Q2

a. # Eruption of Volcanoes:

Volcanoes are geological features formed from eruption of magma from earth's interior.

formation:

Volcanoes are erupted when the tectonic plates beneath the earth's crust collide at subduction zone. This prompts the rise of magma. Magma is a mixture of solid rocks, gases and minerals which exit the volcano through conduit.

Types of eruption:

- Explosive Eruption
- Effusive Eruption

Explosive Eruption:

Explosive eruption takes place when the gases are trapped inside the

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volcanoes and the pressure builds up inside volcano which leads to explosion of ash, gas and rocks which are molten.

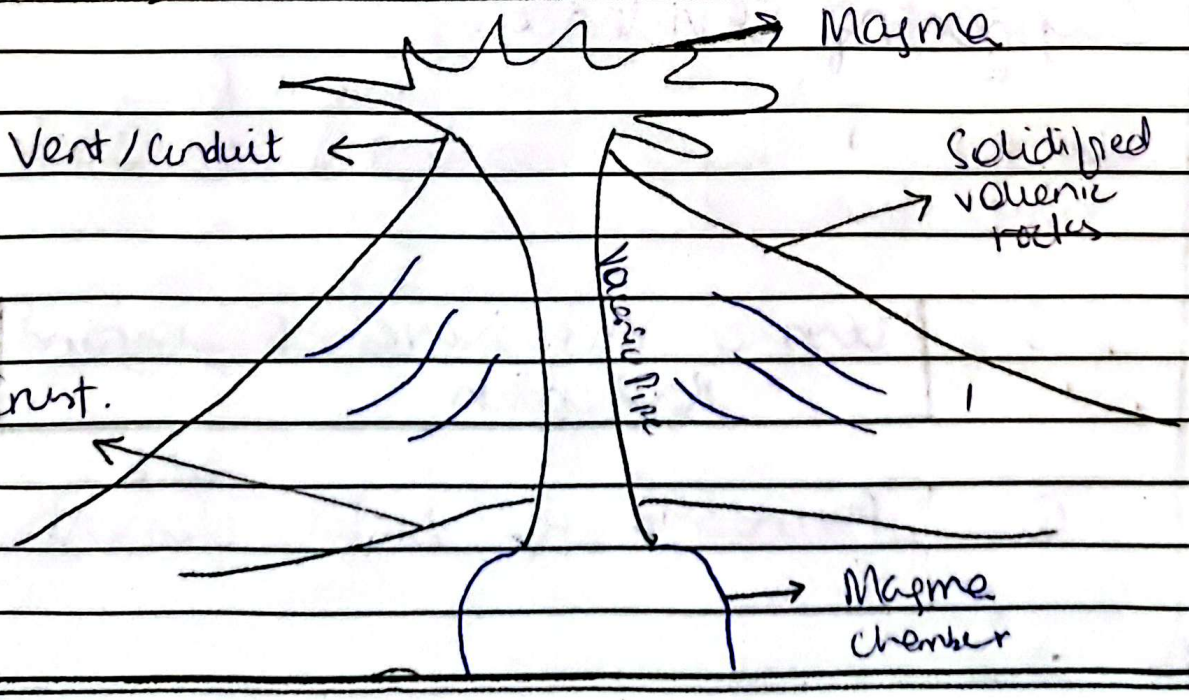
Example: Strato volcanoes/ Composite volcanoes.

Effusive Eruption:

Effusive eruption consists of molten lava which ejects through the conduit without the building of pressure

Example: Effusive eruptions are prominent in Shield volcanoes.

Diagram:



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b.

Big Bang:

Big Bang is a theory posited to explain the origin of the universe. It suggests that universe originated from a small atom like particle. It was in a hot dense state which expanded at a rapid rate and gave rise to space matter and energy.

Time duration:

Scientific studies suggest that big bang took place 13.8 Billion years ago.

Supporting Evidence:

Big Bang is supported by numerous theories like:

1. Cosmic Microwave Background Radiation
2. Abundance of light elements.

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③ Expansion Rate (which is constant) of Universe

④ Distribution of galaxies

⑤ Redshift shift of galaxies

Big Crunch:

Big Crunch is a hypothetical theory which posits that the expansion of the universe can be reversed and the universe could go back to a hot dense like atomic state.

