

1. Give numbering to headings
2. Do not write lengthy paragraphs. Write medium sized paragraphs with headings.
3. Do not use table for comparison and contrast questions.
4. Draw figures/diagram/flowchart where needed.
5. Start new question from fresh page.
6. Write unit of the answer in ability section.
7. Explain mathematical steps and the reasoning for better score.
8. Change colour scheme for references to give them more visibility.
9. Manage time well.
10. Wide page borders are discouraged. Should be reasonable.
11. Avoid writing wrong references.
12. Give more weightage to expressly asked part/s of the question.

①

## Section - A

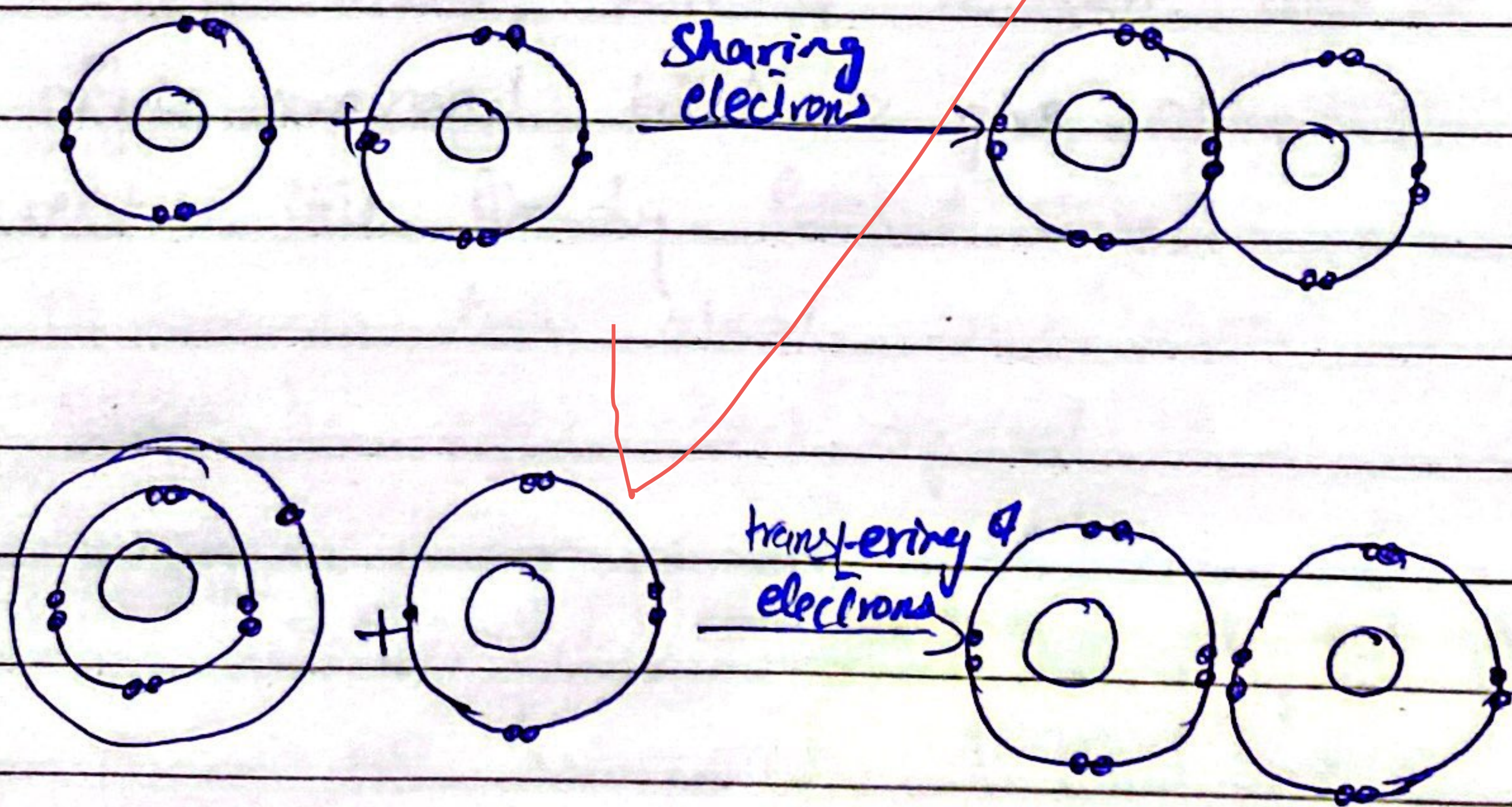
(a)

### Answer

## Octet Rule In Chemical Bonding:

The octet rule in chemical bonding means that atoms want to have full outer shell of eight electrons. This is achieved by the gaining, losing or sharing of electrons with other atoms. This helps them more stable and form chemical bonds.

