Q2:
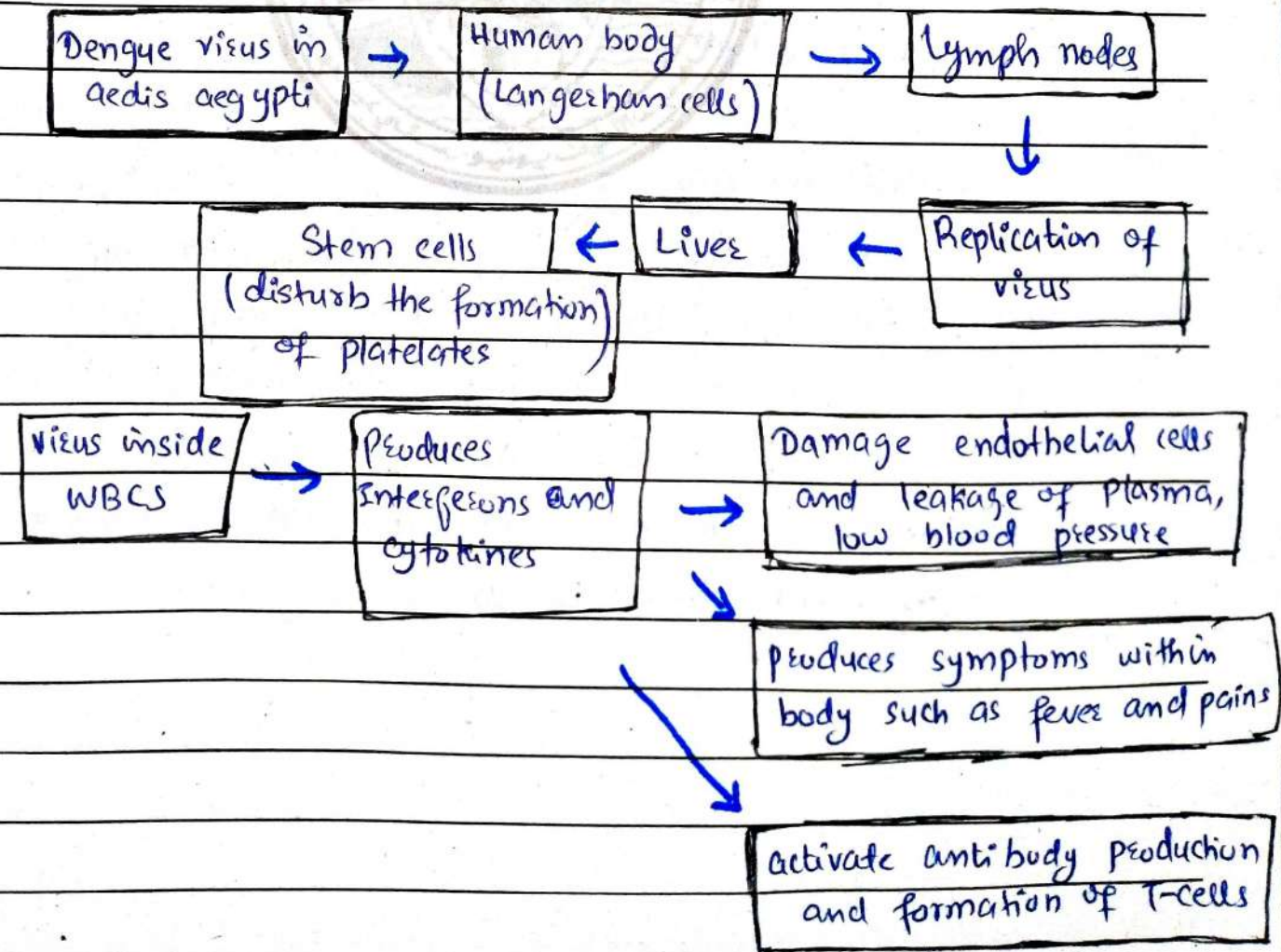
a. What is dengue? Give a brief account of its causitive agents and its symptoms.

Introduction

Dengue is the debilitating, arthropod-born disease that is caused by dengue virus. It is a break-bone fever that results in high-grade fever and severe muscle pain, bone pains. It is mostly an endemic disease that spreads by a mosquito bite i.e mostly aedis aegypti mosquito that carries virus within. This female mosquito needs blood to lay her eggs, while sucking blood, it transmits virus in human body.

| Dengue virus in aedis aegypti | → | Human body (Langerhan cells) | → | Lymph nodes |

↓

| Stem cells (disturb the formation) of platelates | ← | Liver | ← | Replication of virus |

| Virus inside WBCS | → | Produces Interferons and cytokines | → | Damage endothelial cells and leakage of Plasma, low blood pressure |

