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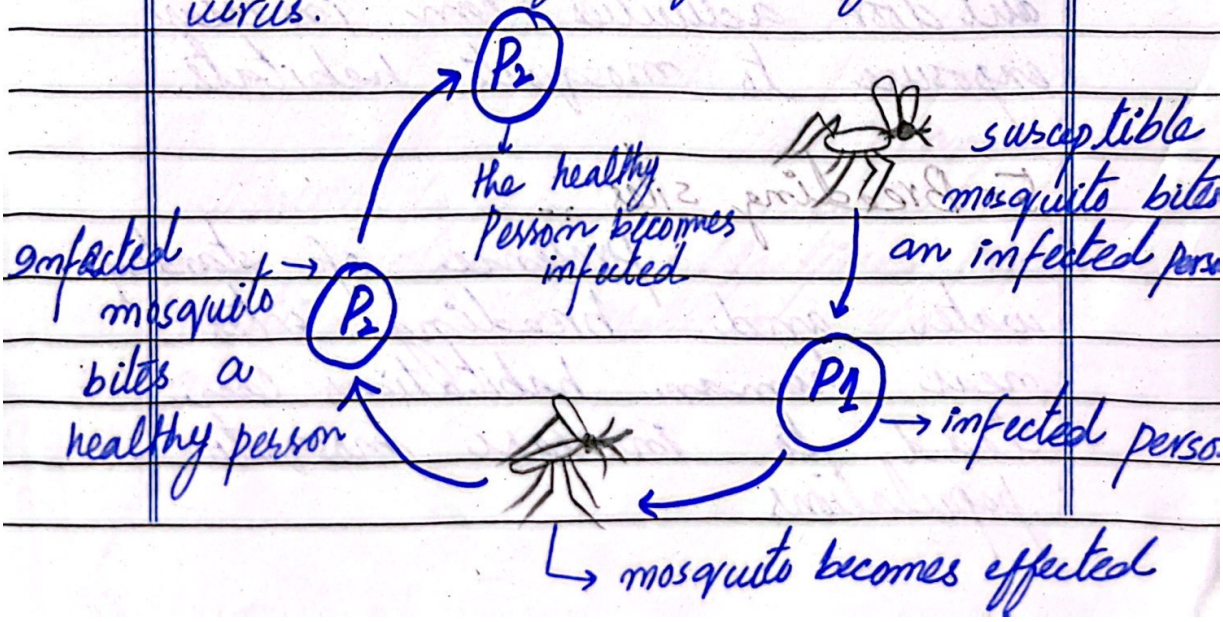
Q1 (i)

Dengue is a mosquito-borne viral disease that has spread rapidly in all regions in recent years. Dengue virus is transfered by female mosquito mainly of species "**Aedes aegypti**". Dengue is spread throughout the tropics, with local variation in risk influenced by rainfall, temperature and unplanned urbanization.

Causative agents of dengue:-

1- Aedes aegypti:-

Aedes aegypti is a female mosquito that is mainly responsible for transmission of of dengue virus.



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The virus replicates in mosquito's slivary glands and transmitted to humans through mosquito bite that leads to dengue fever.

2- Envoirmental factors:-
Temperature, humidity and urbanization can influence mosquito breeding and behaviour, increasing the likelihood of human mosquito contact.

3- Poor public health
Inadequate mosquito control, surveillance and vaccination efforts contribute to spread of dengue fever.

4- Human behaviour:-
Activities like traveling, migration, and out door activities can increase exposure to mosquito habitats.

5- Breeding sites :-
Presence of standing water and breeding sites near human habitations can lead to increase mosquito populations.

6-climate Changes.

Changes in temperature and precipitation patterns can alter habitats and behaviours.

7-Urbanization and population growth.

Increased urbanization and population density can lead to more contact of human and mosquito.

Lack of awareness and Education.

Limited knowledge about dengue fever and mosquito borne diseases can lead to inadequate prevention measures.

All these factors can increase the likelihood of human mosquito contact which is essential for the transmission of Dengue fever. Understanding these factors is crucial for developing effective prevention and control strategies.

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Symptoms of Dengue fever:

Dengue fever is a severe, flue like illness that affects infants, young, children and adults, but seldom causes death.

Symptoms

Early symptoms
- High fever
- Headach
- pain behind eyes
- Muscle and joint pain
- Fatigue
- Nausea and vomiting

progressive Symptoms
- Rash
- Increased severity of pain
- Bleeding gums and nose
- Low blood pressure
- rapid heart rate

Severe symptoms
- Severe bleeding (hemorrhage)
- organ impairment
- Respiratory distress
- cardic problems

critical symtoms
- Severe shock
- organ failure
- Coma

Symptoms usually last for 2-7 days, after an incubation period of 4-10 days after the bite from an infected mosquito.

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Q1 (ii)

Dark matter and dark energy are two mysterious concepts in the universe that scientists have been trying to understand for decades.

Dark matter.

Dark matter is a type of matter that doesn't emit, absorb, or reflect any electromagnetic radiations, making it invisible to the telescopes. Despite its elusive nature, dark matter's presence can be inferred through its gravitational effects on visible matter and the way galaxies and galaxy clusters move. Dark matter is thought to make up approximately 27% of universe's mass-energy density, while visible matter makes up only about 5%.