### Examples



## Covalent Bond:

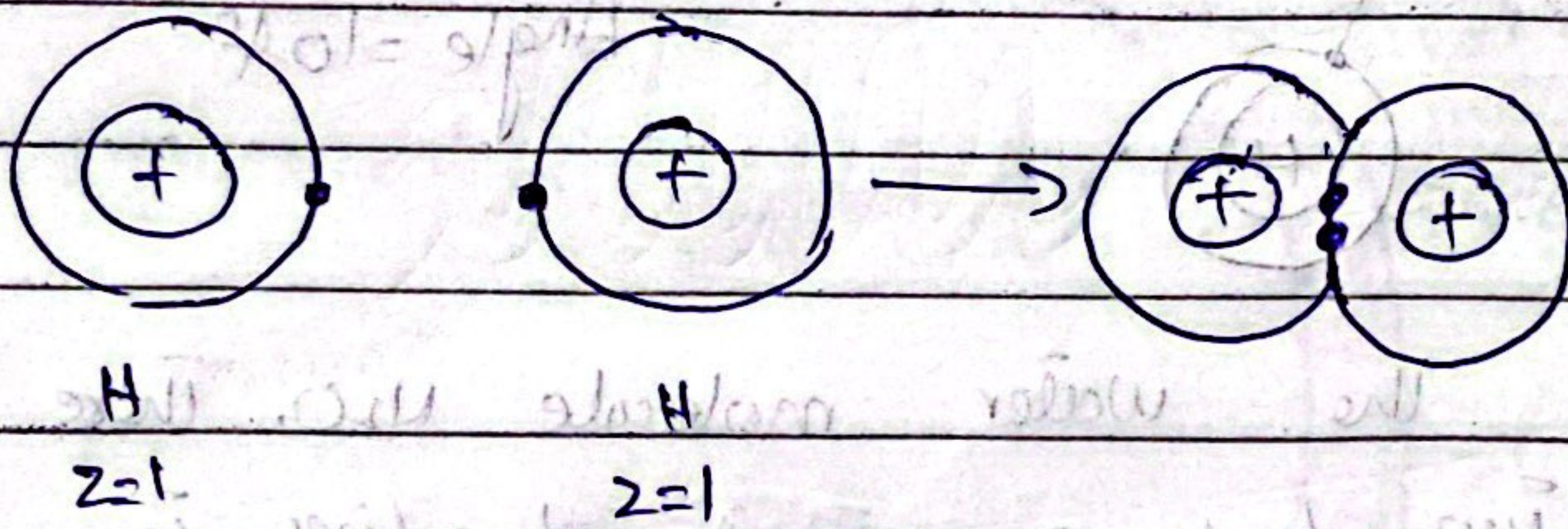
A covalent bond is a type of chemical bond which is formed by the mutual

sharing of electrons between two atoms. This bond is formed between non-metals that have similar electronegativity. The shared electrons are attracted to both nuclei, creating a strong bond.

Covalent bond can be single, double or triple.

### Explanation

Consider the example of hydrogen gas  $H_2$ .



In  $H_2$  molecule, the two electrons forming the covalent bond are equally shared by the two identical atoms having same electronegativity.

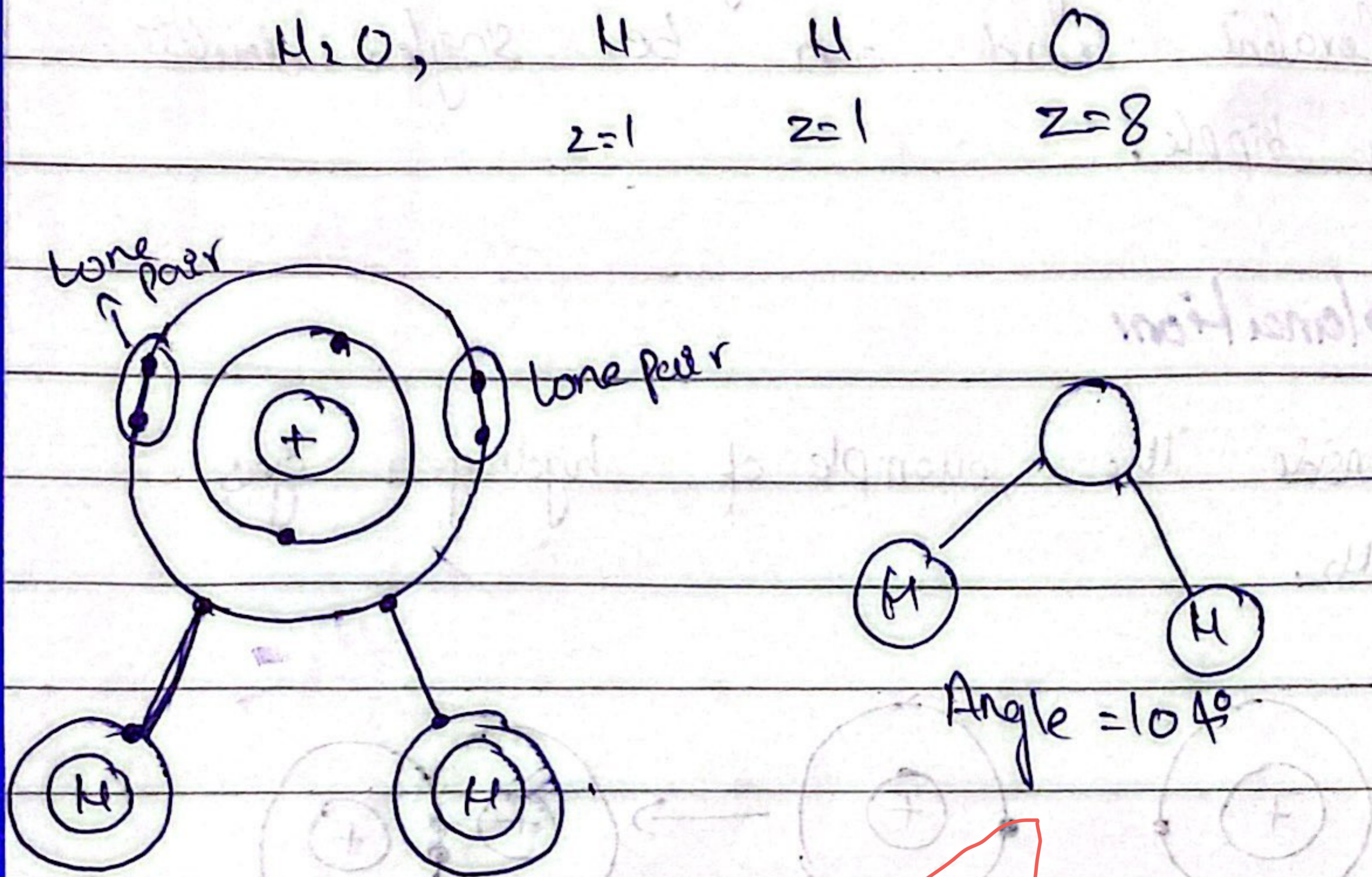
(b) Why water molecule is angular in structure?