↓

| Produces symptoms within body such as fever and pains |

↓

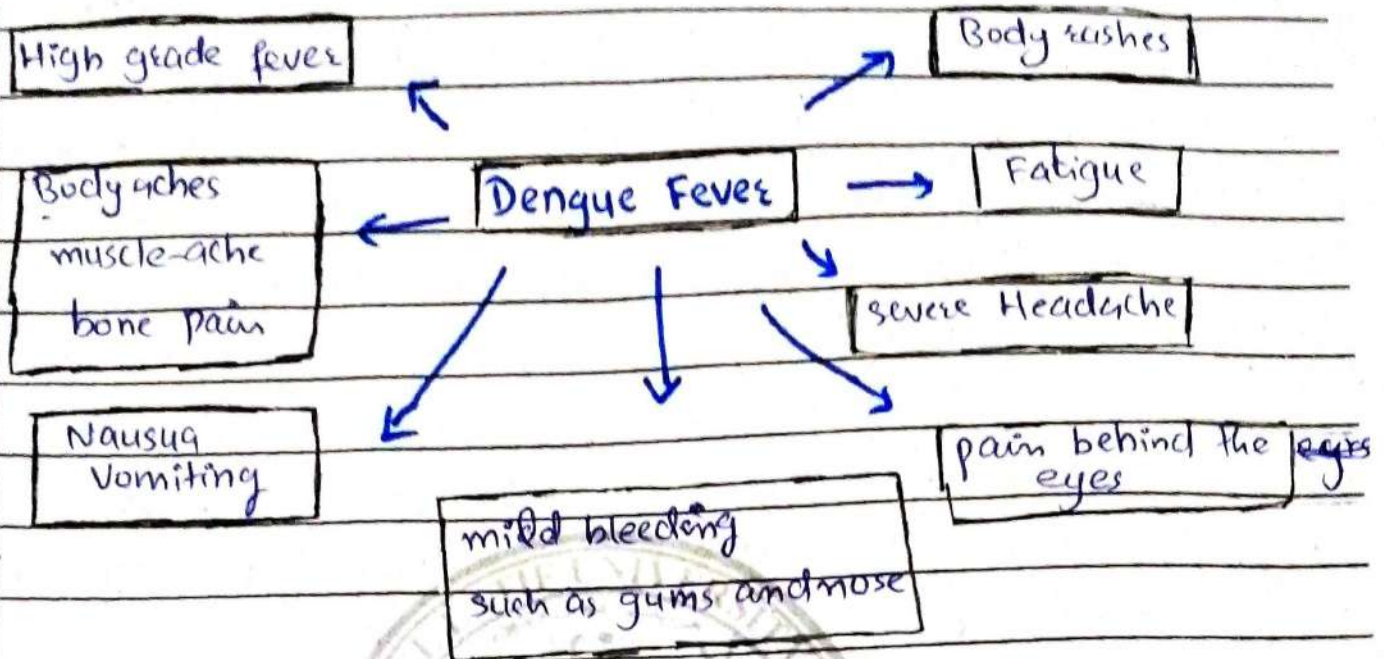| Activate antibody production and formation of T-cells |

Like shown in above chart dengue virus enters the body where it is engulfed by langerhan cells, within langerhan cells it binds with membrane proteins and produces its multiple copies, then travel towards nearest lymph nodes where it produces more copies, enters lives through bloodstream, attacks on stem cells and impair production of ster platelates that results in complications of bleeding.

The infected cells releases endotoxins such as cytokines and interferons that activate immune system and production of antibodies, also produces symptoms in the body such as fever and bodyaches, and at the same time damages endothelial cells of blood vessels, leakage of plasma from vessels and reduced blood pressure and fatigue.

Causitive agents

Dengue virus is of five different types, each-type when infects, the body produces antibodies against that particular type but in future it can be infected by other type of virus. This dengue virus is carried by particular genus of mosquito aedis., mostly aedis aegypti virus that breeds in stagnant water.

Symptoms Of Dengue

High grade fever		Body rashes

Body aches muscle-ache bone pain	← Dengue Fever →	Fatigue

severe Headache

Nausua Vomiting		pain behind the eyes

mild bleeding such as gums and nose

The symptoms of dengue fever include sudden high grade fever, severe headache, pain behind eyes, fatigue, nausau, vomiting, severe muscle and joint pain and body rashes that appear after 1 to 4 weeks of fever and sometimes complications such as mild bleeding from gums, nose, petechia over body etc. It is fever that requires no particular treatment, only supportive treatment such as pain-killers, acetaminophen, fluids plenty of juices, hydration, rest and avoidance of aspirin to prevent bleeding, if required and further check and treat complications if produced.

b.	Explain dark matter and dark energy.
Ans.	The visible matter sun, earth, stars, galaxies, moon and clusters of galaxies are visible matter that constitutes only 5% of the universe matter. Remaining 68% is formed by dark energy and and 27% of the universe is dar matter.