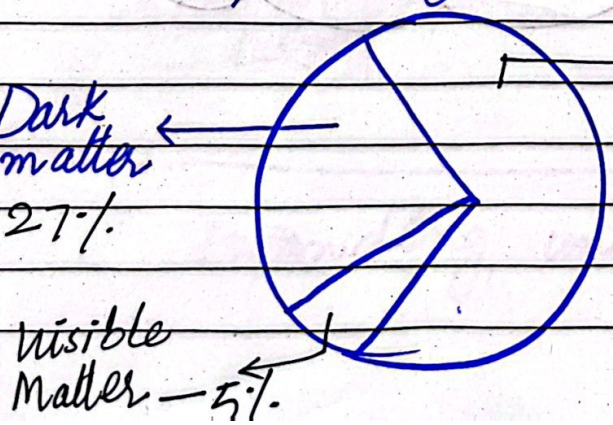

Fig. 1

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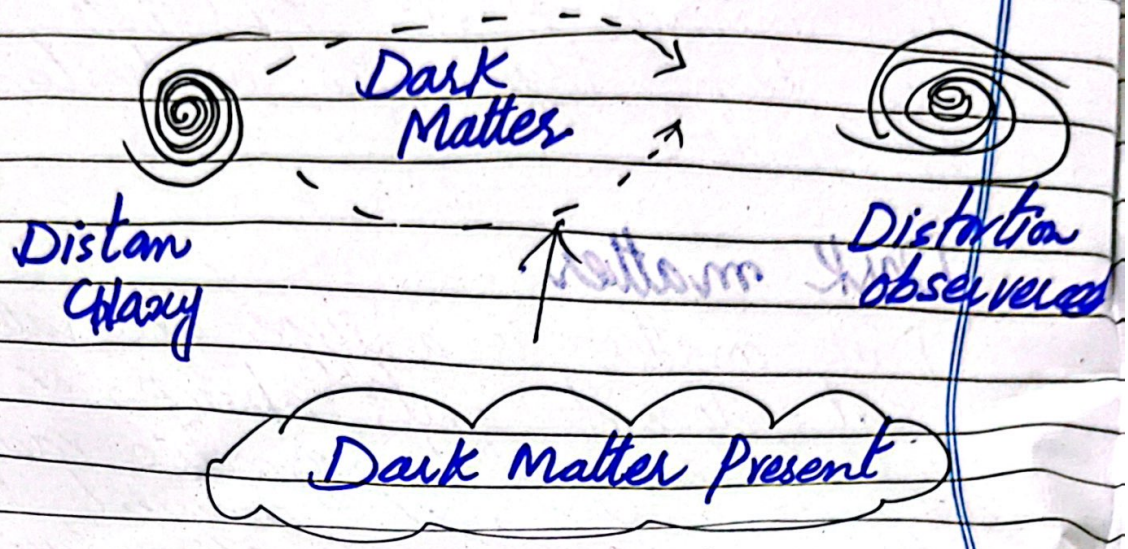
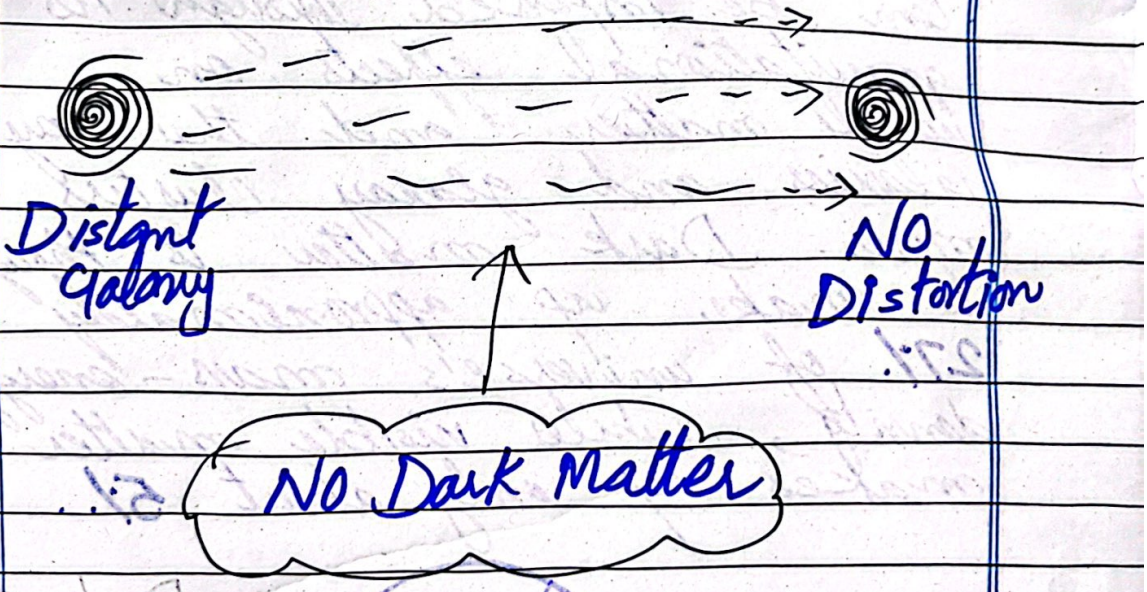
Fig. 1 depicts the energy distribution of the Universe





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The exact nature of dark matter and energy remains unknown, and scientist continue to investigate various theories to explain their properties and behaviour. Scientist hope to eventually shed more light on mysteries of dark matter and dark energy.