Answer:

Water molecule is angular in structure because of the arrangement of

its atoms and the presence of lone pairs of electrons on the hydrogen atom

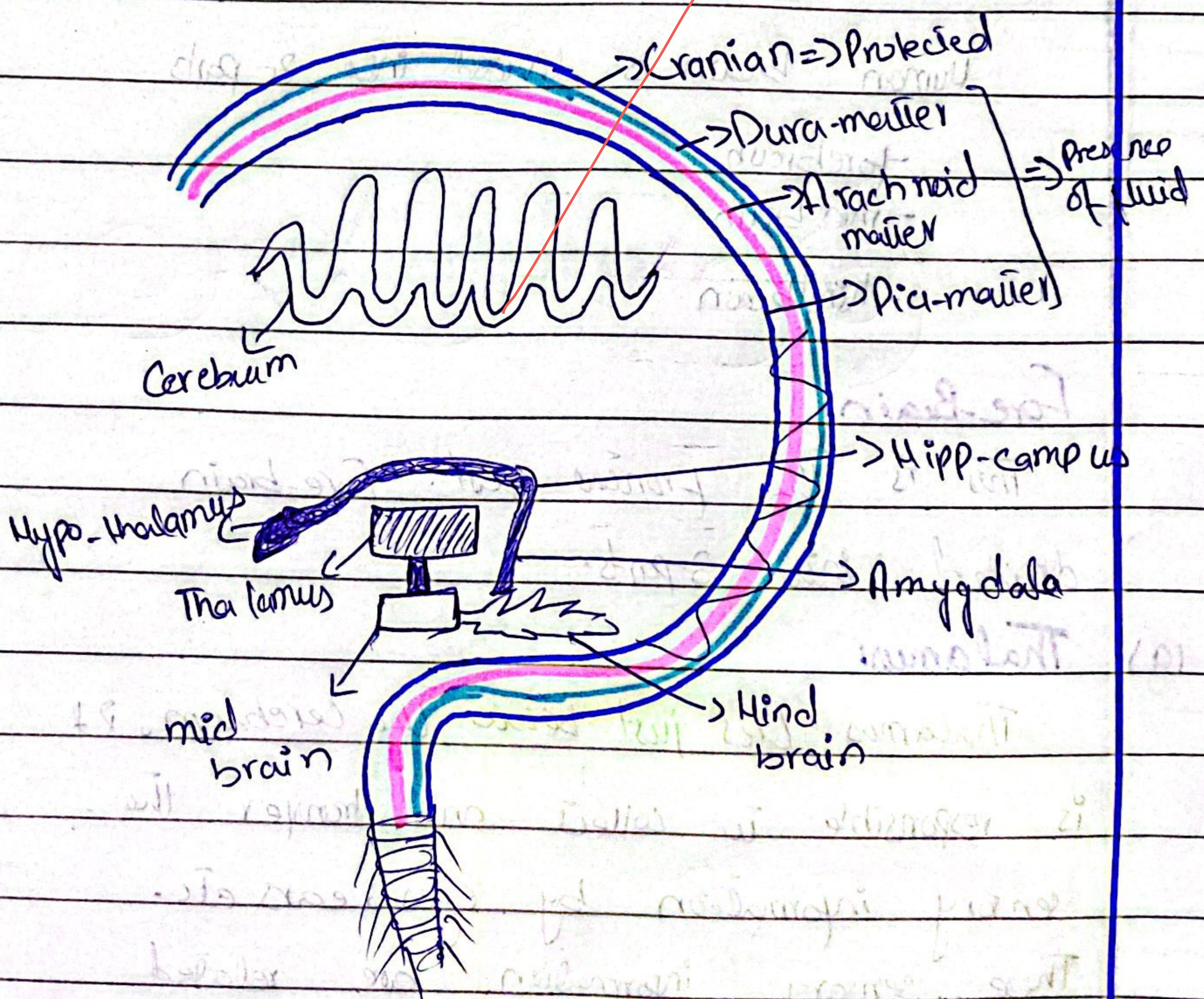
## Explanation



In the water molecule  $H_2O$ , there are two hydrogen atoms bonding to a central oxygen atom. The oxygen atom has six electrons in its outer most shell and it needs two more electrons to complete its outer most shell. Each hydrogen atom contributes and form two covalent bond with oxygen atom. By this oxygen atom gains 8 electrons.