When the gravitational force between the matter in the universe overpowers the expanding force of expansion, it could possibly lead to contraction of universe

Supporting evidence:

The hypothetical theory of big crunch is less likely to happen as

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the rate of expansion of Universe is increasing rather then decreasing. So, it is less likely that the "Big Freeze" or "Heat Death" phenomena could ever take place.

Age of Universe :

Age of the universe is calculated and confirmed by various methods which prove that the universe is 13.7 billion years old.

① **Cosmic Microwave Background Radiation:**

CMB radiations are the afterglow after the birth of universe. This afterglow still persists and can be detected by ground-based telescopes and Planks satellite.

These satellites and telescopes measure the temperature changes in the afterglow radiation which determines and valid-

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adete the age of universe.

① Friedman equation:

Friedman equation describe the age of universe in context of general relativity By incorporating the density of dark energy and dark matter with the expansion rate of universe, it is possible to determine the age of Universe.

③ Hubble Constant:

Hubble constant represents the value of expansion rate of universe. It can be used to determine the age of universe if the cosmic expansion rate is considered constant from the inception of universe till now.

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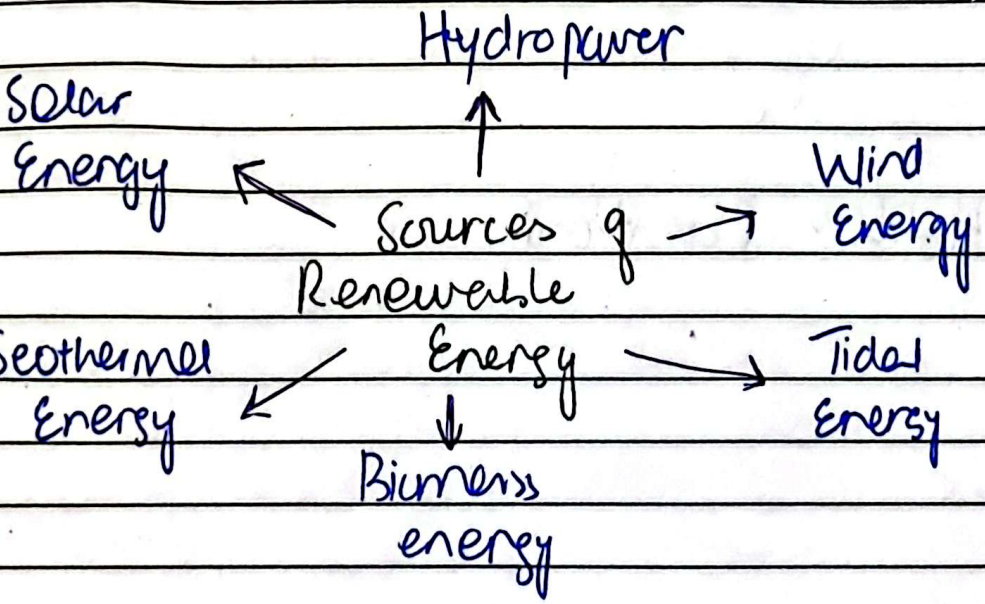
c.

Sources of Renewable Energy:

Renewable sources of energy produces clean energy without any carbon emissions. This contributes to an unpolluted and sustainable environmental conditions.



Solar Energy:

Solar energy refers to the energy derived from the sun when the rays from the sun heat up the photovoltaic cells which produces electrical energy. Excessive energy can be stored in batteries for later use

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Hydropower:

Hydropower is a clean and sustainable source of energy where the flowing pressure of water moves the turbines in dams to convert potential energy into electrical energy.

Wind Energy:

Wind energy consists of winds moving the wind turbines in the wind fields. Kinetic energy is converted to electrical energy. It is a reliable and sustainable source in windy regions.