Dark Matter

Scientist have observed the spining of stars should be slower than those of near the galactic centre and it is also cosmological observation that galaxies have some other gravitational pull that is not from the visible matter. Dark matter is not seen by anyone untill now but scientist believe that such matter exist that is different from normal or baryonic matter that are detected by absorption of radiations passing through them, the matter is not visible with sunlight or any type of electromagnetic radiations or existing instruments. It is not the anti-matter because when anti-matter annhilates with matter, produces unique gamma rays. But scientist are still sure regarding concept of dark matter because of gravitational pull on the galaxies and faster spinning of stars than expected

Dark Energy

Untill 1990s scientists were fairly sure regarding concept of expansion of earth that expansion of earth is decelerating due to attractive gravitational pull of the earth. This concept discarded cosmological constant of Einstein theory, on which he called himself his concept a "biggest blunder" because according to this theory expansion of universe was accelerating.
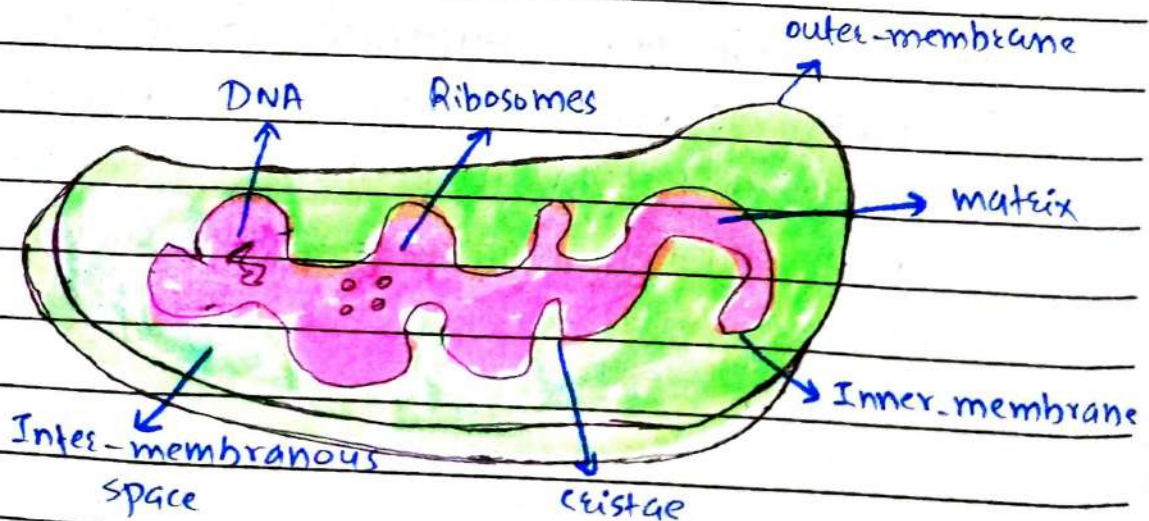
    This discovery shocked the scientist in 1990s when they observed, instead of deceleration the universe's expansion is actually accelerating. Now scientist believe it may be due to strong repulsive force generated by empty space, another idea suggest that it is a fifth and fundamental force that fills the universe like a fluid, another explanation comes from discarded theory of Einstein, but that contained cosmological constant or some other hypothesis regarding dark energy explains that there there may be some kind of field that creates cosmic acceleration. Due to deep mystey regarding it, concept scientist have named it as dark energy.

c.	Discuss Structure and function of mitochondria. How is it the powerhouse?

Structure Of Mitochondria

Mitochondria is an orgenelles within both animal and plant cell. It is called powerhouse of cell because it produces energy. Its number varies from cell to cell depending upon the nature. It contains double-member, an outer membrane and inner membrane that forms finger like foldings called cristae. Between both membrane, a space called inter-membranous space. Within the inner membrane fluid is present called cristae that contain ribosomes, its own DNA and other complexes. It is a self-replicating orgenelle that can make its copies independently and does protein synthesis with the help of ribosomes.

Mitochondria

Function Of Mitochondria

Mitochondria is called powerhouse of cell because it produces energy molecules called Adenusine tri-phosphate (ATP) through cellular respiration. ATP is an energy unit that is produced using glucose. So, the main function of mitochondria is Production of energy in ATP form that can be easily used by cell for different functions of cell. The number of mitochondria within the cell varies in different organs because of nature of cell, it produces mitochondria according to needs of energy.
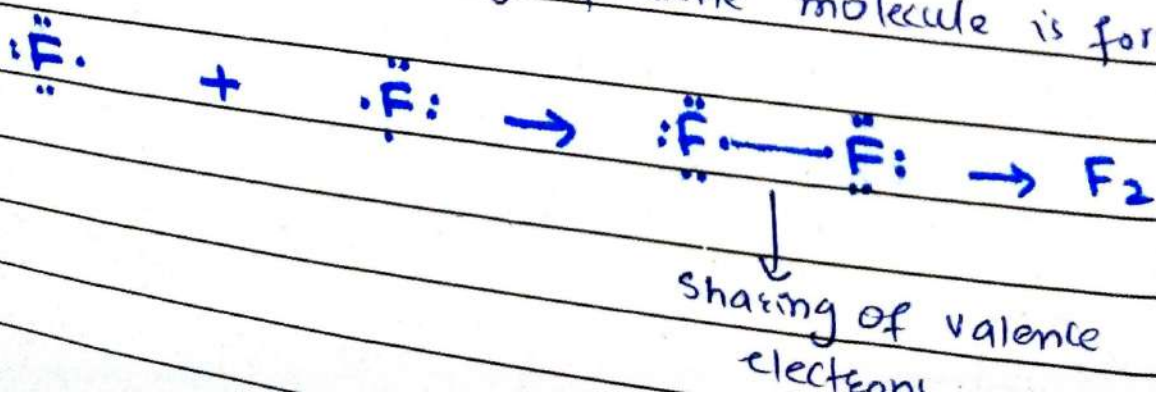
How it is called powerhouse