However, the oxygen atom also has two lone pairs of e<sup>s</sup>, these lone pairs do not take part in bonding and exert a repulsive force on the bonding pairs of e<sup>s</sup>. This repulsion causes the bonding pairs to be pushed closer together, resulting in angular shape.

## (C) Structure & Function of Human Brain



In animals, all life activities are under the control of brain. The structure of brain is suitable to perform this

function. Brain is situated inside a bony cranium. Inside cranium, brain is covered by three layers called meninges. (Dura-matter, Arachnoid matter and Pia matter). Meninges protect brain and also provide nutrients and oxygen to brain tissues through their capillaries.

## Division of Human Brain

Human brain is divided into 3 parts

- forebrain
- midbrain
- hindbrain.

### Fore-Brain:

This is the frontal part. Fore-brain divided into 3 parts.

#### (a) Thalamus:

Thalamus lies just below the cerebrum. It is responsible to collect and transfer the sensory information by eyes, ears etc. These sensory information are related to external environment.

#### (b) Limbic-system:

Limbic-system is further divide into 3-part.

i.e.

(i) Hypo-thalamus

(ii) Hippo-campus

(iii) Amygdala

### (b) Hypo-thalamus

It lies above midbrain and just below thalamus. It regulate to manage body temperature. One of the most important functions of hypothalamus is to link nervous system and endocrine system. It is responsible to manage the hunger menstrual cycle.

### (i) Hippo-campus

It is responsible for memory storage basically long term memory storage.

### (ii) Amygdala

It is responsible to control feelings such as rage, pain, pleasure and sorrow.

### (c) Cerebrum

This is the largest part of forebrain. It controls skeletal muscle, thinking, intelligence and emotions. It is also

responsible for memory storage.

### Mid-Brain:

Mid-brain lies between hind brain and fore brain and connects the two. It receives sensory information and sends it to appropriate part of forebrain. It is responsible to control the reflex movement of human eyes.

### Hind Brain:

Hind brain consists of three major parts.

- (i) Medulla oblongata
- (ii) Cerebellum
- (iii) Pons

#### (i) Medulla oblongata

It lies on the top of spinal cord. It controls breathing, heart rate and blood pressure.

#### (ii) Cerebellum

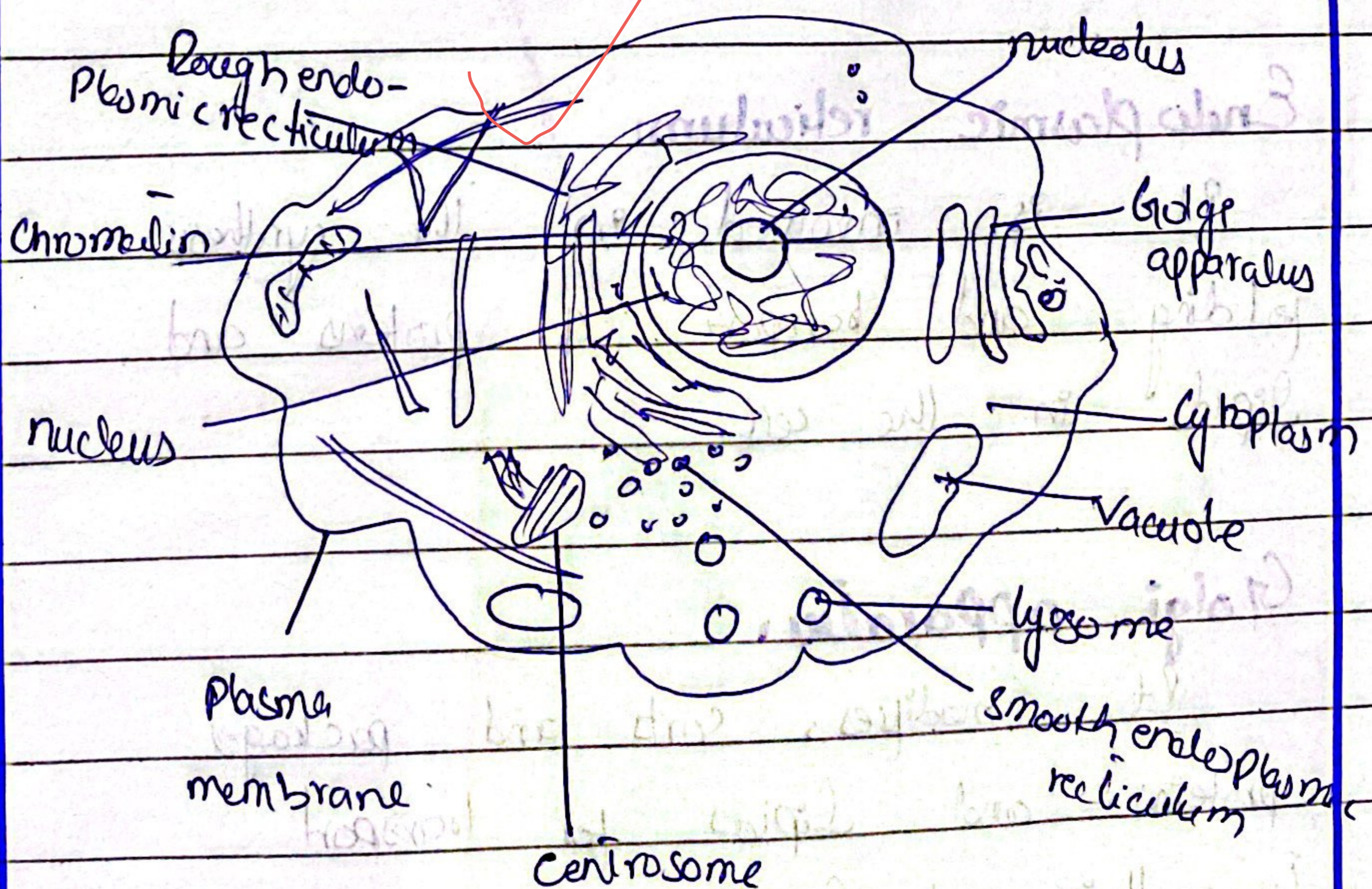
It is behind the medulla. It is responsible for short term memory, body coordination and maintain the balance of body.