Q1 (iii)

Mitochondria

Mitochondria are very important organelles. They are present only in eukaryotic cells. They are involved in manufacturing and supply of energy to the cell. Therefore, they are also know as **power house of the cell.** The size and number of mitochondria is different in different cells.

structure of Mitochondria.

The mitochondria may be vesicle rod or filament shaped. Mitochondria are bounded by two membranes. The outer membrane is smooth. The inner membrane

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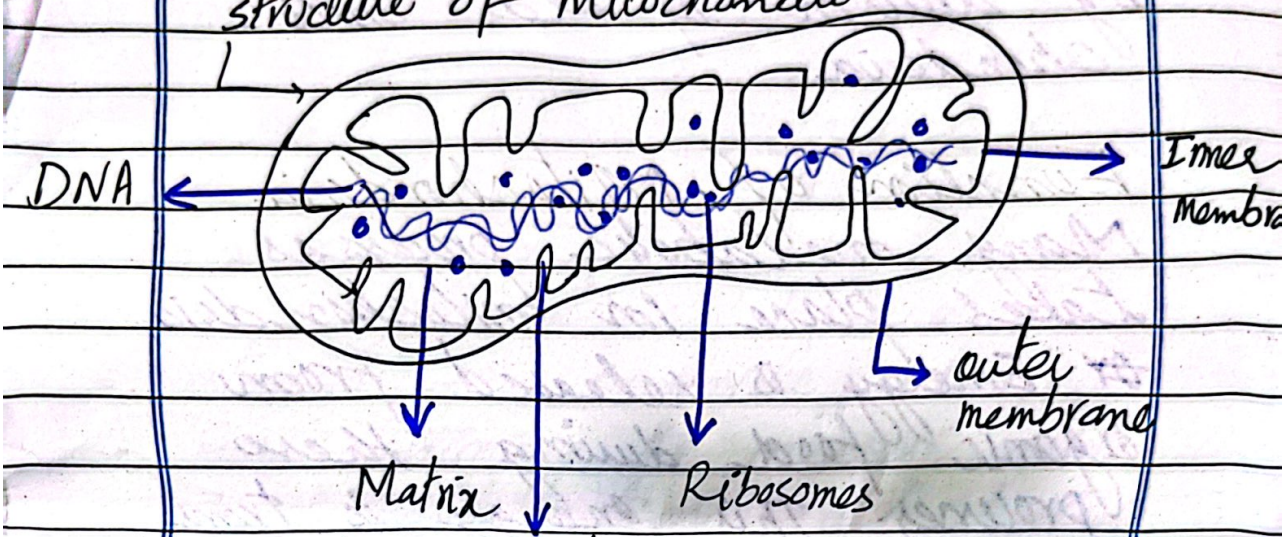
forms many infoldings called cristae. The inner surface of cristae contain knobs like structures called, F-1 particles, that are suspended in matrix.

structure of Mitochondria

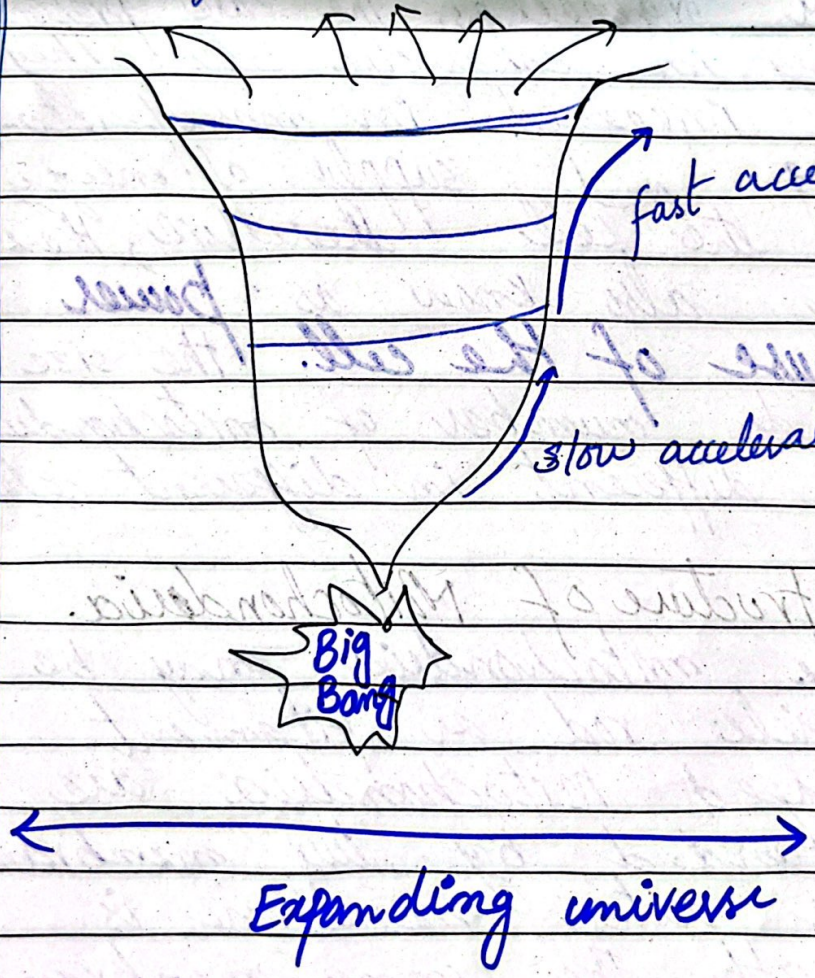


Chemical composition of mitochondria

The mitochondrial membranes have similar composition and structure as other membranes. They are composed of lipids and proteins. The mitochondrial matrix consists a large number of enzymes, co-enzymes, and organic and in-organic salts. Mitochondria also contains DNA and ~~rbo~~ ribosomes. So mitochondria can synthesize their own proteins.