It is called powerhouse because it breaks sugar molecules which is used to transport energy within cell for metabolism. It is the centre of energy production for every function of cell. Glucose is broken down here and energy in the form of ATP is produced which can be utilized by cell.

	d.	What are covalent bonds? Explain types along with elaborating structures.
	Ans.	Chemical bonding is an interaction between two atoms to attain stability and gain noble gas configuration (duplete or octet valence electrons.

One type of chemical bond is Covalent bond in which atoms share their valence electrons in such a way that arrangment of electrons sarrounding both atoms complete their noble gas configuration and formation of bond release some energy, reducing the total energy of the molecule as compared to addition of their constituent atoms.
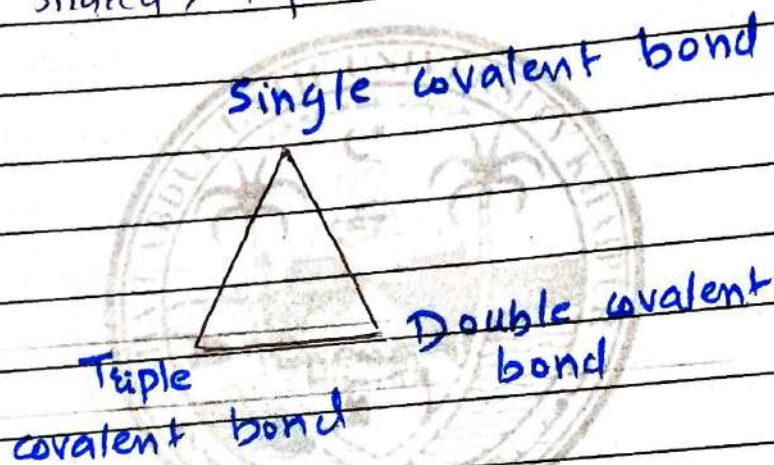
Covalent bond

When two atoms share their valence electrons instead of transferring them it is called covalent bond, which results in formation of polar and non-polar molecules. For example Flourine atom contains seven valence electrons (3 paired and 1 unpair). Two flourine atoms share this unpaired valence electrons. In this way flourine molecule is formed.

$$:\ddot{F}\cdot \quad + \quad \cdot\ddot{F}: \quad \rightarrow \quad :\ddot{F}\!-\!\ddot{F}: \quad \rightarrow \quad F_2$$
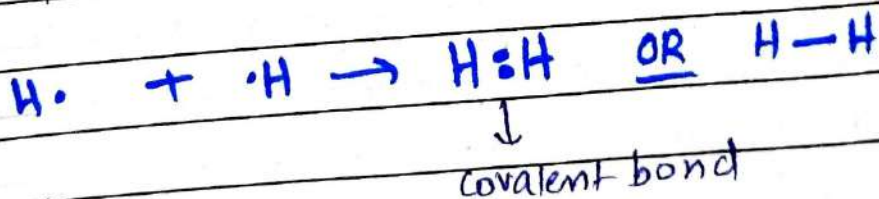
Sharing of valence electrons

Types Of Covalent Bond

Types of covalent bond depend upon number of unpaired electrons in the valente shells if single unpaired electron shared it forms single covalent bond, if two unpaired electrons are shared double covalent bond forms and if three unpaired electrons shared, triple covalent bond is formed.
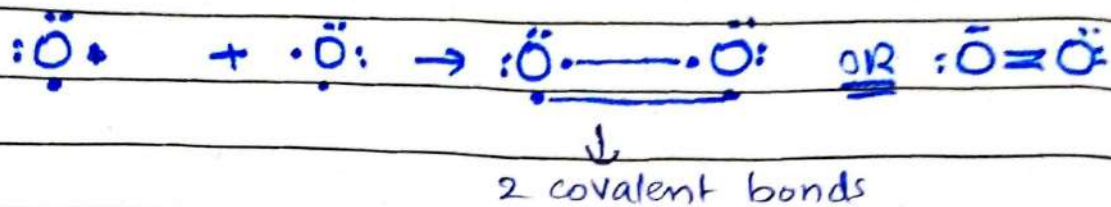
Single covalent bond

Triple
covalent bond

Double covalent
bond

(i) ## Single Covalent Bond

An example includes hydrogen atom that contain single unpaired electron in valence shell.

$$H\cdot + \cdot H \rightarrow H:H \quad \underline{OR} \quad H-H$$

$$\downarrow$$

covalent bond

The shared electrons will be counted for both atoms so, their duplet is completed and hydrogen molecule is formed with maximum stability and less energy.