(iii) Brain

It is responsible to manage the sleep cycle.

(d) Cell structure

The cell is the basic structural and functional unit of all living organisms. It is enclosed by a cell membrane that controls the movement of substances in and out of the cell. The cell structure is highly organised and allows cells to carry out their specific functions within an organism.



Functions of cellular Organelles



Organelles play crucial roles in maintaining the cell's overall function and ensuring its survival. The functions of subcellular organelles are following.

## Plasma Membrane

It is also termed as cell membrane or cytoplasmic membrane. The plasma membrane is present both in animal and plant cells. It plays a role of permitting the entry of selective materials in and out of cell according to the requirements.

## Endoplasmic reticulum:

It is involved in the synthesis, folding and transport of proteins and lipids in the cell.

## Golgi apparatus:

It modifies, sorts and packages proteins, and lipids for transport to their final destinations within or outside of the cell.

## Question # 3

### (a) Definition of Polio:

Polio, or poliomyelitis, is a viral infection that affects the nervous system.

### Causes and Symptoms of Polio

It is caused by the poliovirus, which is primarily transmitted through contaminated water and food. The virus enters the body through the mouth and multiplies in the throat and intestine.

### Symptoms:

Symptoms of polio can vary from mild flu-like symptoms to more severe muscle weakness or paralysis. Some individuals may have experience headache, fever, sore throat and fatigue. However,

it is important to note that polio can be through vaccination, which has significantly reduced the number of polio cases worldwide.

### Differentiation Between IPV & OPV

## Inactivated Polio Vaccine:

- IPV stands for Inactivated Polio Vaccine. It is used to protect against polio virus types 1, 2 and 3.
- It is made from killed poliovirus strains.
- It is given as an injection.
- IPV provides individual immunity and protects against viruses.
- It is considered safe for people with weakened immune system.

## Oral Polio Vaccine

- OPV stands for oral polio vaccine.
- OPV is made from weakened polio virus strains.
- OPV provides individual immunity and helps to interrupt the transmission of the polio virus in communities.
- OPV stimulates an immune response in the intestine.

## (b) Nervous Systems

The nervous system is a complex network of nerves and cells that transmit signals between different parts of the body. It is responsible for coordination and controlling various bodily functions, including movements, sensation and cognition.

### Parts of Nervous System.

Nervous System is basically divided into two parts i.e.

- central nervous system
- peripheral nervous system.

### Central nervous system:

Central nervous system comprises of coordinations i.e.

