

GSA-04

Question no: 07

Part (a) :

Given data :

From Islamabad,

$$\text{Nbr of women} = \frac{1}{2} \text{ of men}$$
$$W = \frac{1}{2} M$$

$$M = 2W \text{ --- eq (1)}$$

In Rawalpindi,

10 men leave = 5 women enter

$$M - 10 = W + 5 \text{ --- eq (2)}$$

Adding value of M in eq (2)

$$2W - 10 = W + 5$$

$$2W - W = 5 + 10$$

$$W = 15$$

$$\text{Number of Women} = W = 15$$

$$\text{Number of men} = M = 2W$$
$$= 2(15)$$

$$\text{Number of men} = M = 30$$

In the beginning, total passengers,

$$\text{total passengers} = \text{Nbr of men} + \text{Nbr of women}$$
$$= 30 + 15$$
$$= 45$$

$$\text{total passengers} = 45$$

Part (c):

Given data:

$$40\% \text{ of a number} = \frac{2}{3} \text{ of another no.}$$

let one number is 'x', and the other number is 'y'

$$\frac{40}{100}(x) = \frac{2}{3}(y)$$

$$\frac{2}{5}(x) = \frac{2}{3}(y)$$

$$\frac{2x}{5} = \frac{2y}{3}$$

$$3(2x) = 5(2y)$$

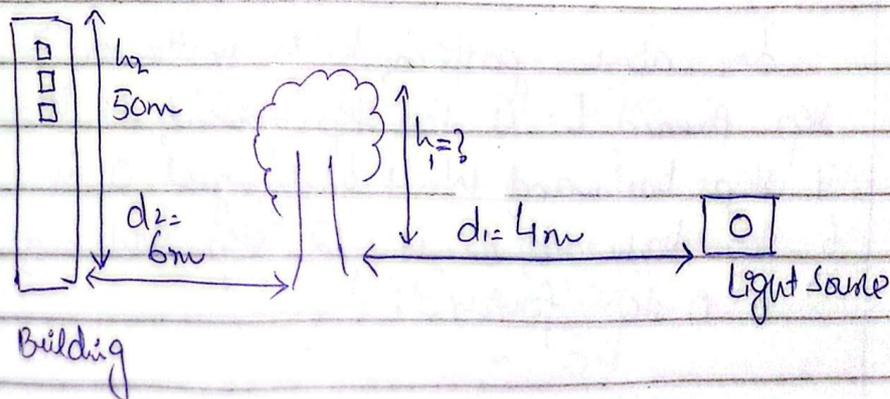
$$6x = 10y$$

$$\frac{x}{y} = \frac{10}{6} \cdot \frac{5}{3}$$

$$\frac{x}{y} = \frac{5}{3}$$

Ratio of first number to the second = 5:3
number

Part (d):



$$\begin{aligned} \text{total distance} = d &= d_1 + d_2 \\ &= d = 4m + 6m \Rightarrow 10m \end{aligned}$$

Ratio of height to base of tree
and building

$$\frac{h_1}{d_1} = \frac{h_2}{d_2}$$

$$\frac{h}{4} = \frac{50}{10}$$

$$h = \frac{50 \times 4}{10}$$

$$h = 20m$$

Height of tree = $h = 20m$

Part (b)

Coding Structure:

KEN IN OOD is written as:

K	E	N	I	N	O	O	D
↓	↓	↓	↓	↓	↓	↓	↓
R	R	G	W	.	I	C	L
+7	+13	-7	0	-6	-12	+8	

In above pattern, K is written as 7 step forward, E is 13 step forward, N is 7 step backward, I is unchanged, O is 6 step backward, O is 12 step backward, D is 8 step forward.

To write PANASONIC, following same pattern;

P A N A S O N I C
+7 ↓ ↓ +13 ↓ ↓ +7 ↓ ↓ -6 ↓ ↓ -12 ↓ ↓ +8
W N G A M C V

Question no: 08

Part (c) :

Given data:

One-third of one-fourth of a number is 15

$$\left(\frac{1}{3}\right)\left(\frac{1}{4}\right)x = 15$$

$$\frac{1}{12}x = 15$$

$$\frac{x}{12} = 15$$

$$x = 15 \times 12$$

$$x = 180$$

then,

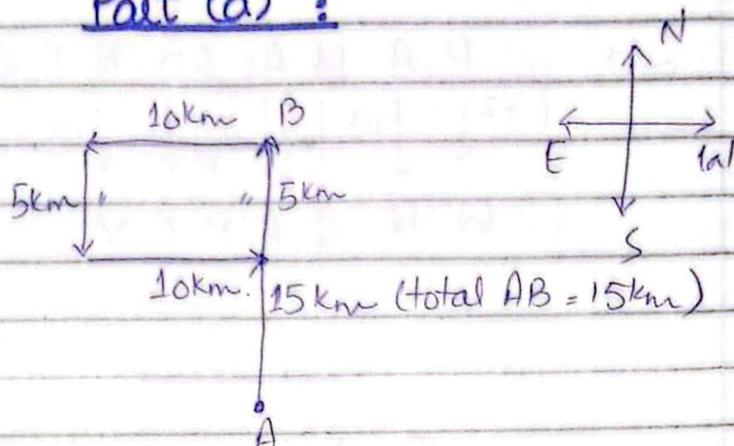
three-tenth of that number is;

$$\frac{3}{10}(x) =$$

$$\frac{3}{10}(180) = 18 \times 3 = 54$$

three tenths of that number is 54.

Part (d) :

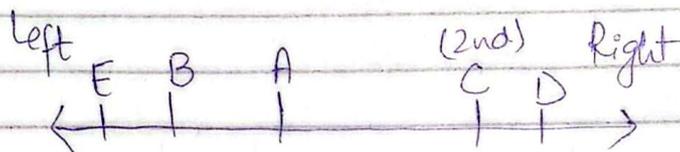


- In North, he is from his house.
- From initial point he is 10 km away
- Total distance = 15 km + 5 km + 10 km
travelled + 5 km + 10 km
= 20 km + 10 km + 10 km

Total travelled distance = 40 km.

Part (b)

A, B, C, D and E are sitting on a bench,



A and C sitting together,
D is sitting to the right and E
is on the left of the bench.

Part (a) :

Given data:

In a garden,

Number of rows = 10

Number of columns = 12

Distance between two trees = 2m

Distance left from all sides of boundary wall = 1m

Length of garden = ?

Formula:

$$\text{Length of garden} = (\text{Nbr of columns} - 1) \times (\text{distance b/w two trees} + 2 \times \text{distance from boundary})$$

$$= (12 - 1) \times 2 + 2 \times 1$$

$$= 11 \times 2 + 2$$

$$= 22 + 2$$

$$= 24 \text{ m}$$

$$\text{Length of garden} = 24 \text{ m}$$

Section - I

Question no : 02

Part (a) :

Working of human kidney

1. Kidney :

Kidney removes wastes and extra fluid from our body. It helps to remove metabolic waste from the body, through a process called **excretion**.

Kidney being an Osmoregulatory organ:

Kidneys are also called as an osmoregulatory organ because it maintains the concentration of water, salts, and minerals such as sodium, calcium, phosphorus, and potassium in our body fluids.

The structural and functional unit of kidney is **nephron**, which plays a pivotal role in blood filtration and excretion of waste material.

2. Functioning of kidney :

Kidney, being composed of millions of filtering units, called nephron works in the following way;

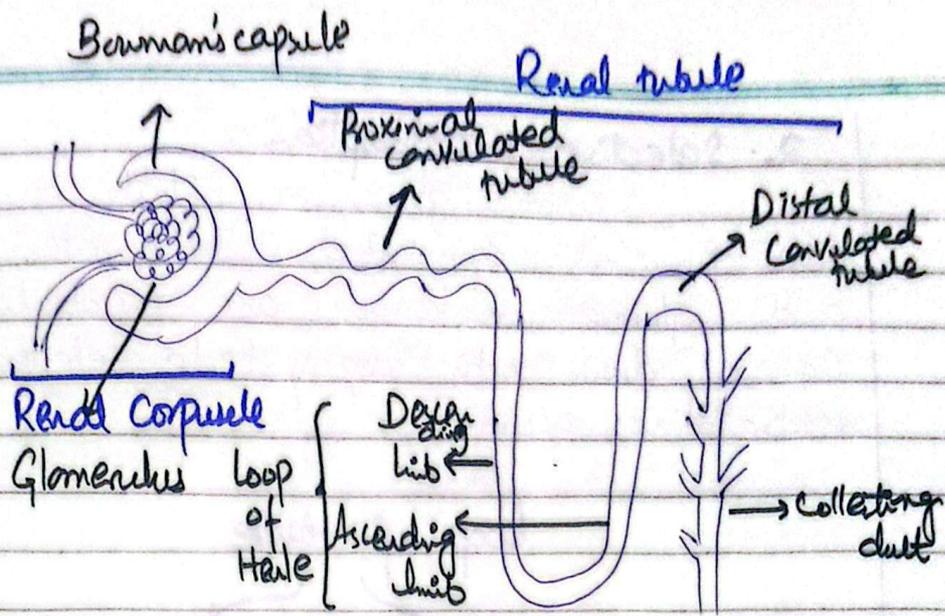
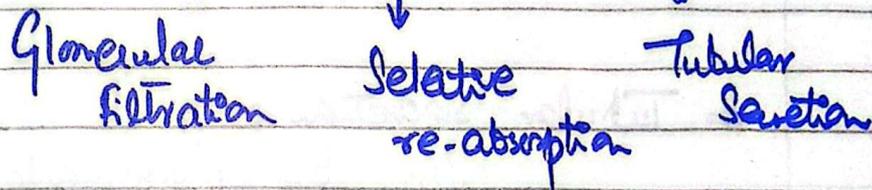


