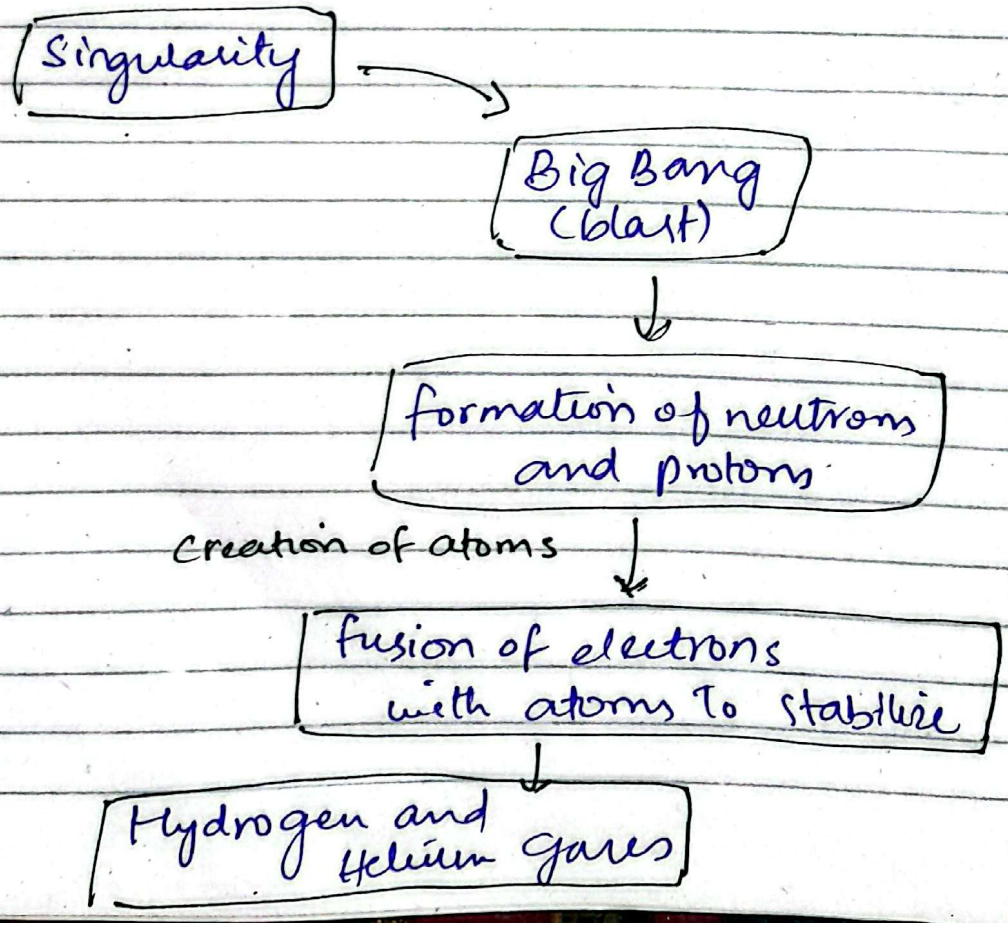
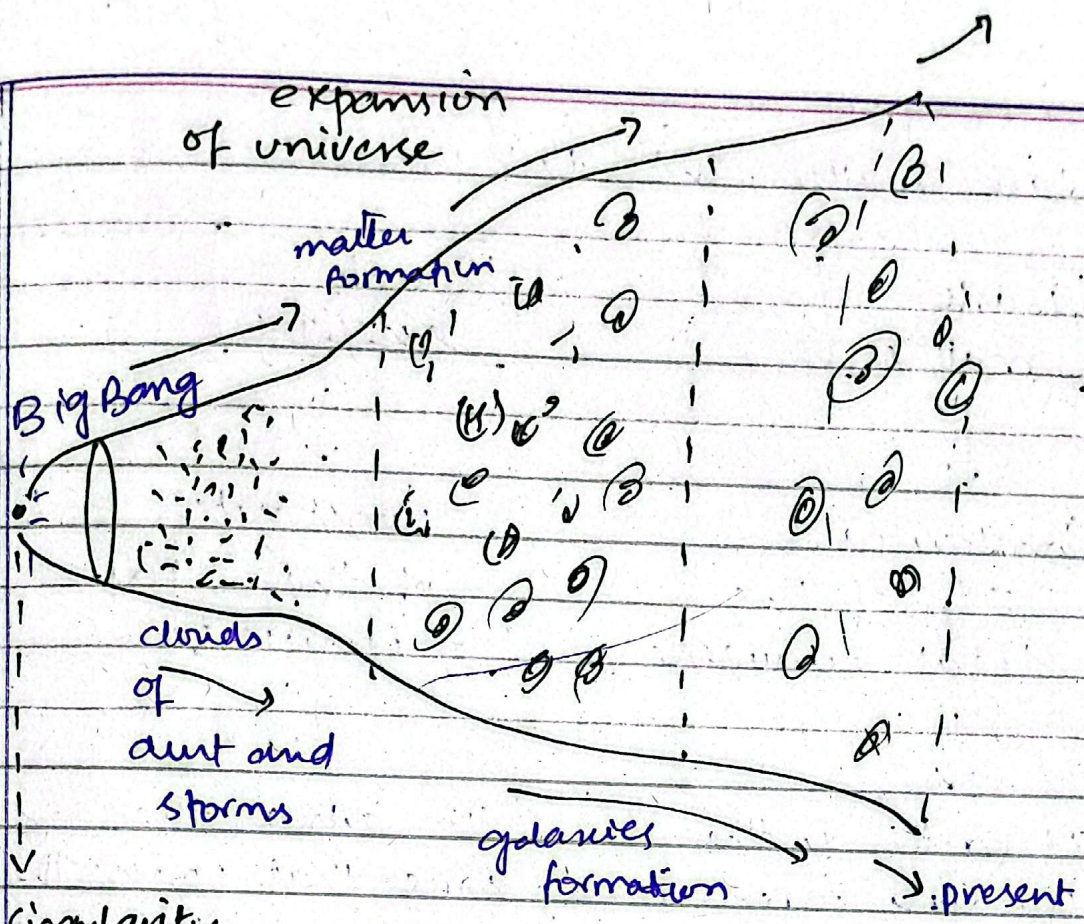
Q3.

a. What is Big Bang Theory ...