- brain and
- spinal cord

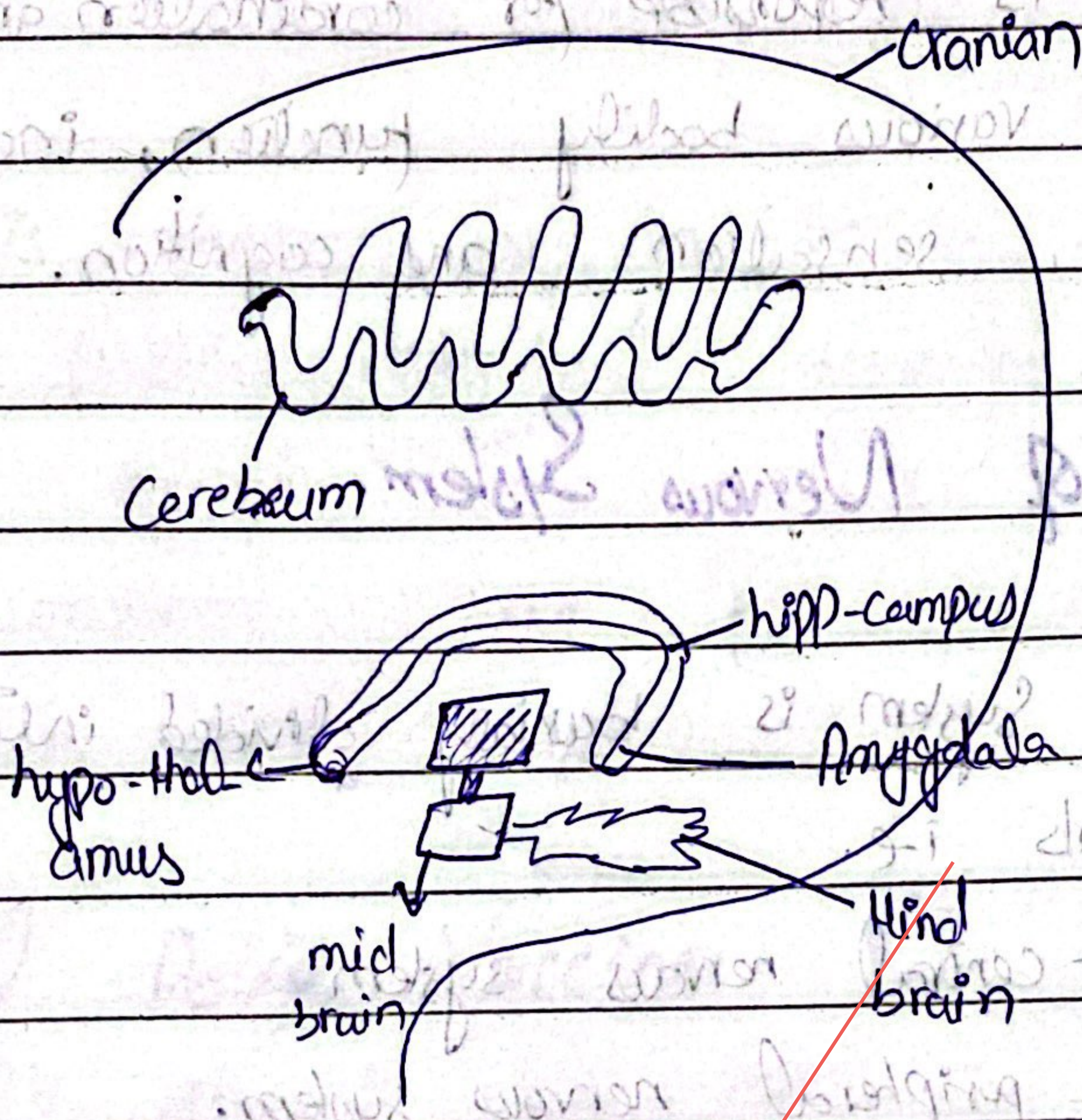
### Peripheral nervous system.

Peripheral nervous system consists of nerves that arise from central nervous system and spread in different part of body.

# Central Nervous System

Central nervous system consists of brain and spinal cord.

## A- Brain



In animals all life activities are under the control of brain. The structure of brain is suitable to perform their function. Brain is situated inside a bony cranium. Inside cranium brain is covered by three layers called meninges. Meninges protect brain and provide essential nutrients and oxygen to brain tissues.

## The Division of Brain

Brain is divided into three major parts i.e.

- fore-brain

- mid brain

- hind-brain

### Forebrain

Fore brain is the largest part of brain. It is responsible for higher level of thinking, decision-making and complex functions. It also includes important structures like thalamus, hypothalamus and cerebrum.