Fig. Structure Nephron

Functioning of nephron

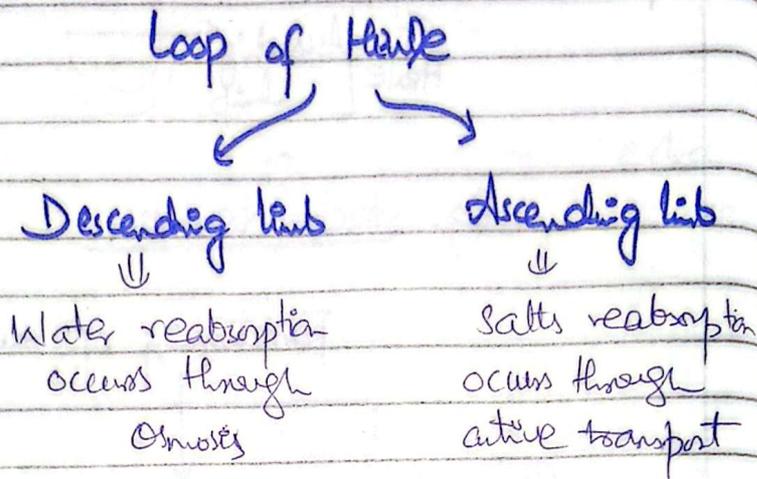


1. Glomerular filtration

As blood flows into each nephron, it enters into a network of capillaries called **glomerulus**. The thin walls of glomerulus allow smaller molecules to pass through it such as water, salts, wastes. and large molecules such as proteins RBCs cannot cross the glomerulus while stayed there. The material filtered is called glomerular filtrate which is passed to Bowman's capsule.

2. Selective reabsorption

As glomerular filtrate passes into proximal convoluted tubule, water and glucose molecules are reabsorbed. Coming down into loop of Henle, selective reabsorption occurs.



3. Tubular secretion :

In this phase certain substances are excreted such as creatinine, uric acid to maintain pH of urine. This process takes place in distal convoluted tubule.

From distal convoluted tubule, it enters to collecting duct. Nephrons from several & several collecting ducts of nephrons combine together to empty urine into ureter.

In this way, kidney functions to remove waste material from the blood in the form of urine.

Part (b):

Solar System :

It is defined as;

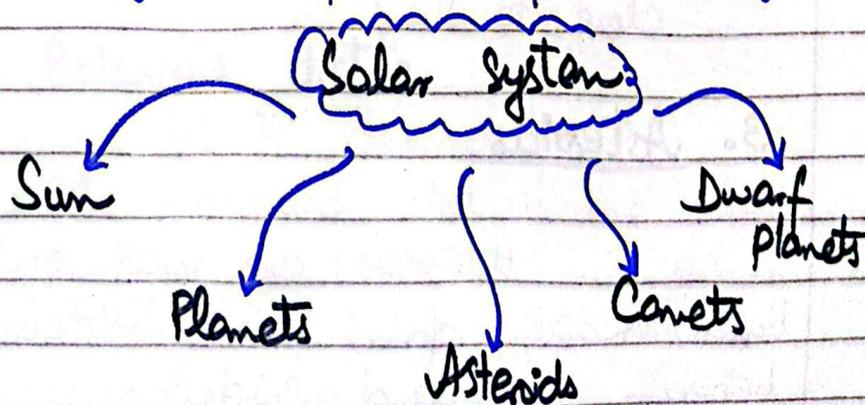
A vast gravitational system consisting of sun and all other celestial bodies that revolve around it.