Dark Energy :→

Dark energy is a mysterious component that drives the accelerating expension of universe. It thought to be responsible for the observed acceleration of universe's expension, which was first detected in late 1990s. Dark energy is believed to make up approximately 68% of universe's mass-energy density.



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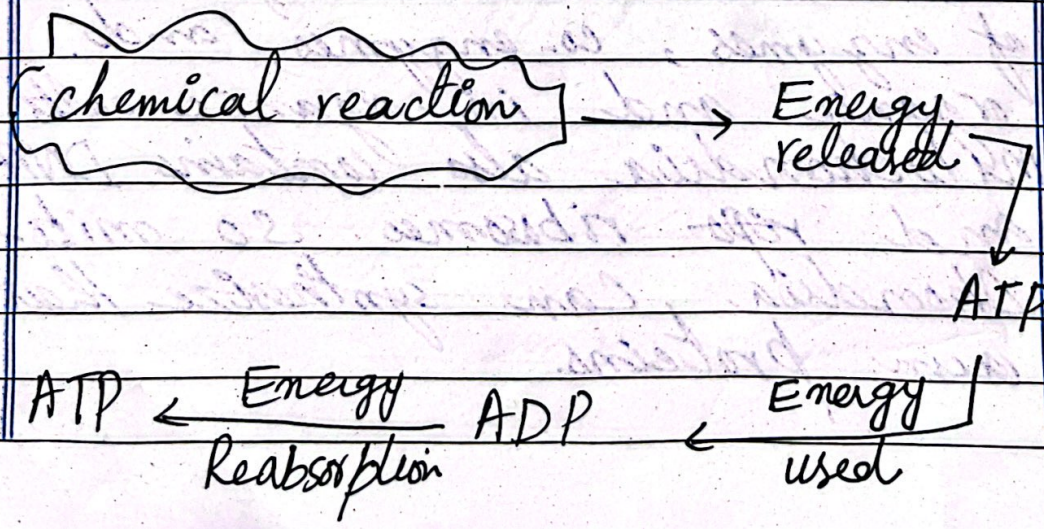
Formation of new Mitochondria

Mitochondria are self replicating organelles. It means new mitochondria are formed by division of old mitochondria.

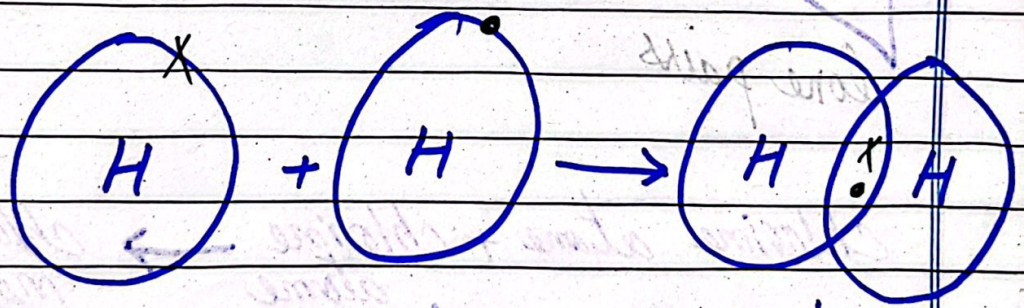
Function of Mitochondria:

Many metabolic processes takes place in mitochondria. Energy is released from organic food during these processes. This energy is transfered to energy rich compound **ATP (Adenosine tri-phosphate)**. ATP provides energy to the cell on demands. ATP is also broken to ADP. This ADP absorbs energy from mitochondria and again becomes ATP.



Covalent Bond:

When two non-metal atoms combine, they share one, or more pairs of electrons. A shared pair of electron is called single covalent bond or a bond pair. A single covalent bond is presented by a single line between atoms. for example, H-H. For attaining the nearest noble gas configuration, each hydrogen atom shares its electron with other hydrogen atom and form a covalent bond in Hydrogen molecule.



H-H

Hydrogen atoms sharing a pair of electrons.