Geothermal energy:

Geothermal energy refers to heating of water source to move turbines. Usually natural gas or coal is used to move the turbines as the heat produced from them prompts the water to move turbines. Thus it is not completely a renewable source of energy due to useage of coal and natural gas in it.

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Tidal Energy:

Tidal energy harnesses the power and energy of oceanic currents and tides to move turbines to create electrical energy. This is an excellent source of sustainable energy in coastal areas to benefit from

Biomass Energy:

Biomass refers to solid waste like agricultural waste or waste from industries which is combustible. Such waste is used to heat the water for movement of turbines to create electrical energy.

Q2

d. **Working of optical fiber:**

Optical fiber works through light signals. Data is transmitted through light energy pulses.

① **LEDs as Source of light pulses:**

Light-

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emitting diode or laser is used as a source to emit pulses to transfer data.

② Structure and working of optical fiber:

Optical fiber are slender pipe-like structures made of glass or plastic which transmit light signals through refractive index and internal reflection

Internal Reflection:

The core of the optical fiber has different refractive index than surrounding This difference in refractive index cause internal reflection keeping the light in the core

Single Mode and Multi Mode:

Single Mode are prefered for transmission of data over long distances. Whereas Multimode are used for transmission of data over short distances.

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Protective coving of fiber optics:

As fiber optics are made of fragile material like glass and high quality plastic, thus they are provided in protective coving to minimise damage over long distances

Signal Reception:

At the receiving end, the light energy is converted to electrical energy for processing of data

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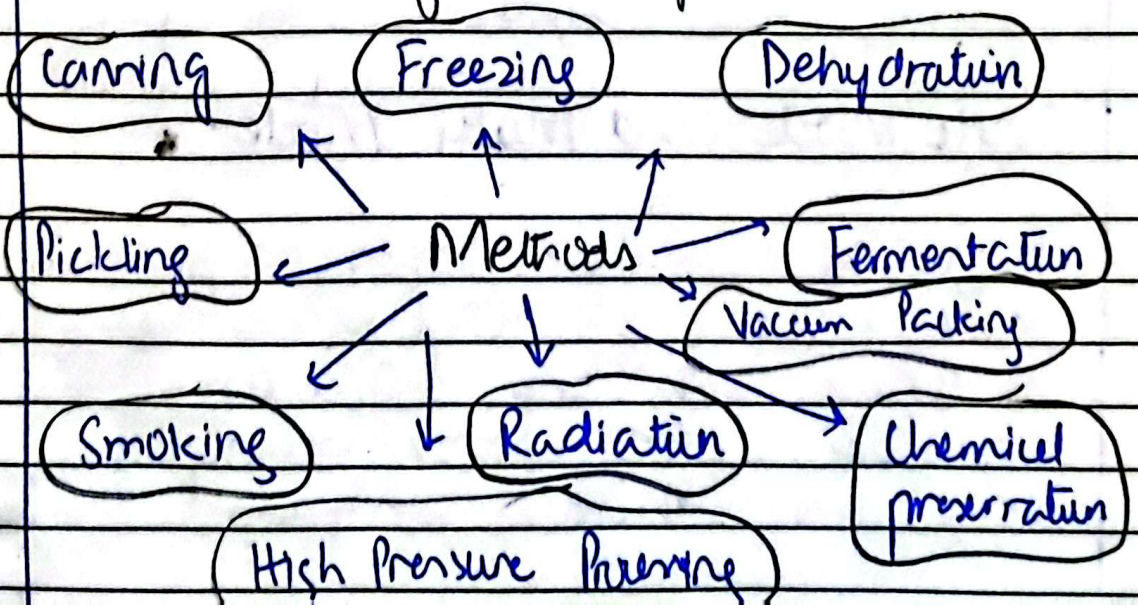
Q5.

a. ## Methods of food preservation:



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① **Canning:**

Canning of food is done after heat process to eliminate all kinds of bacterial and fungal organisms. Food is packed into sealed containers to prevent oxidisation of food.