(ii)		**Double Covalent Bond**

The example of oxygen molecule,

$$:\ddot{O}\cdot \quad + \quad \cdot\ddot{O}: \quad \rightarrow \quad :\ddot{O}\underline{\quad\quad}\cdot\ddot{O}: \quad OR \quad :\bar{O}=\ddot{O}$$

↓

2 covalent bonds

As shown above single oxygen atom contains two unpaired valence elecfsons, when two oxygen atoms share these unpaired electsons, both of the oxygen atoms form double covalent bond.

(iii) **Triple Covalent Bond**

The example of nitrogen molecule,

$$\overset{\cdot}{:}N\overset{\cdot}{:} \quad + \quad \overset{\cdot}{:}N\overset{\cdot}{:} \quad \rightarrow \quad :N\underline{\equiv\equiv}\overset{\cdot}{:}N \quad OR \quad :N\equiv N:$$

As indicated nitrogen atom contains single pair and 3 unpaired electsons in valence shell, When 3 unpaired electsons of one atom are shared with 3 unpaired electsons of another atom, triple covalent bond is formed that contains maximum stability and least bonding energy.
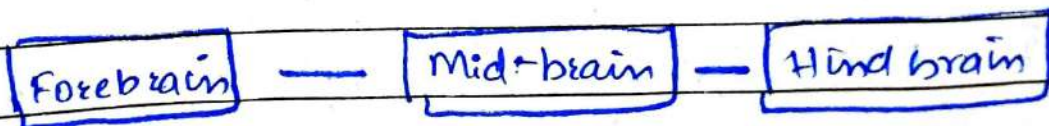
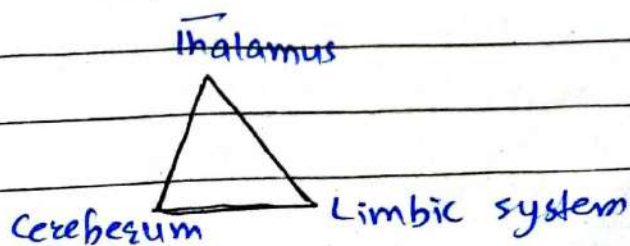| Q5.	
a.	Give structure and functions of human brain. Why is it the control centre?
Ans.	Human brain is the center of the body that controls every function of body consciously and unconciously whatever happening in our body from voluntary activities like walking, lying, working, writing, eating, drinking etc to involuntary function like digestion, respiration, excretion, etc.

Structure Of Human Brain

Human brain is a very delicate organ, protected by part of skull called cranium or skull. After cranium three fluid filled layers are present called meninges i.e durg matter, arachnoid matter and pia matter. Their function is to provide cushioning effect to prevent any shock to the brain. Under meninges brain is present placed beautifully inside the skull. Main parts of brain are three.

Forebrain	—	Mid-brain	—	Hind brain

① **Forebrain;** It is further divided into three parts.

Thalamus

Cerebrum   Limbic system

(i) **Thalamus** The function of thalamus is transfer of sensory information i.e it collects and transfer sensory information especially auditory and visual information from brain to whole body.
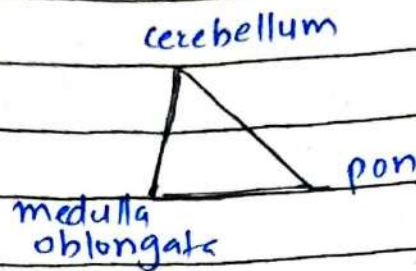
(ii) **Limbic System** It consist of:

a, Hippocampus; responsible for short term and long-term memory and learning.

b, Amygdala; emotion centre of brain that controls happiness, anger, sexual arousal, fear etc.

c, Hypothalamus; control menstrual cycle, hunger, thirst, body temperature, water balance etc.

(iii) **Cereberum** It is the largest part of brain that contain 2 cereberal hemispheres left and right. Right cerebral hemisphere controls left side of body and vise versa. The cerebral cortex present within cereberum responsible for critical thinking, decision-making, learning, intelligence and judgement etc.