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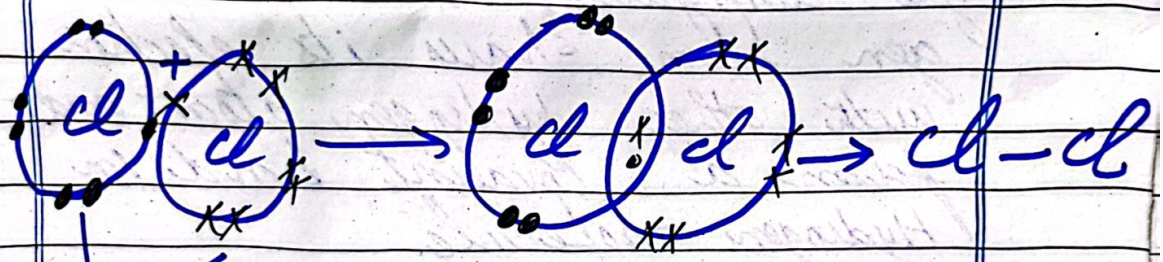
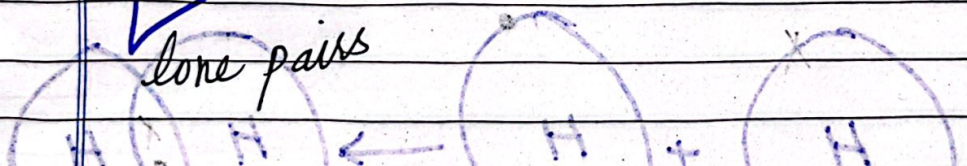
chlorine also forms covelant bond with the other atom of chlorine. chlorine has seven electrons in the shell while only 1 electron participate in the bonding. So the 6 electrons left in the outer shell, who do no participate are known as lone pairs. Each atom of chlorine has three lone pairs. as they do not participate in bonding.



lone pairs



chlorine atome + chlorine atome → chlorine Molecule

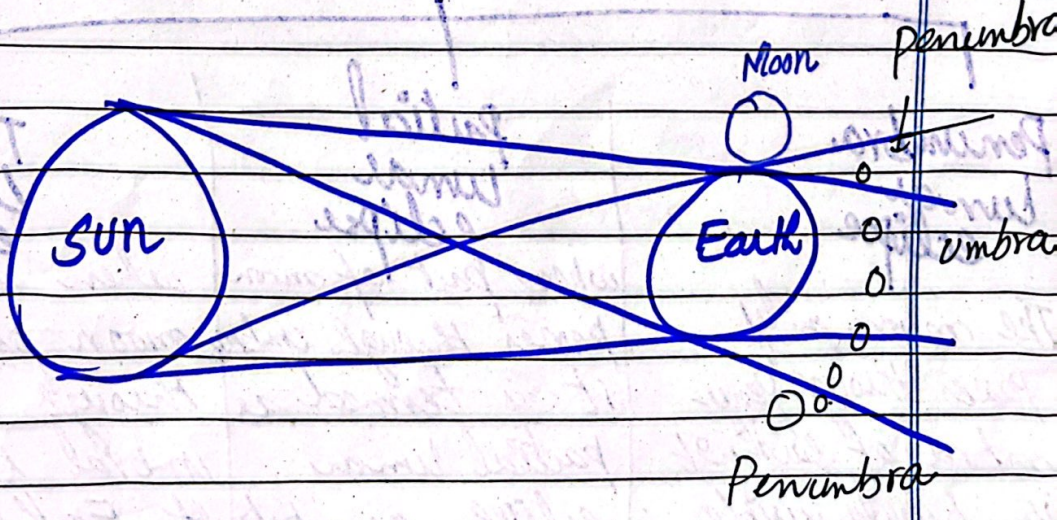
Multi covelant Bond:-

Some atoms can bond together by sharing two pairs of electrons we call it as double covelant bond.

Q#02 (i)

Lunar Eclipse

The moon orbits around the Earth, and at the same time Earth orbits the sun. Sometimes earth moves between sun and the moon. when this happens, earth blocks the sunlight that normally is reflected by moon. This Sunlight is what causes a moon to shine. Instead of light hitting the moon surface, Earth's shadow falls on it. It is an eclipse of the moon- the Lunar eclipse. A lunar eclipse can occur only when the moon is full. A lunar eclipse can be seen from Earth at night.



Lunar eclipse.

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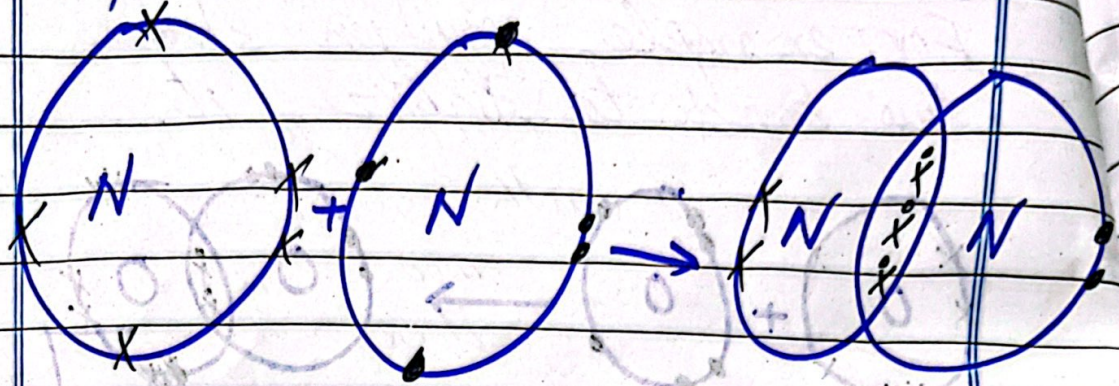
together by sharing three pairs of electrons. we call it as Triple covelant bonds