② **Freezing:**

Food is frozen at very low extreme temperatures to disrupt the microbial activity and inactivate the enzymes and microbial process

③ **Dehydration:**

Dehydration of food consists of eliminating all sort of moisture to inactivate enzymes and microorganisms

④ **Pickling:**

Pickling consists of preservation of food with contents like salt, vinegar and brine to prolong the shelf life of food and enhancement of taste.

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Fermentation:

Fermentation refers to the growth of beneficial bacteria to grow bacteria and fungus to create an inhospitable environment for harmful microbes. Beneficial bacteria and fungus is grown by metabolization of sugars to produce alcohol and acids which creates a harmful environment for microbes.

Vacuum Packing:

Vacuum packing is done to remove air and oxygen to prevent oxidation of food. Such packing preserves flavour of food.

Smoking:

Smoking is introduced to food to preserve its flavour and increase shelf life of food.

Radiation:

Radiations and lasers kill the harmful microbes and target every kind of microbial activity to prevent oxidation of food.

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Chemical preservation:

Chemical preservatives like antioxidents and antimicrobials are used to extend shelf life of food.

High Pressure processing:

High pressure processing is used to introduce high pressures to destroy molds, yeasts, bacteria and viruses to increase foods shelf life

25.

b.

Milky way:

Milky Way is a galaxy spiral-shaped.
Milky way has its own gravitational field which binds the stars and planetary systems around itself.
Various stars, gases and dust are drawn towards its gravitational field.
Milky way is the galaxy we which accomodates our planetary system.

Diameter: Milky way has a diameter

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of 100,000 - 120,000 Light years.

Galactic Center: Milky way has a massive black hole in its center galactic space which is called Sagittarius A* and it is 4 million times more than the mass of sun.

Observation: Milky way galaxy is observed through Hubble Telescope

Dark Matter related to galaxies:

Dark matter makes a significant portion of galaxies' structure. It is a dense area of exceptional gravitational field which is highly dense and absorb anything in its vicinity. Even the light can not escape the gravitational strength of dark matter.

gravitational lensing:

Though dark matter can not be observed but due to its strong gravitational field it bends the light in its vicinity

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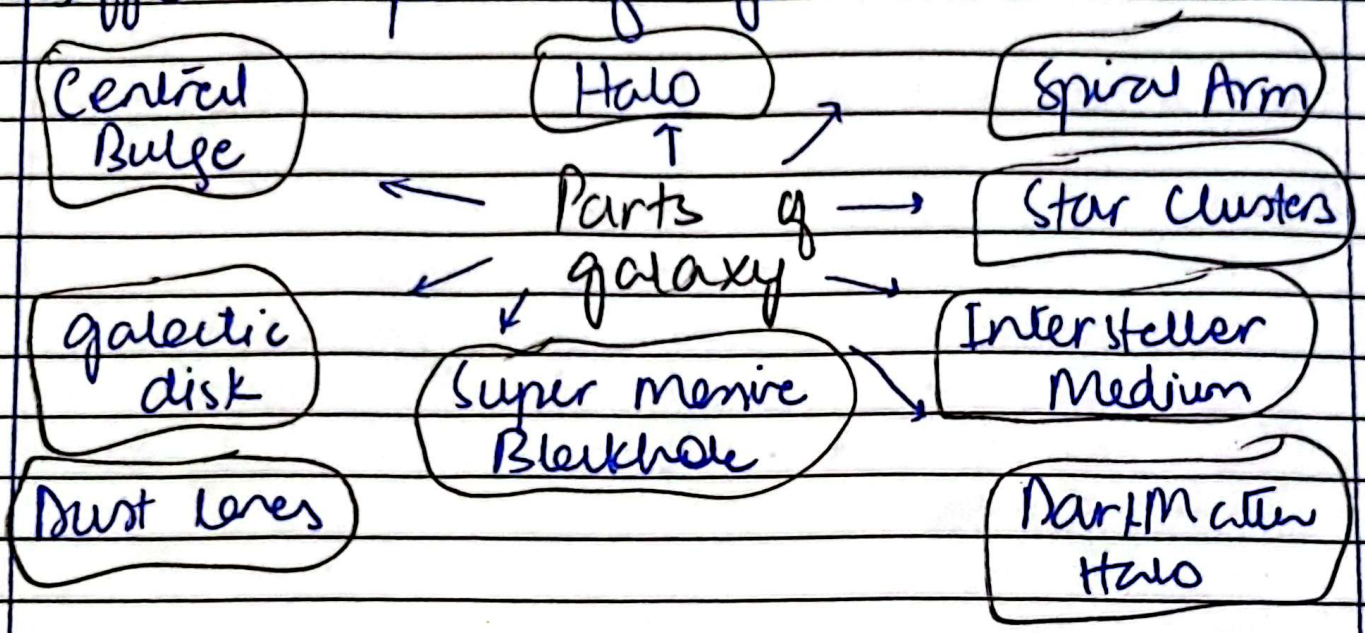
Different parts of galaxies:



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c Difference between Solar and Lunar Eclipse

Solar Eclipse	Lunar Eclipse
Occurence: Moon passes b/w Sun and earth.	Earth comes between Sun and moon.
Visibility: Observed from specific point on earth	Observed from any location on earth

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Alignment:

Sun. Moon	Sun earth and
and earth aligned	moon align in
in a straight line	straight line
Types:	
① Total	① Total
② Partial	② Partial
③ Annular	③ Penumbral
④ Hybrid solar	lunar eclipse
Eclipse	
Appearance:	
Moon covers	earth's shadow
all part of sun's disk	falls on moon
	dimming its glow
- less frequent	- More frequent
- shorter duration	- Longer duration
- Special protection	- Not required
required	safe to observe

Q5

d.

Nuclear fission:

Nuclear fission takes place when nucleus of an atom like Uranium-235 and Plutonium-239 splits and release

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massive energy along with two or more smaller nuclei

Chain Reaction:

Each fission event leads to another fission of smaller nuclei as they release further reactions

Usage:

Used in nuclear power plants. Heat is used to produce steam to turn turbines to produce electricity
- Used in nuclear weapons to produce chain of immense energy.

Nuclear fusion:

It is a reaction when two or more nuclei comes together to form a single one releasing massive amount of energy

- e.g. lighter nuclei particularly isotopes of H come together to form massive nuclei.
  e.g. deuterium and tritium

- Thermo nuclear fusion in suns and

stars.

Ionic bond in table salt:

$[Na^+] \xrightarrow{e^-} [Cl^-]$

↓

Na^+Cl^- salt

Structure:

- 3D-pattern Crystalline structure
- White crystalline solid at room temperature
- soluble in water
- High melting point due to strong ionic bonds.

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Q6.

a. Percentage: $\frac{\text{Winning}}{\text{Total}} \times 100$

$$\frac{15000}{15000 + 8000 + 1000} \times 100$$

$$= 45.5\%$$

b. Ratio of all angles.

3 : 4 : 5.

$$3x + 4x + 5x = 180$$

$$\frac{12x}{12} = \frac{180}{12}$$

$$x = 15$$

1st : 3(15) = 45 degrees

2nd : 4(15) = 60°

3rd : 5(15) = 75°.

c. Each group : 4 boys
6 girls.

102 girls

boys = 3

$\frac{102}{6}$ = 17 groups are formed

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Boys: Girls 17×4
$= 68$ boys.

d)

A : B
6 : 7

After 5 years 7 : 8

Q8.

a) $(2n-1) + (2n+1) + (2n+3) = 273$

$6n + 3 = 273$

$n = 45$.

$2(45) - 1 + 2(45) + 1) + 2(45 + 3) = 273.$

1st: 89,
2nd: 91
3rd: 93.

bi- $10^2 = 100.$

bii. 28.

biii. 35

biv. 42

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ci. SHIRT

cii. DANGER

ciii.

civ.

cv. HOLIDAY

Q8 c.

Sara : x

Mollie : $6x$

Brollie : $2x$

$(x+3) + (6x+3) + (2x+3) = 72$

$9x + 9 = 72$

$9x = 72 - 9$

$x = \frac{63}{9}$ 7

$x = 7$

Sara = 7

Mollie : $6(7) = 42$

Brollie : $2(7) = 14$