② **Mid-brain** It is the middle part that connects fore-brain with hind brain. One of the functions of midbrain is to control reflex movement of eyes and it contains rely centre for auditory information.
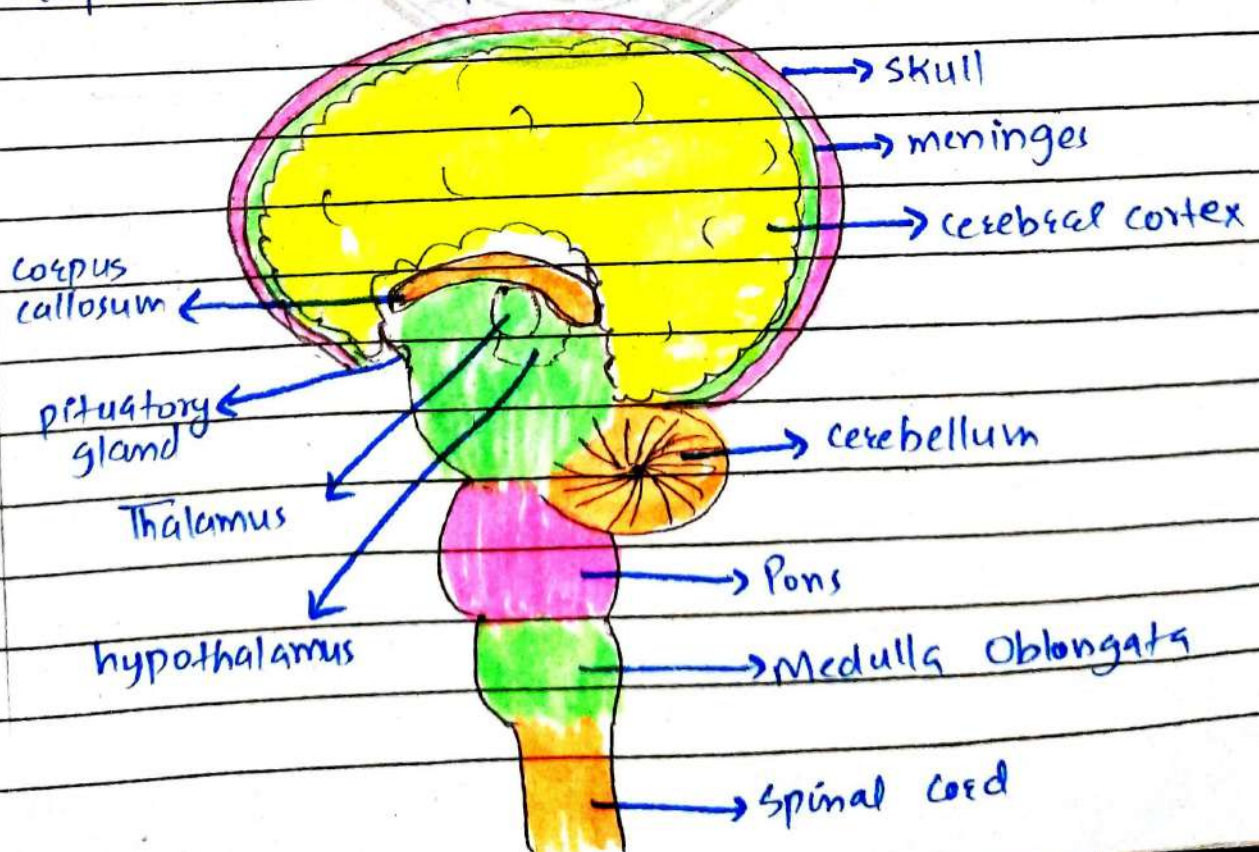
③ **Hindbrain** : It is last part of brain that has 3-sub-parts

cerebellum

medulla
oblongata

pon

(i) | Cerebellum | It controls involuntary mov functions such as coordinating and balance of body. It is also important for long term memory and learning.

(ii) | Pons | The function of pons is control of sleep wake cycle, the transition from sleep to awakening

(iii) | Medulla Oblongata | Its function is control of heart beat, respiration, blood pressure, swallowing etc.

→ skull
→ meninges
→ cerebral cortex

corpus callosum ←

pituatory gland ←

→ cerebellum

Thalamus

→ Pons

hypothalamus

→ Medulla Oblongata

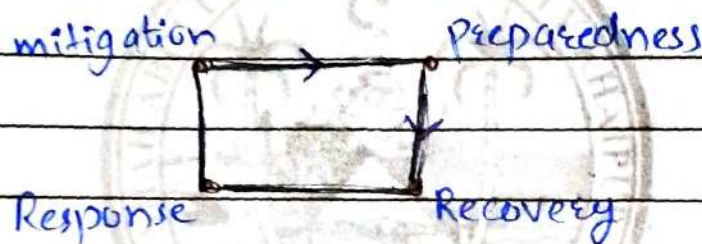→ spinal cord

Function Of Human Brain

The function of human brain is to control all parts of body i.e every voluntary and involuntary function of body is controlled by brain. There are many functions, some of its parts produce hormones, enzymes, it produces neurotransmitors like adrenaline, non-adrenaline, dopamine etc that control fight and flight response, it controls respiration, heart beat, digestion, excretion, movement of body, balance and coordination, sensation (auditory and visual) etc. That's why "Human Brain" is called control centre of body.

b. What is DRM? Explain its situation in Pakistan.