### Mid brain

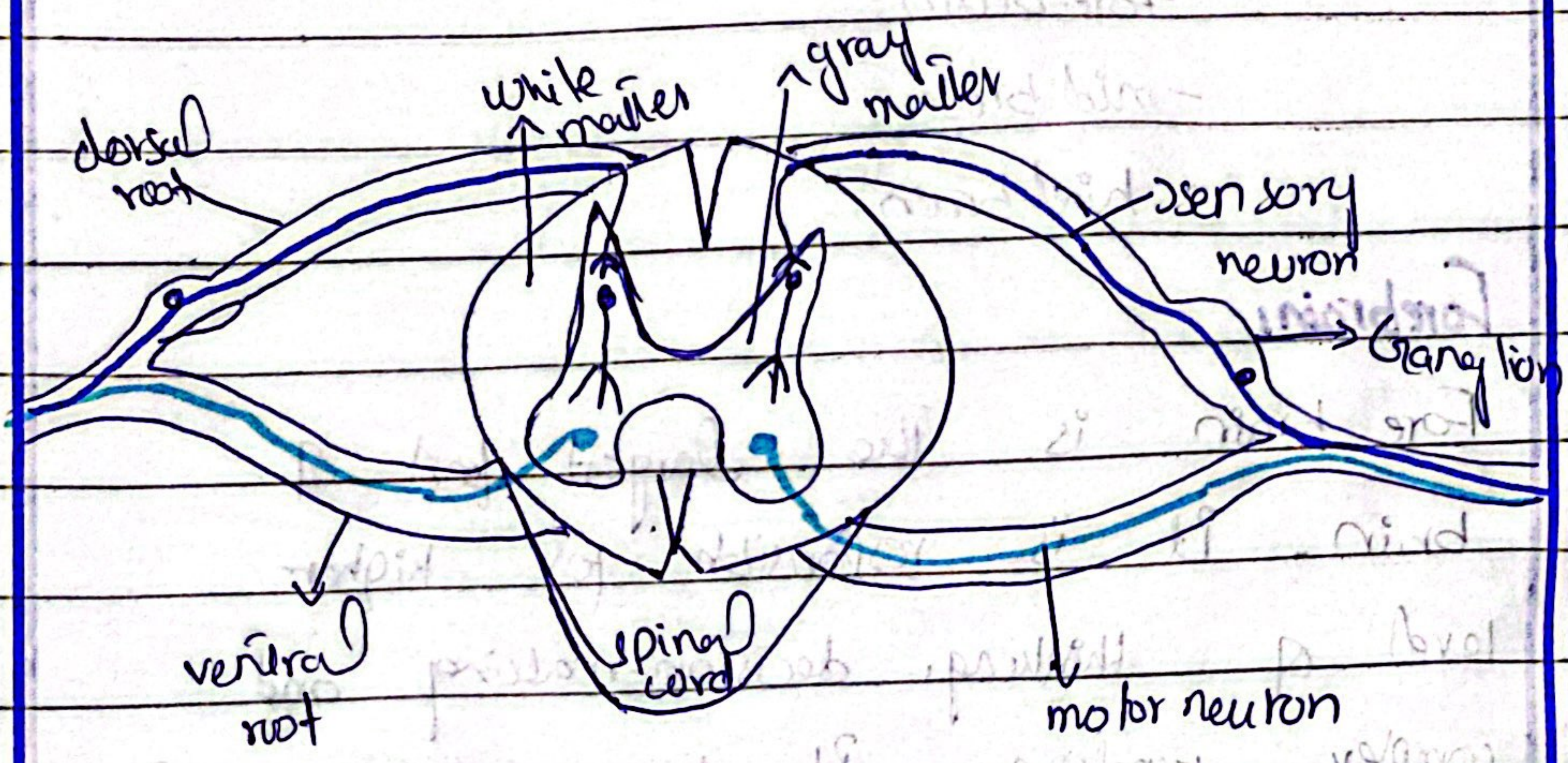
Mid brain lies between hindbrain and forebrain and connects them. It is responsible to control the reflex movements of human eyes.

### Hind-brain

Hind brain is like the back office of our brain. It is responsible for basic functions like controlling our balance

coordination and involuntary action. It includes important structures like cerebellum, pons and medulla.

### B Spinal Cord



The spinal cord is like a communication highway that connects the brain to the rest of the body. It is a long, thin bundle of nerves that runs through the spine.

### Function

- The spinal cord carries signals between the brain and different parts of the body, allowing us to move, feel sensations, and control bodily functions.
- Spinal cord also act as coordinator, responsible for some simple reflexes.

## Alzheimer Disease

Alzheimer disease is the most common type of dementia, and begins with mild memory loss. It is a progressive brain disorder that affects memory, thinking and behaviour. It gradually destroys brain cells, leading to memory loss, confusion and difficulty with daily tasks.

As the disease progresses, individuals may experience personality changes, and problems with language.

## (c) Structure, Function and Classification of Carbohydrates

Carbohydrates are a major source of human body. It is necessary for human brain, human heart and kidney.

### Sources

The sources of carbohydrates are wheat, barley, milk, sweet and fruits etc. Carbohydrates are organic compounds made up of carbon, hydrogen and oxygen atoms.



Carbohydrates have variety of functions including

- providing energy
- storing energy
- and playing a role in cell communication.

### Classification

Carbohydrates can be classified into

3 main categories i.e.

- monosaccharides
- disaccharides
- polysaccharides.

(d) Answer:

### Importance of Preservation and Antioxidants:

Preservation and Antioxidants are important to keep our food fresh and healthy. Preservation methods, such as canning, freezing and drying help extend the shelf life of food and prevent spoilage.

This is important for ensuring food safety and reducing the wastage of food.

## Importance of Antioxidants

Antioxidants on the other hand, are like shields that protect our body from harmful molecules called free radicals. Antioxidants found in many fruits, vegetables and other foods help neutralise these free radicals and promote health.

## Section B

Q. 7

If Ishaq can complete the tailoring job in 6 hours and Abbas it in 4 hours then,

together they can complete

$$\frac{1}{6} + \frac{1}{4} = \frac{2+3}{12}$$

$$= \frac{5}{12}$$

Since Abbas leaves after two hours,

so they have completed

$$\frac{2 \times 5}{12} = \frac{5}{6}$$

$$\begin{array}{r} 2+6 \\ \underline{13} \\ 2+12 \\ \underline{\quad} \\ \quad \end{array}$$

$$1 = \frac{1}{6} + \frac{1}{8}$$

$$\frac{2}{8} + \frac{1}{8} = \frac{3}{8}$$

$$\frac{2}{8} + \frac{1}{8} = \frac{3}{8}$$

19

now irfan takes over so

work would complete in  $\frac{1}{6} + \frac{1}{8}$

$$= \frac{4+3}{24}$$

$$= \frac{7}{24} \text{ hours}$$

Total?