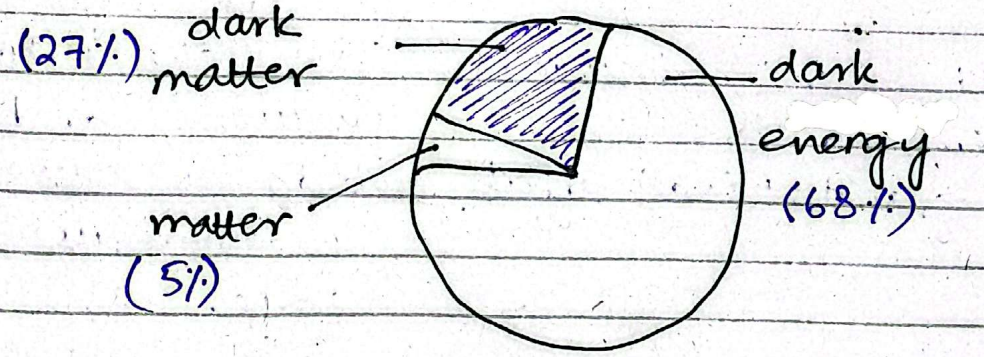
(1) BIG BANG THEORY:

Big Bang Theory propores the idea of a singularity within which the entire matter and non-matter was condered, millions and billions of years ago. The unstability due to extremely high energy caused a huge blast, creating the universe that we know of toddy.





(2) DARK MATTER AND DARK ENERGY:



The matter, consisting of galaxies and stars, constitutes only 5% of the entire universe. The rest percentage is divided between

dark matter and dark energy.

Dark matter

↓

Constitutes 27% of the total universe

↓

It acts as the binding force which keeps the matter of the universe together.

↓

It is only observed due to its gravitational effect.

Dark energy

↓

Constitutes 68% of the total universe

↓

It acts as the force that covers the emptiness of the universe and accelerates the expansion of universe.

↓

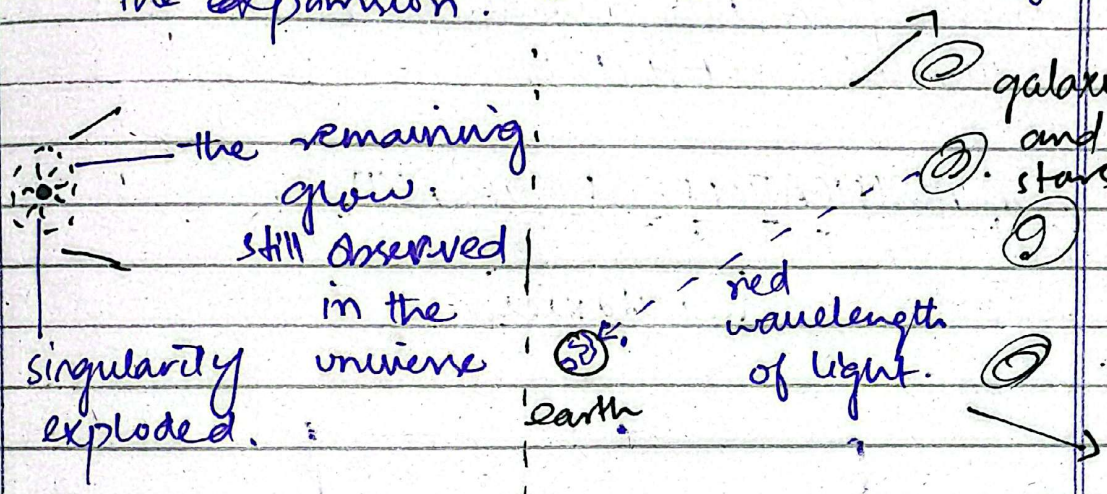
Covers the entire universe and tends to have a repulsive force

In short, it can be said that dark matter keeps the matter in universe, forming galaxies, intact through its gravitational force. Whereas, dark

energy acts as the repulsive force, accelerating the expansion of universe.

(3) KEY EVIDENCES SUPPORTING BIGBANG:

Mainly two evidences are presented;
(a) Presence of an explosion glow.
(b) Red light wavelength of stars hinting the expansion.



distant stars → red wavelength
nearer stars → blue wavelength.

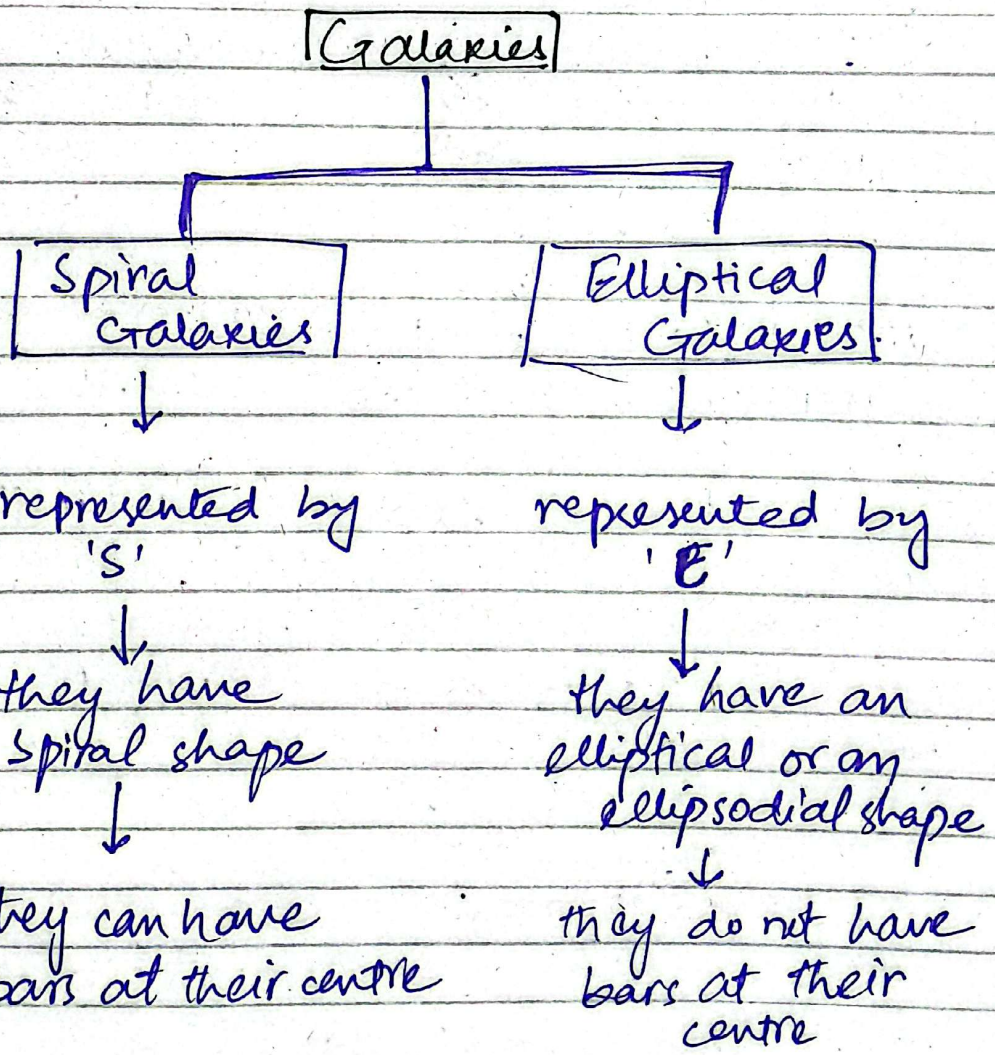
The observed stars have red wavelength of light more than the stars with blue wavelength. This supports the idea that universe is constantly expanding.

