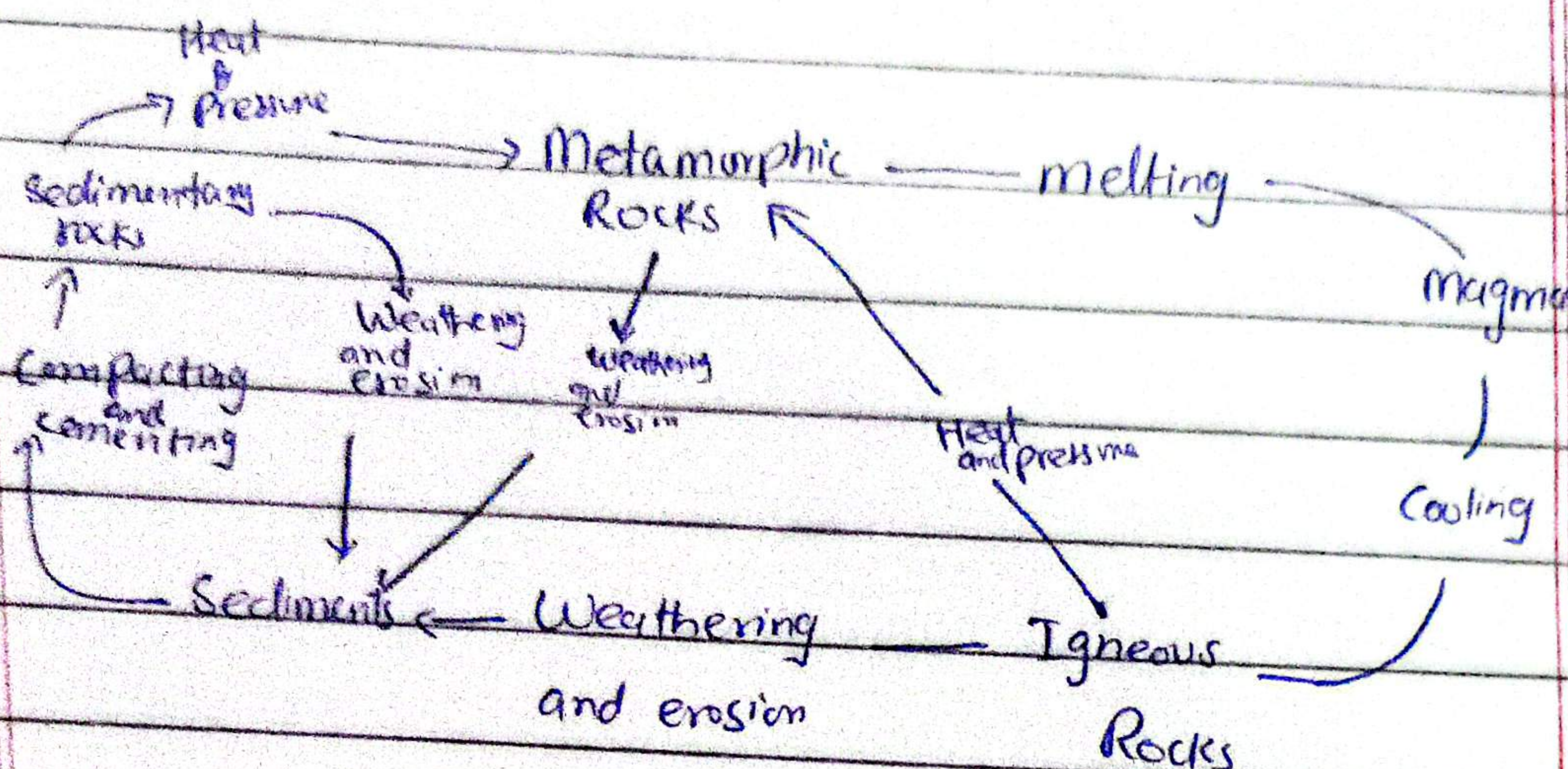
a) Explain the Rock cycle. Differentiate between Igneous, Sedimentary and

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Meta-morphic rocks with examples

Ans Rock cycle:



Igneous Rocks

The rocks which are formed from the cooling and hardening of magma or lava are called igneous rocks. These are classified as extrusive or intrusive.

Extrusive :

When magma comes out on surface in lava form and cools down

Intrusive :

When magma solidifies below the earth's crust are called intrusive.

For example, Granite, Basalt, Obsidian and pumice.

While

Sedimentary rocks

These rocks are formed from the sediments that get buried, compacted, and cemented together into a single rock layers. They are further classified into three different forms:

1. Biologic sedimentary
2. Chemical sedimentary
3. Clastic sediments.

For example; sandstone, shale, limestone, conglomerate and chalk.

And

Metamorphic Rocks

These rocks ~~made~~^{form} when any other rock is exposed to extremely intense heat and pressure. The heat and pressure causes the rock to change into a new form of rock called metamorphic rock. It is of two types:

1. Foliated
2. Non-Foliated

For example; slate, schist, gneiss

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marble and quartzite.