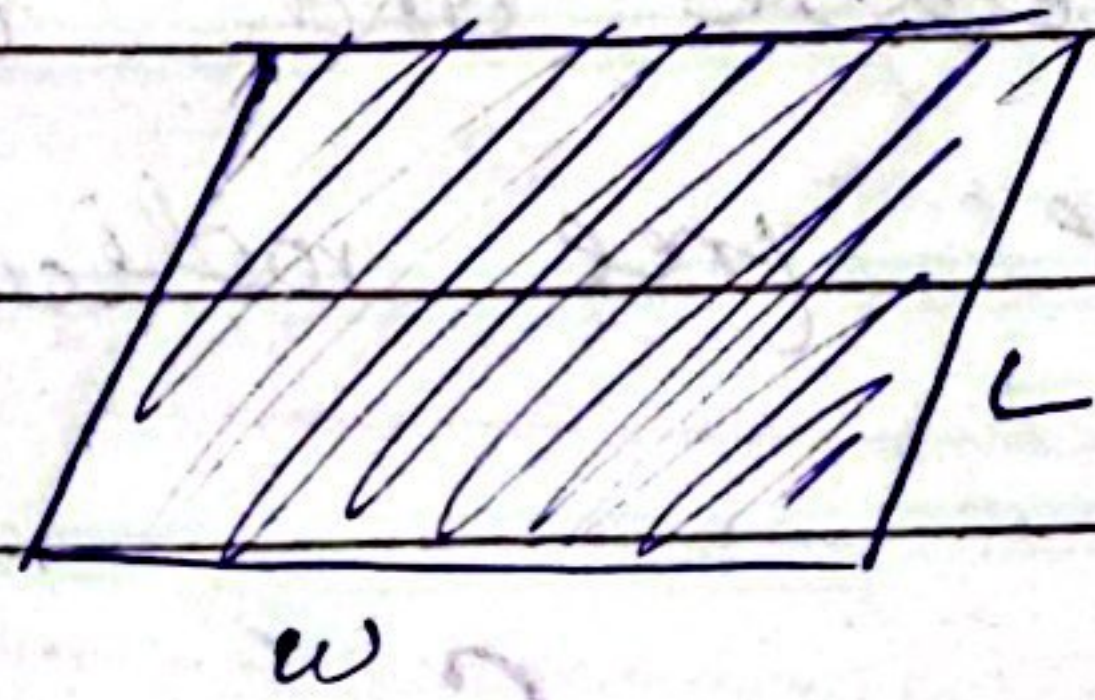
Q# 7 (b)

Since farm is rectangular

so

$$\text{area of farm} = L \times W$$

$$= 576 \text{ m}^2$$



we can find length and width  
by taking  $\sqrt{\quad}$  of area  
suppose

$$L = W = L$$

so taking  $\sqrt{\quad}$

$$L^2 = \sqrt{576}$$

$$L = 24 \text{ m}$$

now,  $\text{circ} =$

area of wall will be

$$\text{Wall 1} = 24 \times 2 = 48 \text{ m}^2$$

$$\text{Wall 2} = 24 \times 2 = 48 \text{ m}^2$$

$$\text{Wall 3} = 48 \text{ m}^2$$

area of wall of 3-meter height

$$= 24 \times 3 = 72 \text{ m}^2$$

Total area

$$= 48 + 48 + 48 + 72$$

$$= 216 \text{ m}^2$$

(c) Answer

Mean

Mean is the sum of all values divided by total number of values

$$\text{mean} = \frac{18, 18, 19, 19, 19, 21, 21}{7}$$

$$= \frac{135}{7}$$

$$= 19.28$$

Median

Median is the middle value of arranged data i.e.

$$18, 18, 19, 19, 21, 21$$

and the middle value of arranged data is 19.

Mode

Mode is the most repeated value in arranged data

Date

18, 18, 19, 19, 19, 21, 21

most repeated value is 19

so mode = 19

Range

Range is the difference b/w max. value and minimum value.

data:

18, 18, 19, 19, 19, 21, 21

$K_{max} = 21$

$K_{min} = 18$

Range =  $K_{max} - K_{min}$

=  $21 - 18$

= 3

(d)

A mental ability skill refers to a specific cognitive or intellectual ability such as problem solving, memory or creativity. while,

an IQ test measure a person's overall intelligent quotient, which is general measure of their abilities across various domains. It aims to provide a single numerical score that represents person's overall intellectual capacity.

Q: 8 (b)

Solution

Rose = 6821

CHAIR = 73456, PEARL = 961473

Find code for SEARCH

Codes for Alphabets are

R	O	S	E	C	H	A	I	P
6	8	2	1	7	3	4	5	9

So;

in search

S will be coded as 2

E as 1

A as 4

R as 6

C as 7

and H as 3

and the code for search will be

214673

(c) Answer

If A is brother of B;

B is sister of C

C is father of D

that means A, B and C are siblings

and A and C are brother of B. now C is father of

D means A is uncle of D so D is nephew of A.