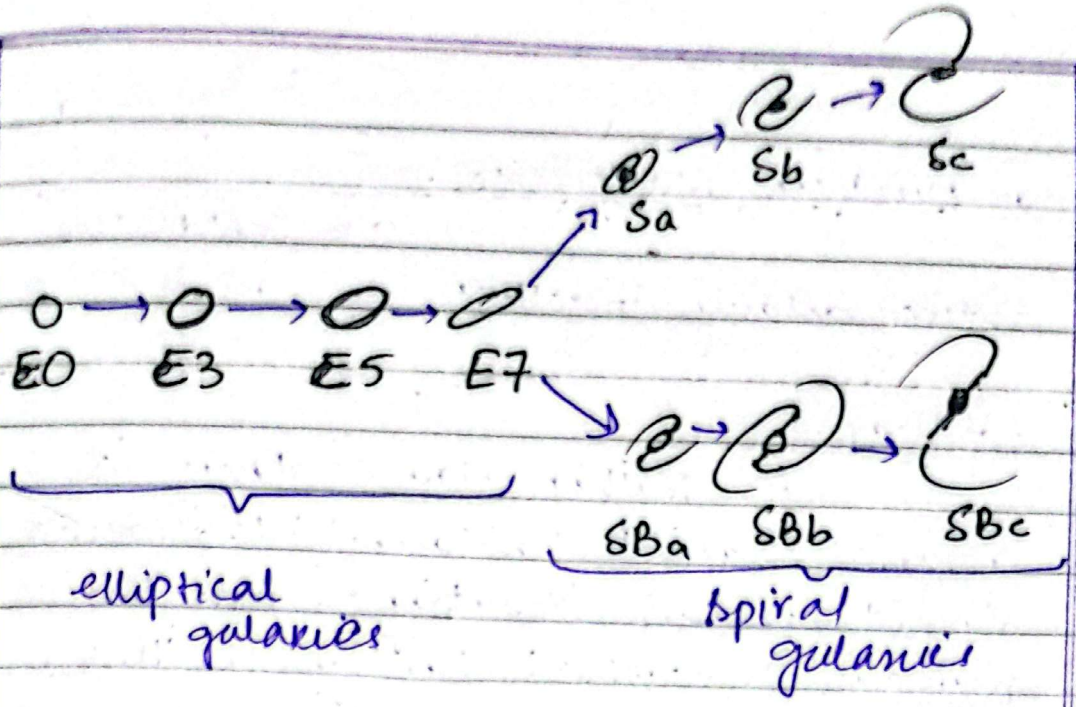
(b) What is a galaxy --

(1) GALAXY:

A galaxy is a gravitationally bound body consisting of a blank hole at its centre, along with dust, nebulae, asteroids, meteorides, solar systems, stars, planets, dwarf planets and natural satellites.

(2) CLASSIFICATION OF GALAXIES:

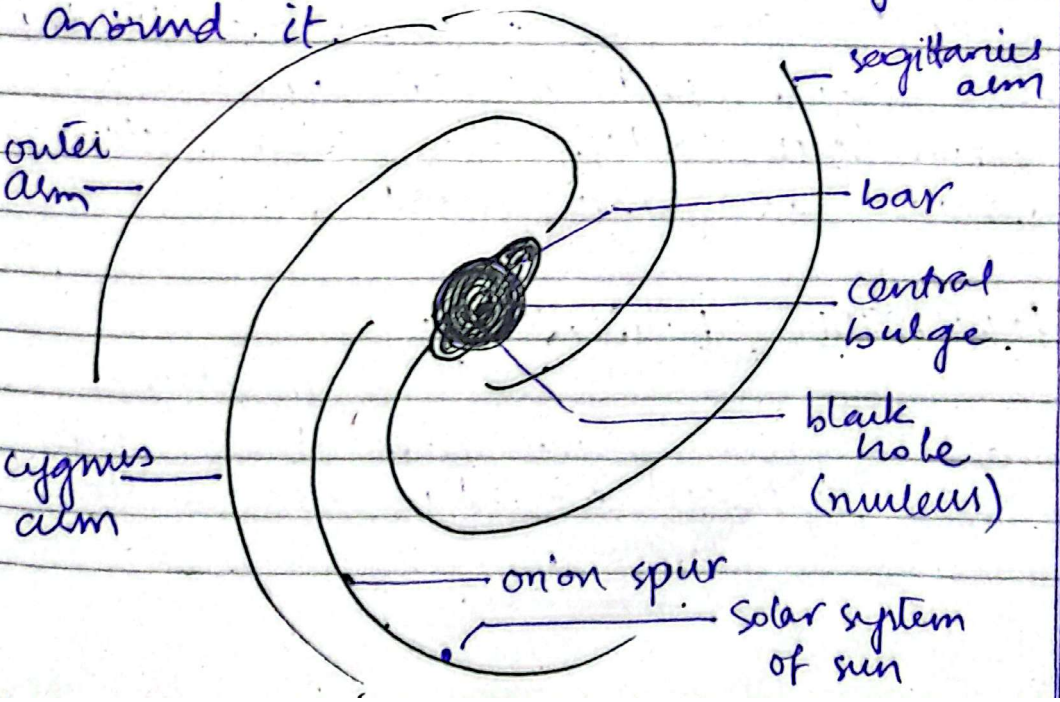




(3) MILKY WAY GALAXY

- (a) Structure of Milky Way Galaxy.

Milky Way Galaxy is the home of our solar system. It consists of a central bar consisting of a black hole, with arms circulating around it.



(a) Nucleus / black hole:

It holds the entire galaxy together.