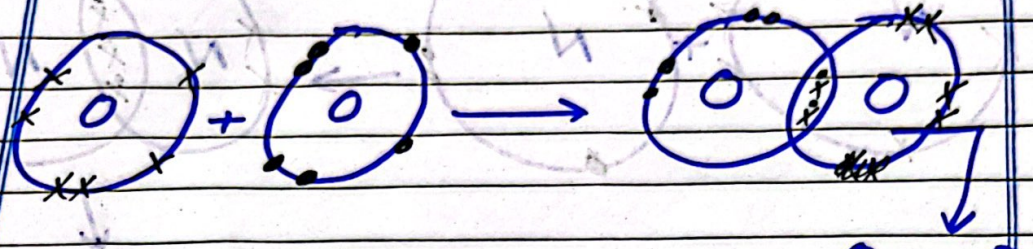
$N \equiv N$

In order to form nitrogen molecule, each nitrogen needs to gain three electrons to complete its outer shell

Covelant Bond

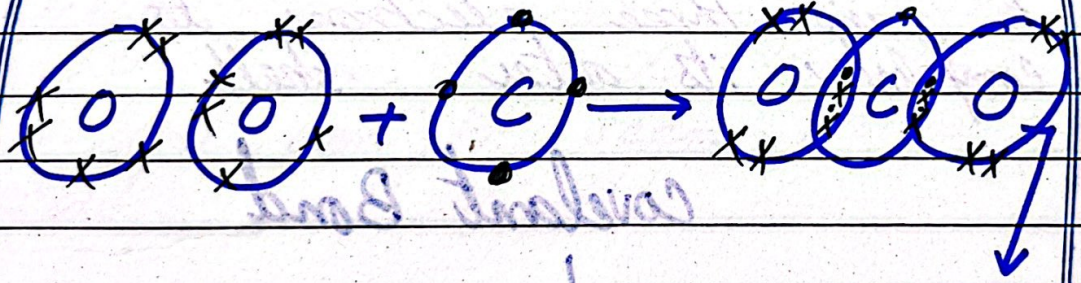
Single covalent Bond	Double covalent Bond	Triple covalent Bond
H–H	O=O	N≡N
Cl–H	O=C=O	

A double covalent bond is donated by double lines.
O=O.
For example, oxygen shares two bonds to stabilize it.



oxygen atom — oxygen molecule

Lets consider the example of CO_2.



O=C=O

For CO_2 each oxygen atom needs to gain two electors. But carbon need to gain four elector to complete its outer shell. So two oxygen atoms share two bonds with carbon.

A atom can also bond

DATE: __/__/__ (18)

Functions:-

Catalyst:-

Enzymes speed up chemical reactions, allowing them to occur efficiently and accurately.

Substrate Binding.

Enzyme bind to specific substrate, positioning them for efficient reaction.

converting substrates to product.
Enzymes transforms substrates into products, driving reaction forward.

Reducing activation Energy:-

It lowers the energy required for reactions to occur, making them more feasible.

Regulating Metabolic pathways.

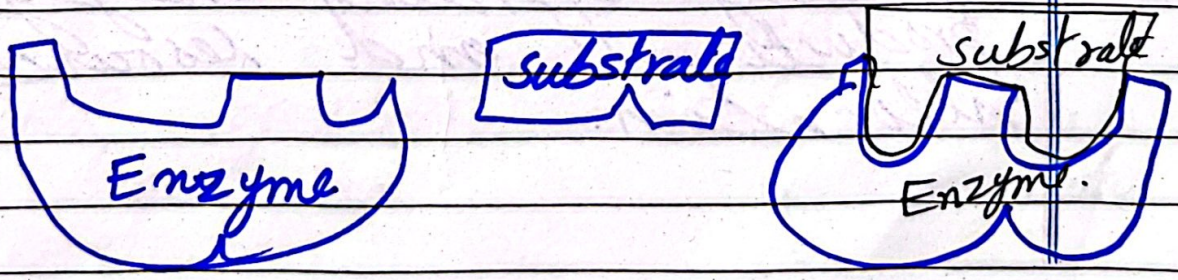
Enzymes control the flow of metabolites through pathways, ensuring efficient energy production and resource allocation.

Enzymes:-

Enzyme is specialized organic substance, composed of polymers of amino acid that act as catalyst to regulate the speed of any chemical reaction. There are various types of enzymes that perform different tasks. Most enzymes are associated with blood clotting, healing of wounds, controlling the production of hormones, destroying pathogens and environmental toxins.

structure

Enzymes are highly selective, they catalyze specific reaction only. Enzymes have a part where only certain substrates can bind it, this site of activity is known as <u>active site</u>. The molecule that react and bind to enzyme is known as <u>substrate</u>



Enzyme substrate complex

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The earth cast a long conical shadow in space. At any point within that cone the light of the sun is wholly ocuuled. surround the shadow cone, also called umbra, is an area of partial shadow called the penumbra. Lunar eclipse usually last for few hours. At least two partial lunar eclipse happen every year, but total lunar eclipse are rare. It is safe to look at lunar eclipse

Lunar Eclipse

↓

Types

Penumbra lunar eclipse	Partial lunar eclipse	Total lunar eclipse
The moon only passes through penumbra of earth. It is barely visible as there is slight change in moon's color	when part of moon passes through umbra it is termed as partial lunar eclipse, as whole area is not covered.	when the entire moon passes through the umbral region of Earth shadow and moon is totally covered.

supporting immune function.
Enzymes aid in the breakdown and elimination of pathogens and foreign substances.