→ It was formed about 4.6 billion years ago, from a rotating cloud of gas and dust called the solar nebula.

→ The strong gravitational pull of the sun keeps all planets and other objects in their fixed paths called orbits.

→ Centre of the solar system occupied by the Sun, a massive star that contains nearly 99.86% of the total mass of the Solar System.

Major components of Solar System:



1. Sun

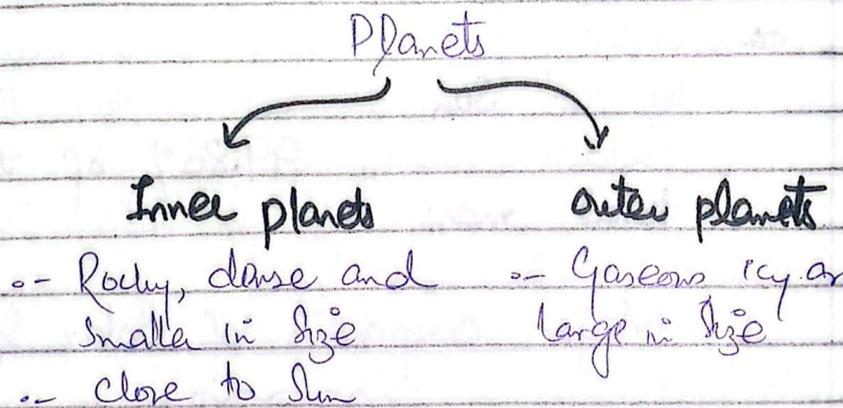
A medium-sized star present at the centre of the solar system. It is composed mainly of hydrogen and helium and produces energy through a process of nuclear fusion. Also, it is the source of light, heat and gravity for all planets.

Functions:

- Controls planetary orbits
- Maintain temperature conditions for life on Earth

2. Planets

Planets are non-luminous bodies that revolve around the Sun in an elliptical orbits.



3. Asteroids

Asteroids are small rocky bodies mainly found in the Asteroid belt between Mars and Jupiter.

Asteroids are remnants of early solar system formation

Example: Vesta, Pallas

4. Comets

- Comets are icy bodies made of ice, dust and gas.
- Develop a tail when near the Sun.

Example: Halley's Comets

5. Dwarf planets

Bodies that orbit around the Sun but have not cleared their orbital path.

Example: Pluto, Ceres, Eris

Part (c)

Importance of balanced diet:

1. Balanced diet:

It is defined as;

A balanced diet is one that provides all essential nutrients — carbohydrates, proteins, fats, vitamins, minerals, fibre and water — in

an amount required by the body.

It plays a vital role in maintaining physical health, mental-well being and disease resistance.

2. Importance of balanced diet

i) Source of energy

Carbohydrates and fats supply energy required for daily activities, work and exercise. Adequate energy intake prevents fatigue and weakness.

1g of carbohydrates \rightarrow 4kcal of energy

1g of fats \rightarrow 9kcal of energy

(ii) Support proper growth and development of body

Proteins are essential for growth, tissue repair, muscle development and the formation of enzymes and hormones, especially in children and adolescent.

(iii) Strengthens immunity

A balanced diet helps to strengthen immunity by enabling the body to fight infections and diseases.

Such as Vitamins (A, C, D, E) and minerals (Iron, Zinc and Calcium) - boost immunity of the body.

(iv) Maintains healthy weight

A balanced diet prevents obesity and malnutrition by ensuring proper calorie intake and healthy metabolism.

v) Prevention of diseases

Regular intake of a balanced diet reduces the risk of cardiovascular diseases, diabetes, anemia, osteoporosis and digestive disorders.

vi) Enhances quality of life

A healthy diet improves energy levels, mood, physical appearance and increases life expectancy.

Let food be thy medicine and
medicine be thy food.
(Hippocrates)

Part (d) :

Cell :

A cell is the basic and structural unit of life. All living organisms are made up of one or more cells and all vital

processes such as growth, metabolism, respiration and reproduction take place within cells.

In other words,

The cell is the smallest unit of life capable of carrying out all essential functions.

2. Differentiate between plant, animal and micro-organismic cell

(i) Cell wall

→ In plants, cell wall is present, made up of cellulose.

→ In animals, no cell wall is present.

In micro-organismic cell, cell wall is present made up of mainly peptidoglycan.