Ans. Disaster is a serious disruption that is produced due to nature into the functioning community that disturb its social, cultural, economic and environmental functions. Its destruction level exceeds the capablity of community to cope with using its resources. Some of the great disasters included in history are earthquake, cyclone, floods, Tsunami, etc.

Disaster risk managment include some important phases such as

mitigation → Preparedness

Response → Recovery

① **Mitigation** — 1st phase of disaster managment is sustained action that reduces short term and long term risk to people and property from hazards. It is an innovative method to lessen the effect of disaster such as china has developed 4-5m wall, to cope with effects of Tsunami, along its coastal line.

② **Preparedness;** It is second phase of disaster managment in which several steps are taken after forecasting the weather. It enhances the

ability of community and government to respond to the disaster. The steps included in preparedness include evacuation planning, maintainance of resources, communication planning, needs assessment etc. It prepares the government to respond effectively in extreme situation.

(3) Response: It is an action taken by government to an emergency. It includes situation analysis, evacuation and shelters, early damage assessment. Trained and equipped personnel produced to deal with emergency crises.

(4) Recovery: It is a phase of returning to normal. It may be short-term or long term. It includes reconstruction, transport, clean drinking water, communication and agriculture.

Situation Of DRM in Pakistan

Pakistan has faced major disasters like Tsunami in 1945, Earthquake in 2005 and 2015, Floods of 2010 and Pakistan is top ten countries having major disaster risk but DRM in Pakistan is not a priority for government. National disaster risk management Plan (NDMP) is a milestone in the history of disaster managment but it lacks the capability of advance planning. It is not empowered enough to utilize reasonable resources like shelter homes, ambulances, helicopters, and lack of accountability and leadership has curtailed its capacity to cope with disasters with efficiency. Need of the hour is to focus on this significant issue to empower NDMP.

c.		Write a short note elaborating fat-soluble vitamins.
Ans.		## Fat Soluble Vitamins

These are type of vitamins which are soluble in fat only and insoluble in water. These vitamins when ingested are digested with the help of bile secreted from gall bladder and then excess is stored in fat cells, liver and kidney. Fat soluble vitamins include vitamin D, Vitamin E, vitamin K & A, these are essential nutrients for body, as they can be stored by body so they don't need to be consumed everyday for to accomplish its needs. When these vitamins are depleted from body, its deficiency produces severe symptoms in body. For example vitamin A is essential for growth g process, good vision and growth of muscles and its deficiency causes night blindness, vitamin D is essential for healthy teeth and bones, its deficiency causes rickets in children, vitamin E is essential for healthy skin, hairs, growth of body similarly vitamin K is beneficial for clotting mechanism in the body. Main sources include meat, green leafy vegetables, soyabeen, yogurt, milk, carrots, cauliflower, oranges etc.

d. What is your understanding of internet standards?

Ans. Internet standards make fundamentals of internet to help functioning of whole system. It consist of complex technologies which are approved by an organization called Internet engineering Task force (IETF). This organization is well-known for approving basic standards of internet oto run smoothly according to its strict protocols. These standards will help web affinity to signal, security, and privacy. Inter-connect between hardwares and softwares help running of websites These standards are not chosen arbitarily but instead a very strict approval protocol is followed & and that they are also made available to the public so they ensure that internet continues in a coordinated manner as a system of users all over the world. An example of internet standards is TCP/IP (Transmission control protocol or Internet protocol), W3C (world wide web). An internet standard is created by elevating a specification through a process that includes its proposal, giving it the first review, then developed by working group, the final review being published by RFC document and then final review encountered through its test in real life application.

47.

q. If 20% of x=y, what is the value of y% of 20 in terms of x.

Ans. If 20% of x = y

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

$$0.2x = y \rightarrow ①$$

The value of y% of 20 interms of x can be calculated as:

$$\frac{y}{100} \times 20 \rightarrow \text{equation} ②$$

we will put value of 'y' from equation ① into equation ②, so by putting value of 'y'

$$\frac{0.2x \times 20}{100}$$

$$\boxed{0.02x} - \text{Ans}$$

From above calculation it is clear that if 20% of "x" is equal to "y" then y% of 20 in terms of x will be 0.02x.

b. P and Q have an average monthly salary of Rs. 5050, Q and R have an average monthly income of Rs. 6250, while P and R have an average monthly income of Rs. 5200. Find the monthly salary of P.

Ans.