(b) Bar:

As Milky way galaxy is a spiral barred galaxy, the arms do not emerge directly from the nucleus or central bulge, rather from the bar

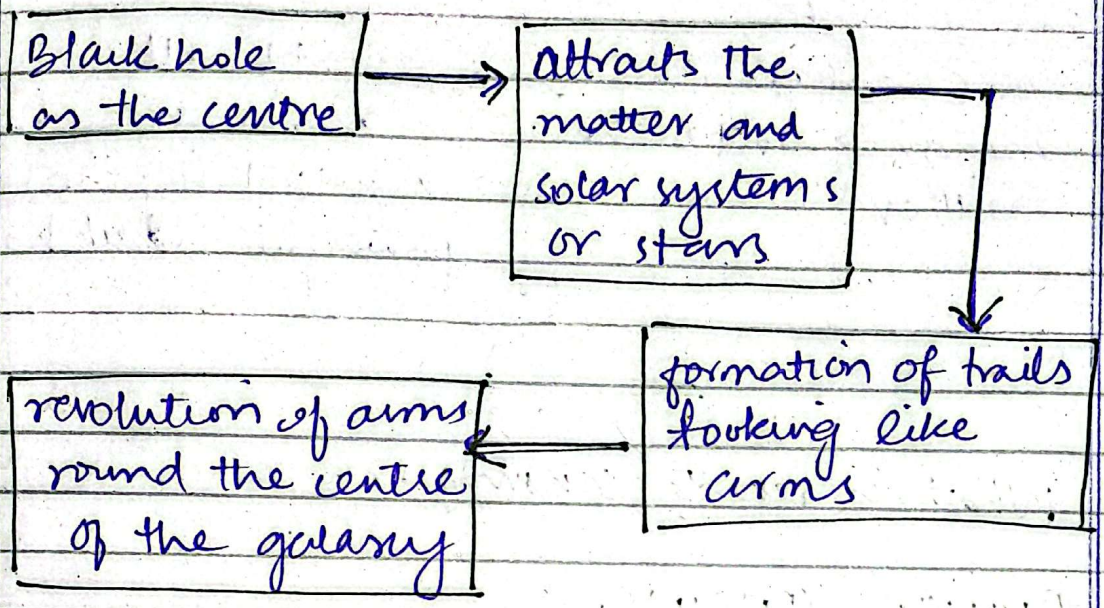
(c) Arms:

The arms are the trails of dust particles, nebulae, solar systems, planets, asteroids and meteroids forming an arm shape, circulating or revolving round the centre of the galaxy due to it's strong gravitational pull. They are divided into major and minor arms. The Orion Spur contains the solar system where our planet resides.

(4) FORMATION OF GALAXIES:

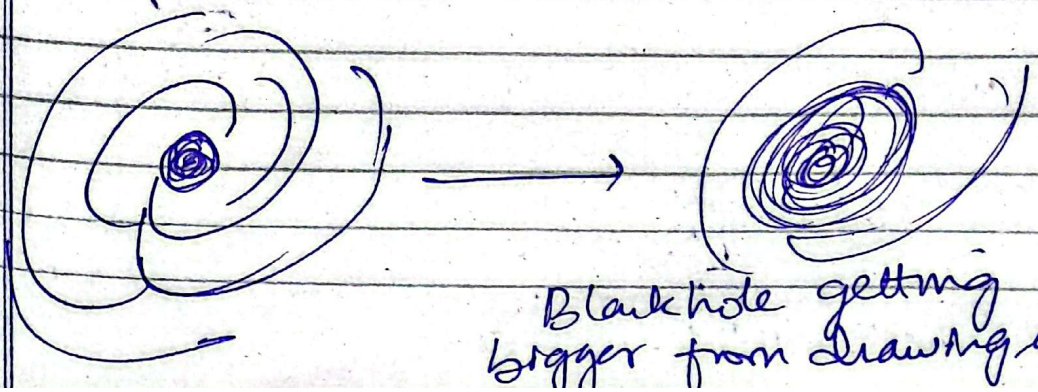
Formation of galaxies begins from the black hole, whose gravitational pull

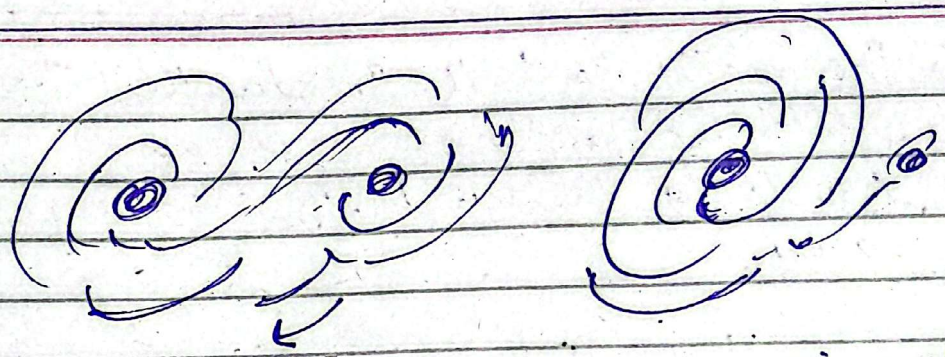
attracts the matter to itself. Gradually, the matter builds up, getting closer and begins revolving around it, creating the galaxy.



(5) EVOLUTION OF GALAXIES:

The blackhole at the centre keeps on attracting the arms, or the material, into itself until they completely vanish. The galaxies may also form a hybrid, drawing energy from eachother until one completely takes over the other.





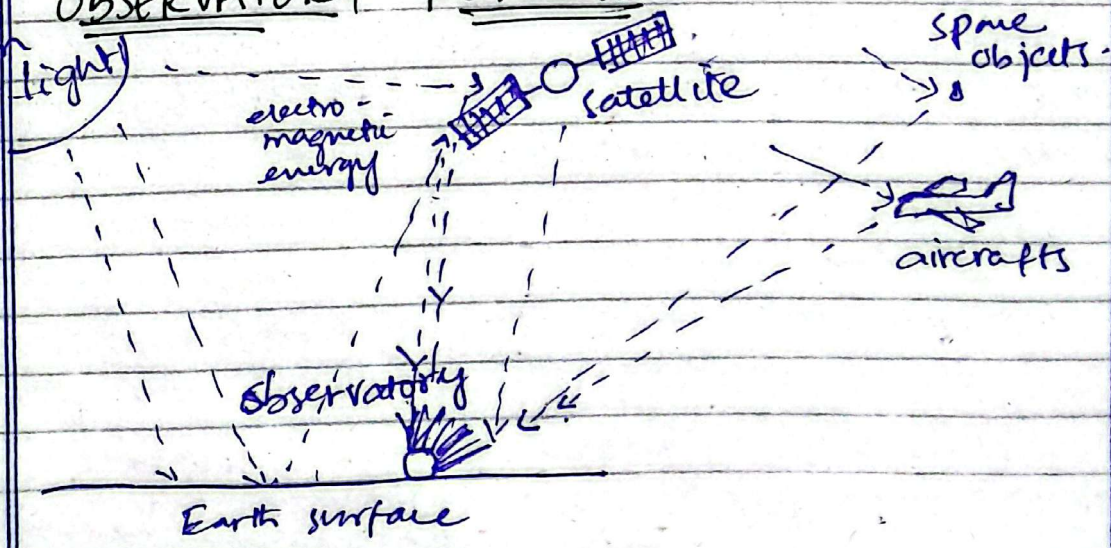
one galaxy merging into the other → until all arms are engulfed by the powerful black hole.