(ii) Nucleus

Nucleus is present in both plant and animal cell; however in plant cell it is located at peripheral region of the cell due to presence of large central vacuole. In animal cell, it is located in the centre.

In micro-organismic cell, no well defined

nucleus is present.

iii) Chloroplast

Chloroplast - an organelle for the capturing of sunlight for photosynthesis

- In plant cell, chloroplast is present.
- In both animal and micro-organismic cell, chloroplast is absent.

iv) Vacuole



Meant for storage of water and dissolved minerals

- Plant cell - contains large central vacuole
- Animal cell - contains ^{rather} small or no vacuole at all.

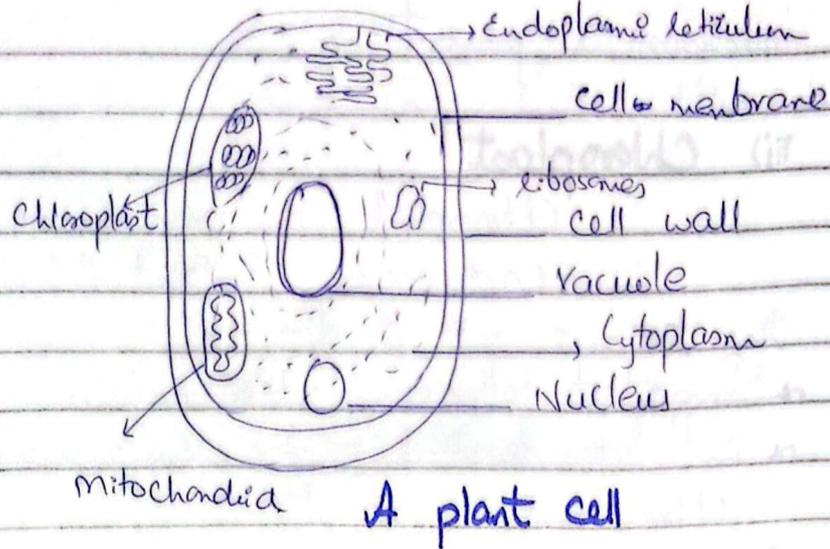
In micro-organismic cell, vacuole is absent.

v) Mitochondria

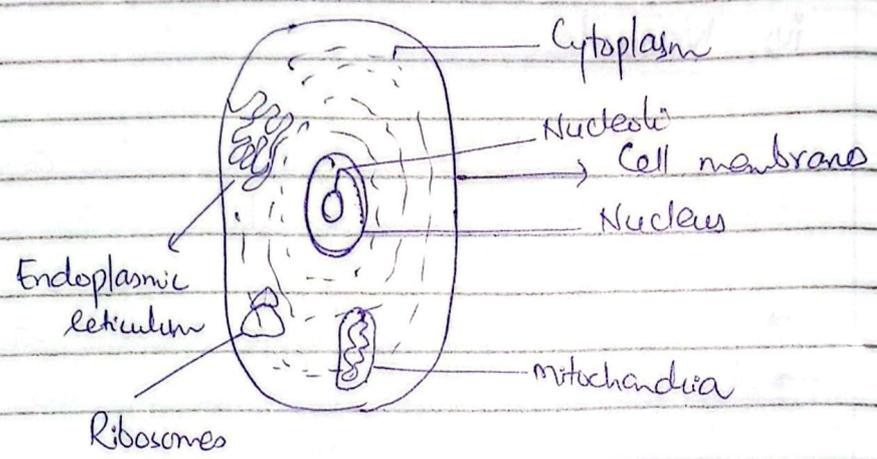


an organelle for synthesis of energy in the form of ATP

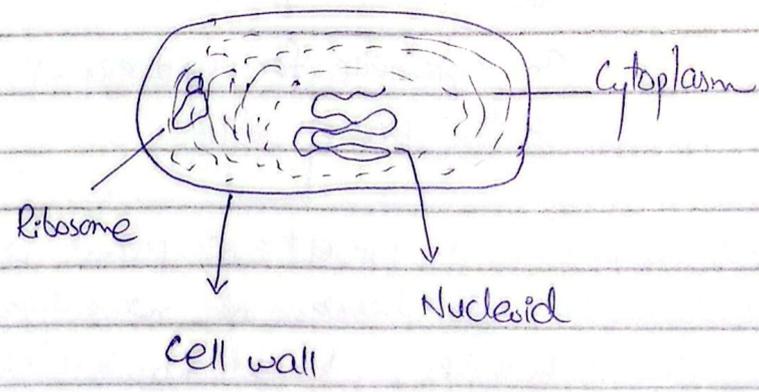
-- Mitochondria is present in plant and animal cell whereas in micro-organismic cell (prokaryotes) - have no mitochondria at all.