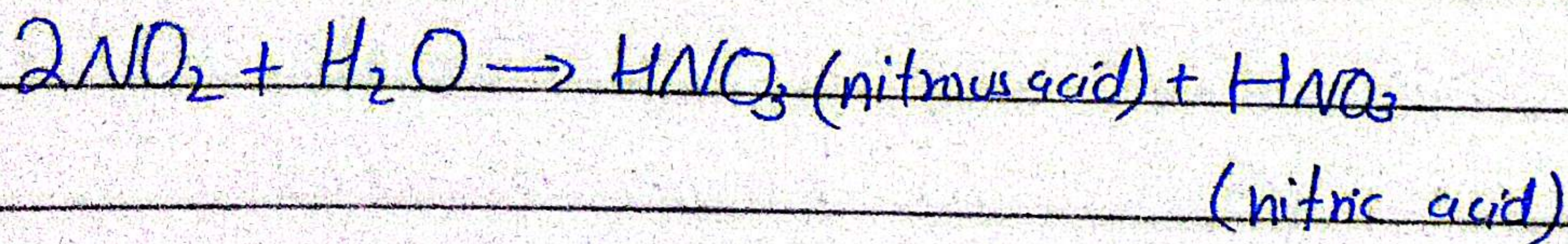
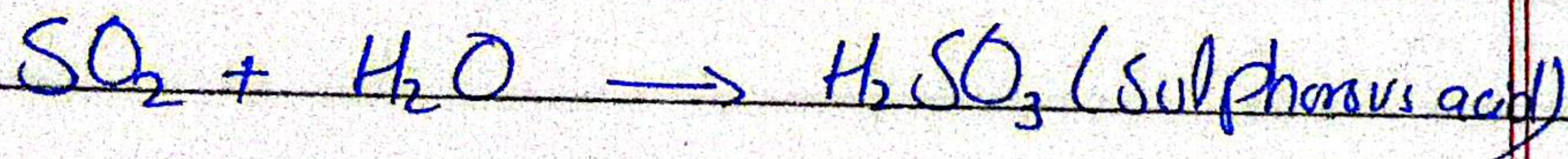
Q. 4(b)

Ans: Acid Rain

"Acid rain" is a broad term referring to a mixture of wet and dry deposition from the atmosphere containing higher than normal amounts of nitric and sulfuric acids.

Sulphur dioxide and nitrogen oxides react with water and other chemicals in the air to form sulphurous acid, nitrous acid and other pollutants.

Chemical Reactions:



These acid pollutants reach high into the atmosphere, travel with the wind for hundreds of miles and eventually return to the ground by way

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of rain, snow or fog.

Harmful effects on aquatic life and vegetation:

Acid rain devastates aquatic life by making water toxic (releasing aluminium, preventing egg hatching) and harms vegetation by leaching soil nutrients, damaging leaves, and making trees vulnerable to disease, disrupting entire food webs and causing forest dieback by altering soil chemistry and blocking nutrients absorption, leading to ecosystem collapse.

Q4(c)

Ans:- Role of Remote Sensing and GIS in environmental monitoring and disaster management:

Remote sensing (RS) and Geographic Information System (GIS) ^{are crucial} for environmental

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monitoring and disaster management by

- Providing timely spatial data for tracking changes (pollution, land use),
- Assessing risks (flood plains, seismic zones),
- Predicting hazards (weather)
- Mapping damage,
- Guiding response and recovery (resource allocation, reconstruction planning) through analysis and visualization
- Transforming raw data into actionable intelligence for informed decisions and enhanced resilience.

Role in Environmental Monitoring:

- Land Use: Satellites track deforestation, urbanization, and desertification over time, identifying environmental degradation.
- Water quality: RS monitors algal blooms, oil spills, and sediment loads in water bodies.
- Biodiversity and Ecosystem Health: Maps vegetation health, habitat changes and carbon sequestration potential.

(e.g. mangroves).

→ Climate Change Indicators: They track sea-level, ice melt, and atmospheric conditions.

Role in disaster Management:

1. Preparedness and Risk Assessment

(Before): Hazard mapping: GIS integrates RS data (topography, land use) to create detailed maps identifying flood plains, landslide zones, fault lines, and vulnerable populations.

2. Response and damage Assessment

(During): Situational Awareness: Rapid, high-resolution RS imagery (satellite/drone) shows disaster extent (flooded areas, fire perimeter, earthquake damage).

3. Recovery and mitigation (After);

Reconstruction Planning: GIS organizes damage data to evaluate sites for reconstruction and plan new developments in safer zones.

Q4(d)

Ans: Solid Waste Management:

Solid Waste Management (SWM) refers to the systematic management of the generation, collection, transfer, treatment, recycling, recovery, and disposal of solid waste.

Environmental Hazards of Improper Disposal:

Improper disposal like open dumping, creates severe problems particularly in urban areas:

Air pollution: Decomposing waste releases methane (a potent greenhouse gas) and harmful gases, while burning waste creates smog and respiratory irritants.

Disease spread: Uncontrolled dumps become breeding grounds for vectors like rodents and insects, spreading diseases.

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Resource depletion: In-efficient management wastes ~~also~~ valuable recoverable materials, increasing demand for new resources.

Urban Flooding: Clogged drains from plastic waste exacerbate urban flooding.

Q: 8 (a)

Ans: Sol:

ROAD

UQDG

LAKE

OCNH

8(c)

i) 4, 12, 6, 18, 9, 27, _____

Sol:

$$4 \times 3 = 12$$

$$12 \div 2 = 6$$

$$6 \times 3 = 18$$

$$18 \div 2 = 9$$

$$9 \times 3 = 27$$

$$27 \div 2 = \underline{13.5} \rightarrow \text{Ans.}$$

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(c) 11) 1, 2, 6, 24, 120

Sol:-

Multiplication of the previous term
by the next integer:

$$1 \times 2 = 2$$

$$2 \times 3 = 6$$

$$6 \times 4 = 24$$

$$24 \times 5 = 120$$

$$120 \times 6 = \underline{720} \rightarrow \text{Ans}$$

Best

of

work