(C) What is remote sensing ...

(1) REMOTE SENSING

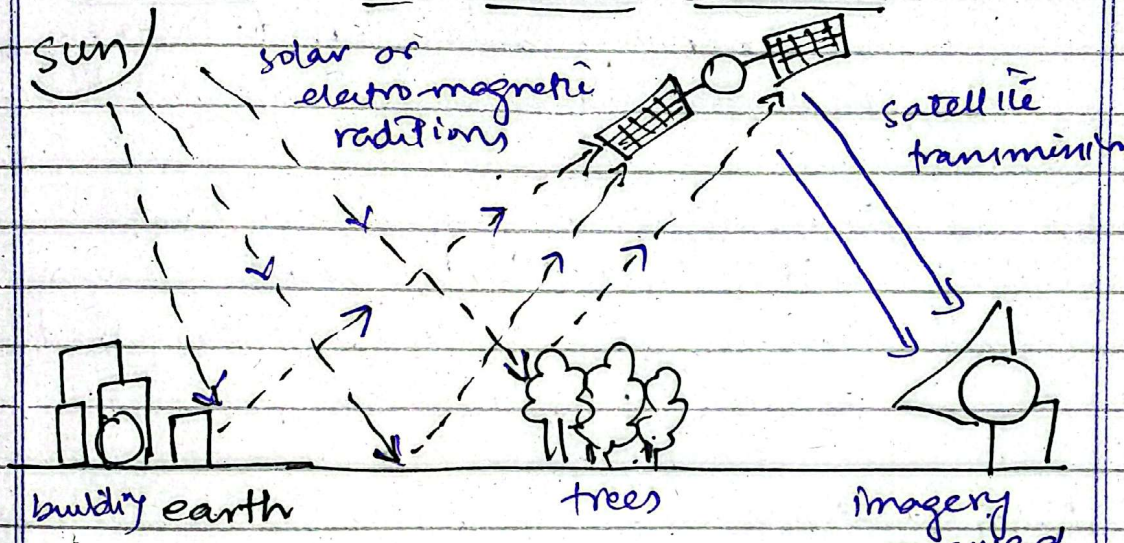
Remote sensing is a system of locating, sensing and analyzing the environment or a particular object in a wide area.

(2) OBSERVATORY FUNCTIONS :

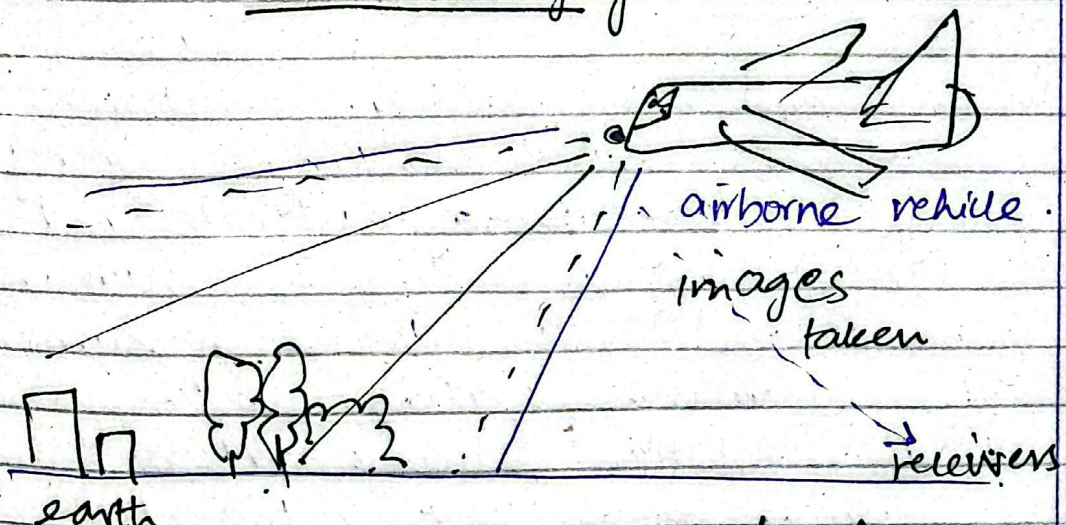


The observatories use the technology of sensing and receiving ~~the light from the object~~ the reflected electromagnetic energy from the sun. It is received and the image is generated by using it.

(3.) APPLICATIONS OF REMOTE SENSING



Satellite imaging ↑



ariel photography ↑

(4) MONITORING NATURAL DISASTERS AND ENVIRONMENT

(a) Ariel photographs and videos can help analyze the situation without physical presence in that area.

(b) The changing environmental conditions can be received beforehand through the shift in radiation reception.

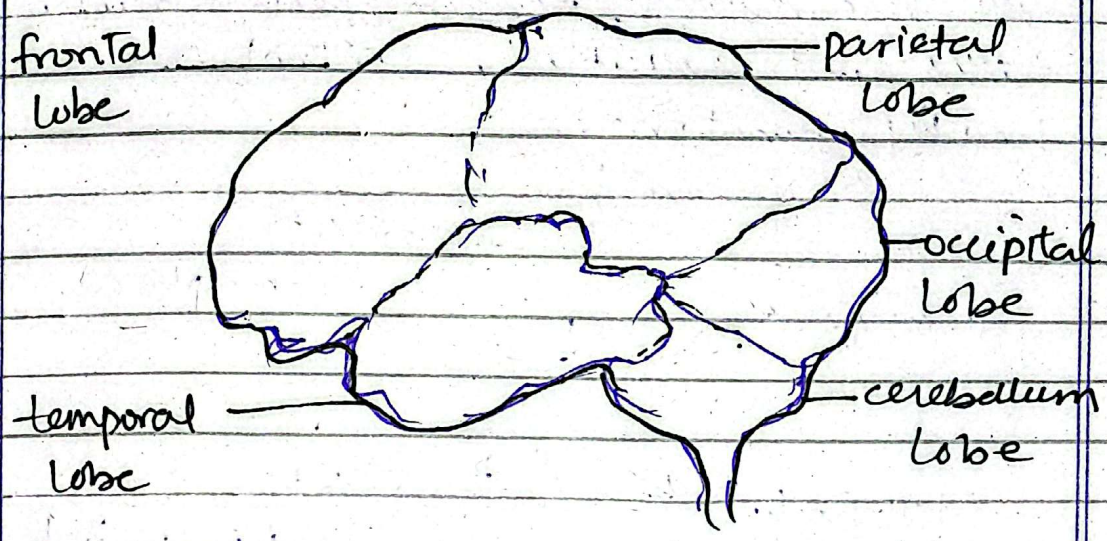
(c) The remote sensing technology can help send the affected areas images to analyze if a damage has happened.