A plant cell



An Animal cell



A micro-organismic cell

Question no: 04

Part (b)

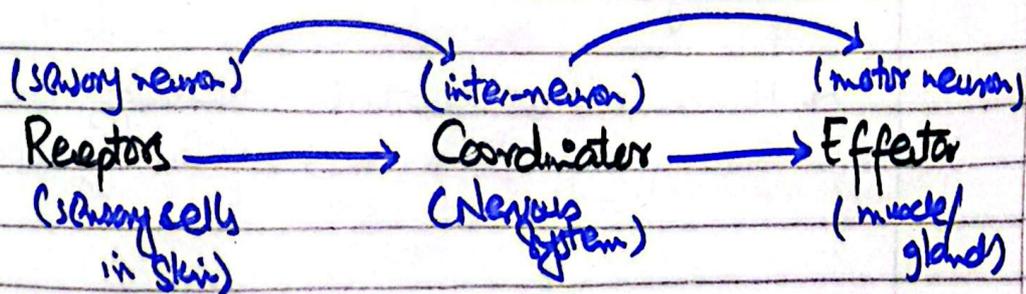
Nervous System:

The nervous system is a complex and highly organized system that controls, coordinates and communicates between different parts of the body.

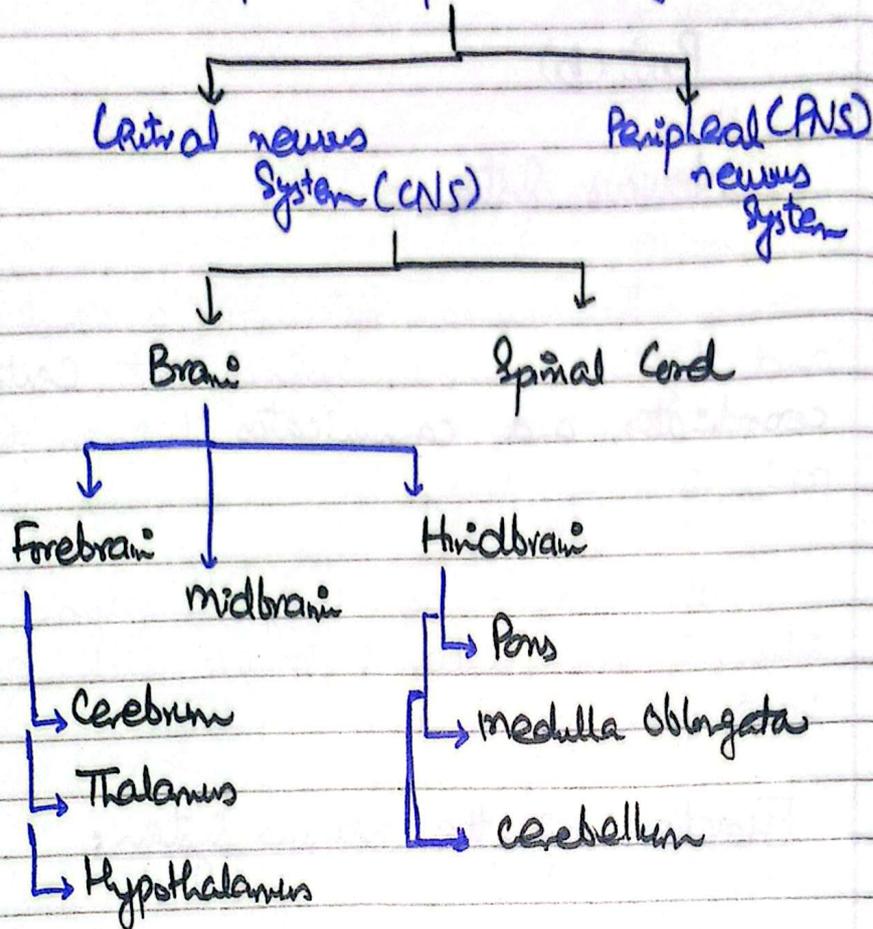
It enables the body to respond to internal and external stimuli such as heat, pain, sound and light.