Detoxifying harmful substances
Enzymes help eliminate toxins and harmful by products from cellular metabolism.

These functions highlight the vital role enzymes play in maintaining cellular efficiency, regulating metabolism, and ensuring overall organismal health.

Q #2

(iii) Electromagnetic Radiation

Electromagnetic Radiations (EMR) is a form of energy that is all around us and takes many forms such as light rays, radia waves, x-Rays, Gamma rays. Visible light is only a small portion of EMR spectrum which contains a broad range of electromegnatic wavelengths.

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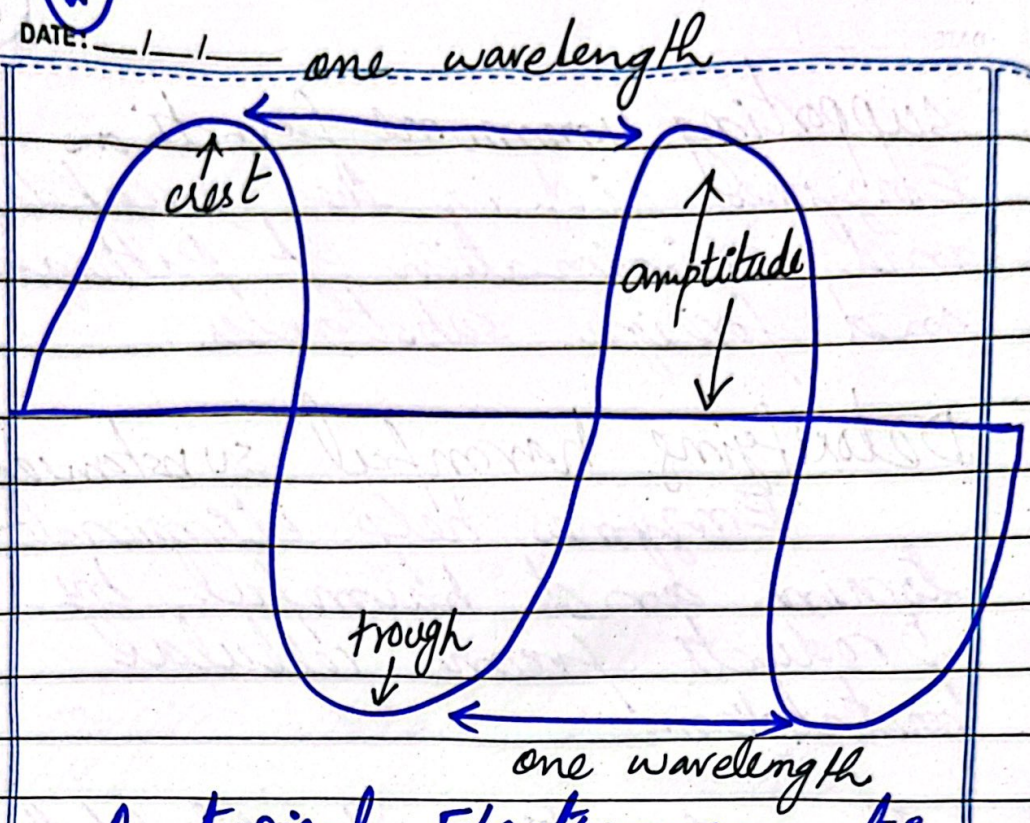

A typical Electromegnatic wave

we use frequency to measure the wave length.

$$V = f\lambda$$

V → velocity of wave

λ → wavelength

$$\lambda = \frac{V}{f}$$

f → frequency

The frequency of a wave is the number of waves produced by source each seconds and it is measured in hertz (Hz) and denoted by f.

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altering stress on the earth's crust.

Shared causes

Both earthquakes can volcanic eruptions can be caused by same factors, such as plate movements, stress build up, and magma movement.

Precursory sign

Earthquakes can occur before volcanic eruptions, serving as precursory sign of an impeding eruption.

Volcanic unrest

volcanic unrest can lead to earthquakes, gas emissions, and ground deformation.

Geothermal activity

Geothermal areas with hot springs and geysers, can experience earthquake and volcanic activity.

Magma chamber

Magma chambers can cause both earthquakes

DATE: Q.2 (iv)

Earthquacks and volcanic Eruptions

Yes, earthquakes and volcanic eruptions are interconnected Here are some ways, they are connected.

1- Plate Tectonics

Both earthquakes and volcanic eruptions are results of plate tectonic. movement of plates can cause both.

Magma movement

Volcanic eruption involve the movement of magma (molten rock) beneath surface. this movement can cause ~~volc~~ earth quack.

volcanic Arcs

Subduction of plates can lead to formation of volcanic arcs, where earth quakes and volcanic eruptions occur together.