(d) Main functions ...

(1) HUMAN BRAIN FUNCTIONS:

Human brain controls the bodily functions of movement control, thinking, memory storing, breathing, ~~blood~~ heart rate and the emotions of the body. The human brain is the control house of human body, ensuring effective working and regulating various actions of human body, both internal and external.

(2) REGIONS OF HUMAN BRAIN:



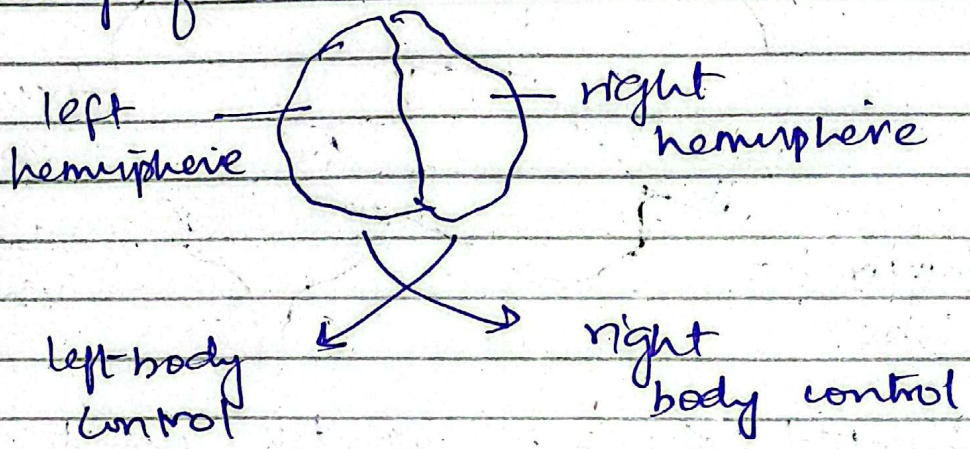
Frontal Lobe → cognitive functions
- → personality, behavior
- → problem solving skills
- → reasoning.

Parietal Lobe → sensory information (pain, temperature, touch)
- → spatial awareness

Temporal Lobe → hearing functions
- → understanding language
- → processing emotions

Occipital Lobe → visual information and processes
- → recognizing shapes and colors.

All there regions perform their specific tasks and collectively control the bodily functions.



(3) FACTORS AFFECTING BRAIN FUNCTIONS:

(a) Sleep → disturbs the body's inbuilt clock system.
→ It affects the time of bodily functions which further disturb the brain's normal working.

(b) Stress → Stress can cause hormonal imbalance in the body which in return disturbs the brain functions that depend on the hormonal balance.

(d) nutrition → each body part requires nutrients to function effatively. The deficiency of the necessary nutrients is like cutting off the fuel of car engine. Once the supply is reduced or completely cut off, the ~~nutrients~~ brain functions are affected.

Q4. ----

(a) FIBER OPTICS.

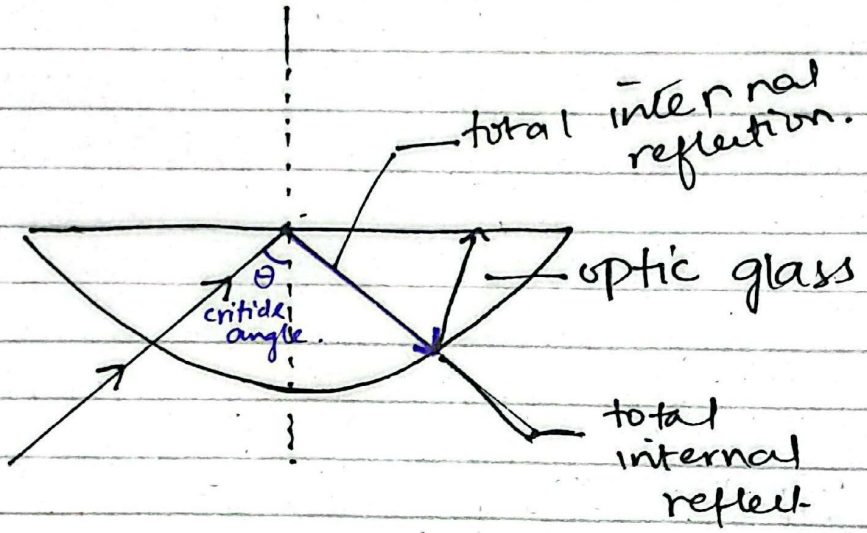
Fiber optics are optically thin glass, as thin as hair, which are used to transfer digital information over long distances.

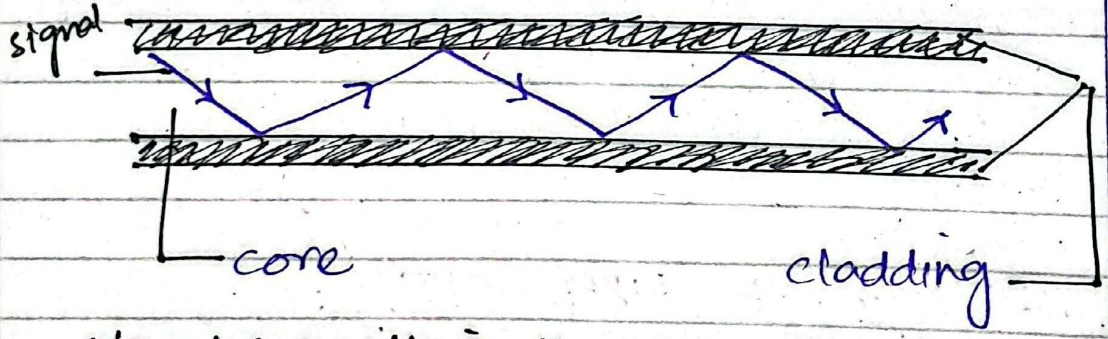
WORKING OF FIBER OPTICS:

Fiber optics transfer digital data through use of total internal reflection.

⇒ Total Internal Reflection:

Total internal reflection takes place when the angle of incidence exceeds critical angle and completely reflects inwards.





signal travelling through optical fiber through total internal reflection.