Functions of the nervous system:

- Receives sensory information from receptors
- Processes and interprets signals to generate a desirable response against stimuli
- Sends instructions to muscles and glands to generate response
- Maintains coordination and balance
- Controls voluntary and involuntary actions



Classification of nervous system



1. Human Brain

Being part of Central Nervous System (CNS), it is the control centre of the body.

→ Located in the skull, and protected by a protective covering called as meninges

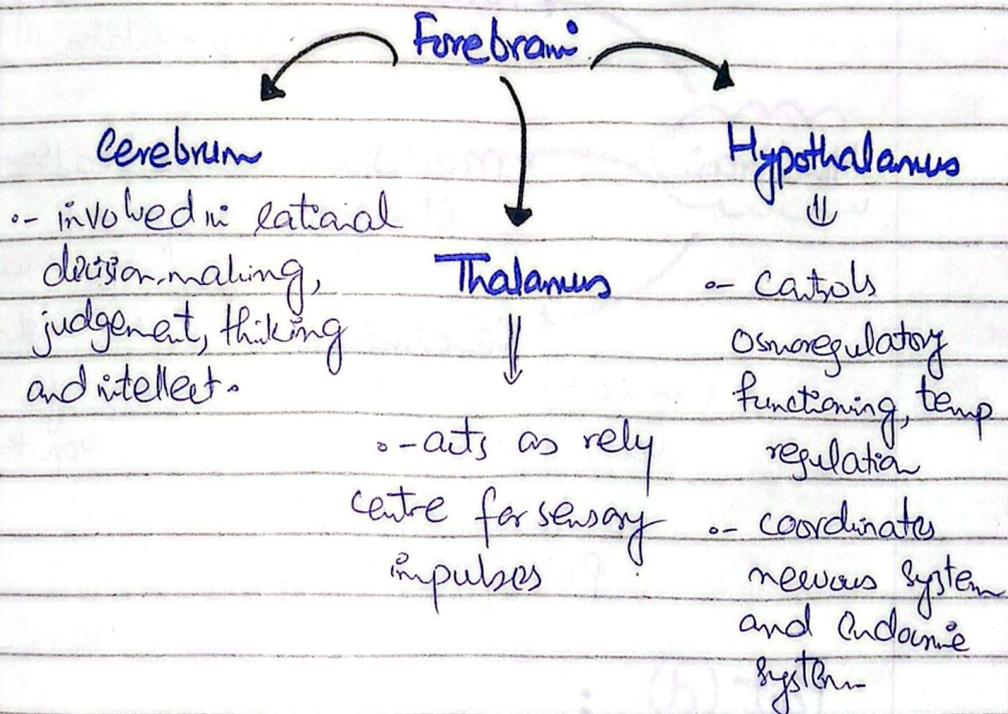
→ Human brain controls thinking, memory, emotions and voluntary actions.

Human brain is divided into three parts:

- Forebrain
- Midbrain
- Hindbrain

1. Forebrain :

Largest part of the brain, consists of two cerebral hemisphere each interconnected with corpus callosum. Each lobe of cerebral hemisphere is responsible for vision, speech, hearing.



2. Midbrain :

a small central part of the brain that is located between the forebrain and hindbrain.

- It acts as a bridge between brain regions

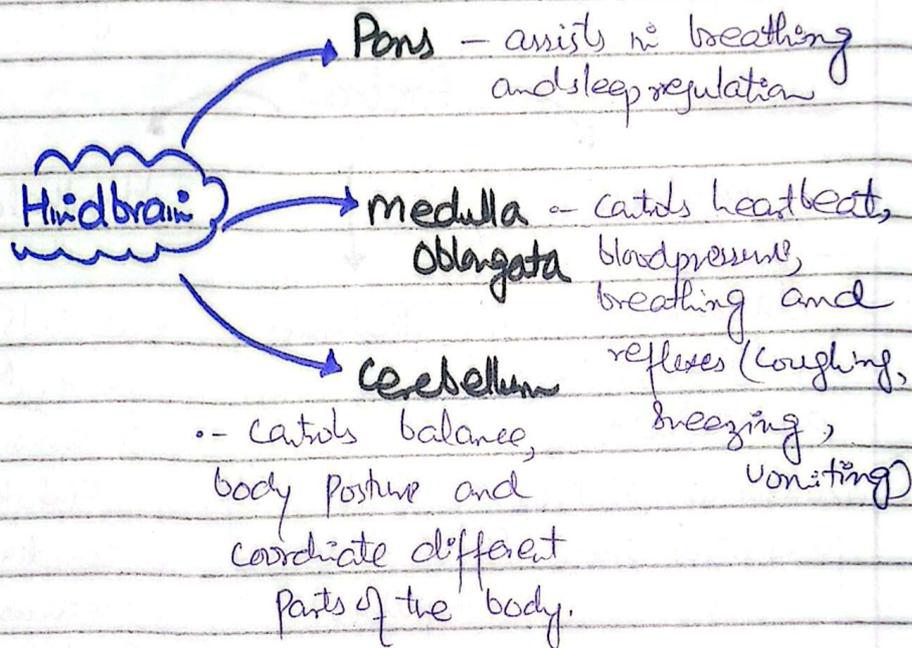
→ Involved in reticular formation, controls arousal and consciousness