Average monthly salary:

$$P + Q = 5050 \rightarrow eq. \text{①}$$
$$Q + R = 6250 \rightarrow eq. \text{②}$$
$$P + R = 5200 \rightarrow eq. \text{③}$$

Here we have to find average monthly income of "P". For that purpose we take equation ②

$$Q + R = 6250.$$
$$Q = 6250 - R \rightarrow eq \text{④}$$

Then we put equation ④ in eq ①

$$P + Q = 5050.$$
$$P + 6250 - R = 5050 \rightarrow \text{⑤}$$

Then we take equation ③ to gain value of "R"

$$P + R = 5200$$
$$R = 5200 - P \rightarrow \text{⑥}$$

By putting value of "R" in equation ⑤

$$P + (6250 - R) = 5050$$
$$P + 6250 - (5200 - P) = 5050$$
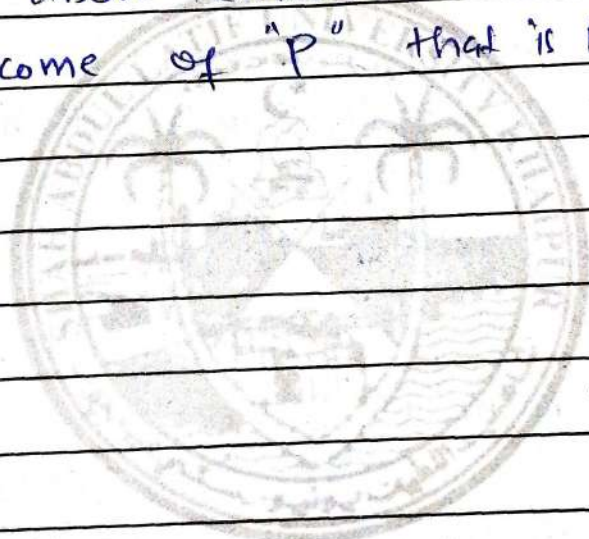
$$P + 6250 - 5200 + P = 5050$$

$$2P + 1050 = 5050$$

$$2P = 5050 - 1050$$

$$2P = 4000.$$

$$P = \frac{4000}{2}$$

$$\boxed{P = 2000 \, Rs}$$

So, from above calculation we have found the average income of "P" that is Rs.2000.

d. Jamie's dad is 4 times older than Jamie. In 14 years time, Jamie's dad will be twice the age of Jamie. What is the sum of Jamie's age now and Jamie's dad's age now?

Ans. Let Jamie's current age is "J" and Jamie's dad's current age is "D"

As given, Jamie's dad is 4 times older than Jamies

$$4J = D$$
$$D = 4J \rightarrow \textcircled{1}$$

In 14 years Jamie's dad's age will be twice the age of Jamies

$$D + 14 = (4J + 14)2 \rightarrow \textcircled{11}$$

Putting equation ① in equation ⑪ to Find age of Jamie

$$D + 14 = (4J + 14)2$$
$$4J + 14 = 2J + 28$$
$$14 - 28 = 2J - 14J$$
$$2J = +14$$
$$J = \frac{+14}{2}$$
$$\boxed{J = 7}$$

Now calculate Jamie's dad's age use equation ①

$$D = 4J$$
$$D = 4 \times 7$$
$$D = 28 \text{ years}$$

1. Now find the sum of Jamie's age and Jamie's dad age,

$$J + D$$

$$7 + 28$$

$$\boxed{35 \text{ years}} \text{ Ans}$$

Therefore, the sum of their ages is 35.

c. Two coins are tossed 500 times and we get:

Two heads = 105 times

one head = 275 times

No head = 120 times

Find the probality of each event to occur.

As probability of event = $\dfrac{\text{No: of trials}}{\text{Total number of outcomes}}$

To Find probability of getting two heads,

$$\text{Probability (Two heads)} = \dfrac{105}{500} = \boxed{0.21}$$

Probability of getting one head,

$$\text{Probability (one head)} = \dfrac{275}{500} = \boxed{0.55}$$

Probability of (no heads $= \dfrac{120}{500} = 0.24$

Therefore, Probabilities of two heads, one head and no head are 0.21, 0.55, 0.24 respectively

Q8.	
a.	Brian is a window cleaner. He uses the following formula to calculate the amount to charge his customers: Charge = £20 + 4n where 'n' is the numbers of windows a house has. If a house has 7 windows, how much would Brian charge?
Ans.	The formula used by Brian to charge his customers is: $$Charge = £20 + 4n \rightarrow ①$$ If no. of windows is denoted by "n" in above formula, to calculate his charge if the number of windows in a house are 7. $$charge = £20 + 4n$$ $$charge = £20 + 4(7)$$ $$charge = £20 + 28 = £48.$$ There, For 7 windows Brian will charge <u>£48</u> in a house.

6

(b)	Find out the correct word from given jumbled spellings:
(i)	ralciep
(ii)	tyhniaum
(iii)	arsehcc
(iv)	moniteah
(v)	tareph

8

| d. | No. of triangles in the given figure. |

We will here use formula

$$x = \frac{n(n+1)}{2}$$

here 'n' is greatest number present in each base.

$$n = \frac{4(4+1)}{2} = \frac{20}{2} = 10$$

$$\boxed{x = 10}$$

So the number of triangles in each base are 10 and there are total 4 bases in above figure so,

$$10 \times 4 = \boxed{40}$$

So, the total number of triangles in above figure are 40.