⇒ ADVANTAGES OF FIBER OPTICS OVER TRADITIONAL COPPER WIRES

(a) Thin structure:

A thin fiber cable allows humongous amount of information to be transferred effectively.

(b) Limited loss of data:

Use of fibre optics allow little loss of energy over long distances.

(c) Immune to interference:

These means of data transfer do not allow loss of information due to external interferences like sound, heat or other factors.

(d) More data transfer in less time:

It effectively transfers alot of digital information in less time with almost no data loss.

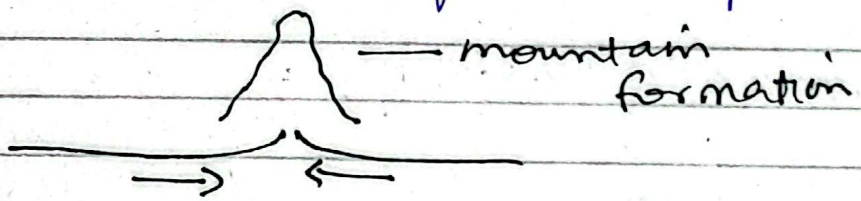
b) CAUSES OF EARTHQUAKES

(i) The movement of tectonic plates

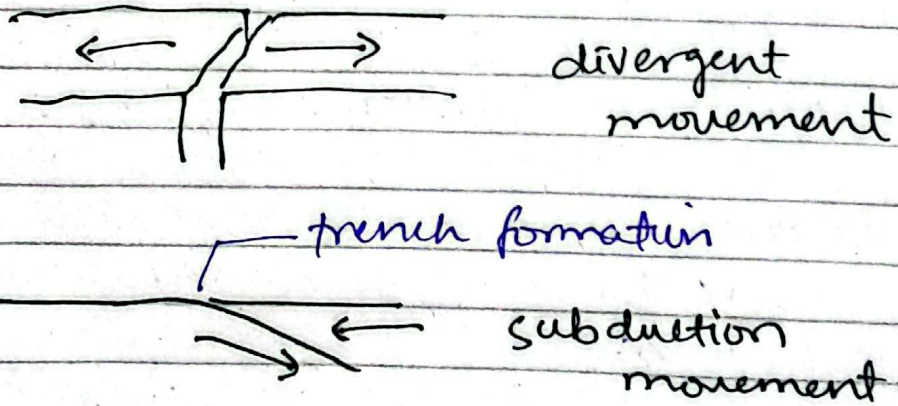
(ii) The rebounding of elastic energy stored in the earth's crust due to prolonged stress over earth's crust.

EFFECTS OF EARTHQUAKES:

(i) Relocation of tectonic plates



(ii) Formation of mountains



(iii) Damage to the infrastructure

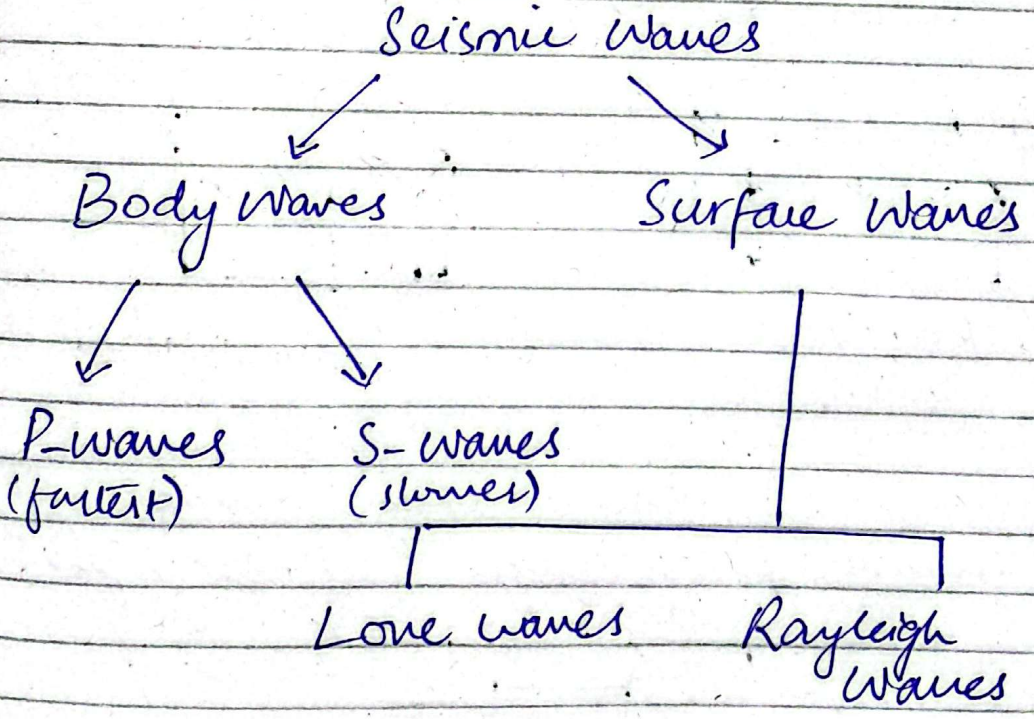
(iv) Trenches in oceanic beds are formed leading to tsunami

(v) Mountain ranges are formed as a result of convergent movement

(vi) Agricultural area is lost

(vii) Casualities and injuries to human beings and other life on earth.

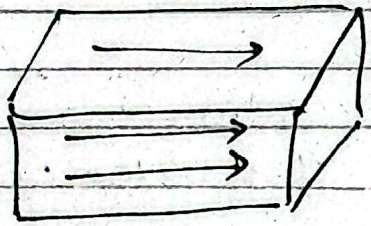
TYPES OF SEISMIC WAVES



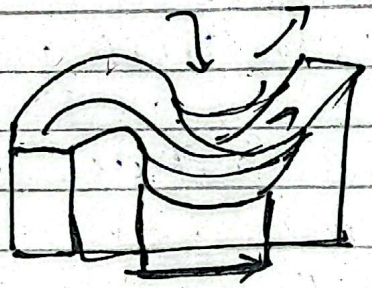
Body waves → travel through earth's interior