Trigering effect

Large earthquackes can trigger volcanic eruptions by

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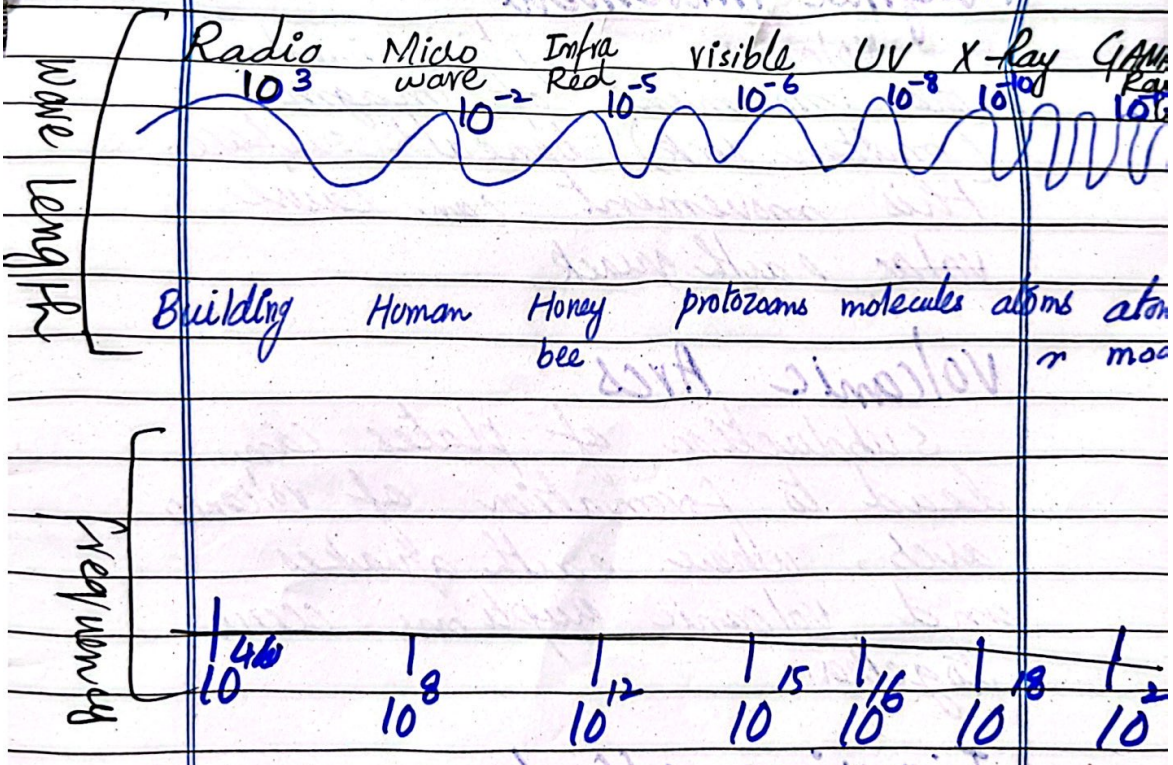
Electromagnetic spectrum:-

Electromagnatic waves can be characterized either by frequency or wavelength of their oscillations to form EMR spectrum, which include, in order of increasing frequency and decreasing wavelengths: radia waves, microwaves, IR, visible Light, UV, X-Rays, Gamma rays. This array of rays is called EMR spectrum.



Electromagnatic spectrum

(iii)

Two head = 105 times

one head = 275

~~one to~~ head = 120

probability of two heads = $\frac{105}{500}$ = 0.21 = 21%

" " one head = $\frac{275}{500}$ = 0.55 = 55%

" " no head = $\frac{120}{500}$ = 0.24 = 24%

(iv)

Jamies' age = x

Jamies' dad = $4x$

In 14 years, ab Jamies' dad will be twice of Jamie

$$2(x+14) = 4x+14$$

$$2x+28 = 4x+14$$

$$28-14 = 4x-2x$$

$$14 = 2x$$

$$x = 7$$

Jamies age = 7 years

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substitude x in eq (i)

$$0.20y = 0.20x$$

$$y = x$$

Now, substitute value of y in origial expression

$$x\%\ of\ 20 = \left(\frac{x}{100}\right) \times 20$$

$$\left(\frac{x}{100}\right) \times 20 = = 0.2x$$

If 20% of x is equal to y, then y% of x is equal to 20% of x

(b)

P and Q have average salary = 5050

average salary of both = 5050×2
$= 10100$

P and Q average monthy income = 6250

for both $= 6250 \times 2$
$= 12500$

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and volcanic eruptions.

Feed back Loop

Earthquakes can alter magma movement, which can lead to more earth quackes, creating a feedback loop.

The connection between earthquakes and volcanic eruptions is complex and bidirectional. Understanding this relationship helps scientists better monitor and predict these natural hazards.

Q #7

a-

$$20\% \text{ of } x = y$$

$$\frac{20}{100}x = y$$

$$y = 0.2x \longrightarrow (1)$$

$$Y\% = \frac{Y}{100}$$

Now multiply y with 20

$$(Y/100) \times 20 = 0.20$$

Jamies' dad age = 7×4
= 28

sum of Jame and his dad
= 7 + 28
= 35

Q6:-

C-

Volume = $\frac{4}{3}\pi r^2$

r = 12 cm

= $\frac{4}{3} \times 3.14 \times (12)^2$

=

d=

Q8:-

charge = 20 + 4n

n = 7

= 20 + 4(7)
= 20 + 28
Charge = 48

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lap

ralaiep

Tyhniaum humanity

arsehcc res

search

monitea h Hot

mute

taiph t r p h

Pheart