Surface waves → travel through earth's upper surface

Body Waves

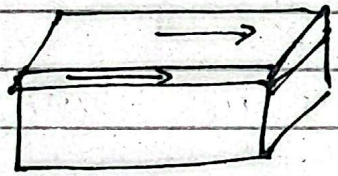


P-waves

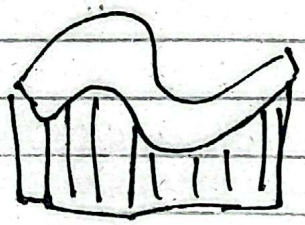


S-waves

Surface Waves

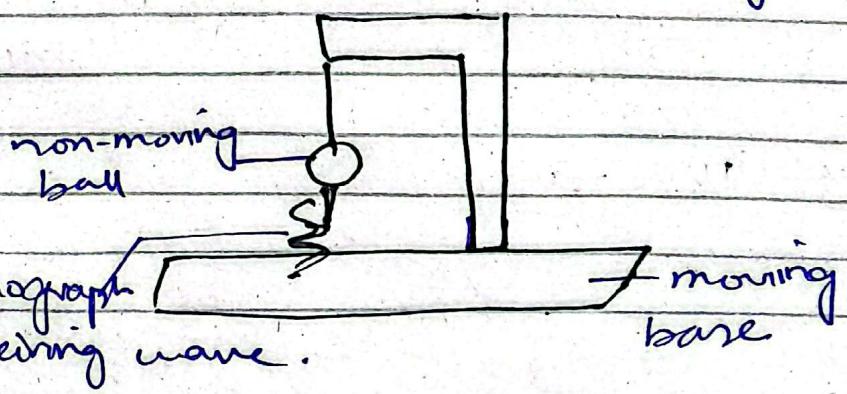


Rayleigh wave



Love wave.

Seismic waves are measured through "seismograph"

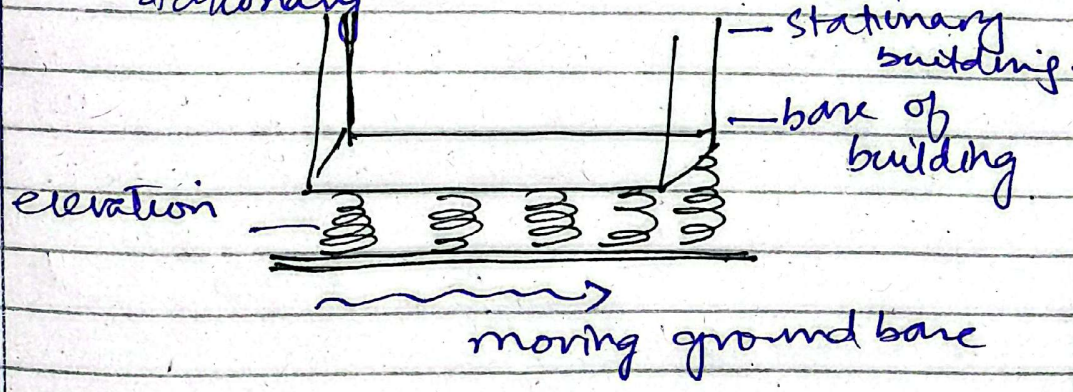


EARTHQUAKE RESISTANCE

(a) Flexible infrastructure allows the earthquake waves to travel through them, but donot collapse under a compact, immovable structure.

(b) An inbuilt seismograph inside a building allows the wave energy to move the heavy ball in the top most part of the building, protecting the structure of the building.

(c) If the base of the building is elevated from the ground, the seismic waves donot affect the building, rather keep the body stationary



(c) BALANCED DIET:

Balanced diet consists of all the important carbohydrates, proteins, fats, nutrients, minerals, vitamins etc in a balanced amount.

The three major sources of energy in our diet are as follows in a balanced amount.

Carbohydrates	—	58%.
Fats	—	30%.
Proteins	—	12%.

NUTRIENTS:

Nutrients are important sources of energy that are required for proper functions of body, to move and for reproduction.

They are classified into two categories.

(1) Macro nutrients
(2) Micro nutrients

Nutrients

Micronutrients

needed in small amounts by the body

Examples

(a) Vitamins
(b) Minerals

Macronutrients.

needed in large amounts by the body

Examples

(a) Carbohydrates
(b) Fats
(c) Proteins

The micro nutrients are taken in smaller amounts because ~~they~~ the excessive intake can lead to toxicity increase in the body.

PREVENTION OF CHRONIC DISEASES

A balanced intake of;

(a) carbohydrates
(b) fats
(c) proteins
(d) minerals
(e) vitamins
(f) water
(g) nutrients

lead to a healthy lifestyle.

It helps in;

- regulating blood sugar
- maintaining blood pressure
- preventing obesity
- promotes health of heart and other organs
- prevents toxin buildup

All these outcomes help in leading a healthy life and prevents contracting a life threatening disease or chronic diseases.

(a) SOURCES OF WATER POLLUTION:

Definition:

The contamination of water bodies through pollutants is called water pollution. It includes the pollution of lakes, rivers, sea, ocean and underground water bodies.

Sources

(i) Unfiltered industrial waste

(ii) Leakage and seepage of polluted water into the underground

(iii) Human activities polluting rainwater that ultimately dumps in water bodies.

(iv) Agricultural waste containing insecticides, pesticides and fertilizers

(v) Acid rain and flood water containing wreckage and pollutants.

EFFECTS OF WATER POLLUTION:

(i) Effects on human body:

→ Drinking polluted water causes water borne diseases like cholera.

→ Can act as a vector for spreading of plague

(ii) Effects on marine life:

→ The aquatic life is affected badly due to toxins or other pollutants in water.

→ Death of aquatic life and harm to their bodily functions

→ Aquatic plants also suffer due to pollutant presence.

(iii) Effects on environment:

→ It degrades the water quality and can lead to smell/odour buildup.

Q5

(c) Initial Population = 1,75,000
Increased population = 2,62,500

Increase = 2,62,500 - 1,75,000
= 87500

Average % increase =

$$\frac{\text{Increase}}{\text{Initial population}} \times 100$$

$$= \frac{87500}{175000} \times 100$$

$$= \frac{35}{70} \times 100$$

$$= \frac{1}{2} \times 100$$

$$= 0.5\%$$ increase

R.W

262500
-175000
87500

0.5
2|1

(d) Cost price of 1 dozen eggs = Rs 375

C.P of 1 egg = Rs 31.25

CP of 20 dozen = 20 × 12 = 240

= 240 × 31.25

= Rs. 7500.00

S.P of 1 egg = Rs. 33

S.P of 240 eggs = 240 × 33

= Rs 7920

Profit = SP − C.P

= 7920 − 7500

= Rs 420

$$\text{Profit \%} = \frac{\text{Profit}}{\text{original price}} \times 100$$

$$= \frac{420}{7500} \times 100$$

$$= \frac{420}{75} = \frac{84}{15} = \frac{28}{5}$$

$$= \frac{28}{5}$$

Profit % = 5.6 %

Rw

31.25 — 240 — 33 — 20

12 | 375.00 — 24 — 33 — 12

36 — 60 — 72x — 792

15 — 60 = 792

12

30

−24

60

12 | 375.00

24

12500

6250x

75000

5 | 28.0

25

30

5.6