→ Connects the cerebrum with the lower parts of the brain and spinal cord

3. Hindbrain

Lower part of the brain, located just above the spinal cord.

→ Controls vital body functions such as coordination and balance.



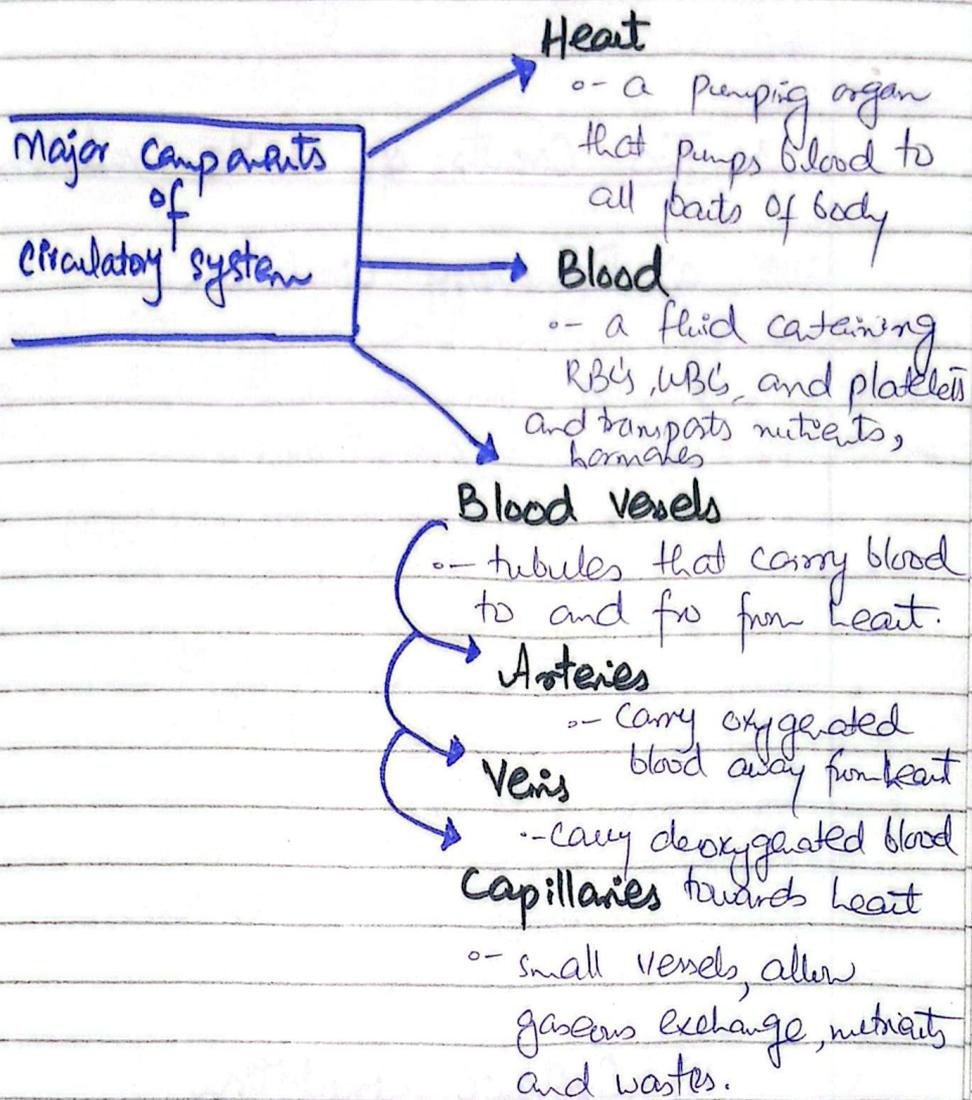
Part (d) :

1. Circulatory System :

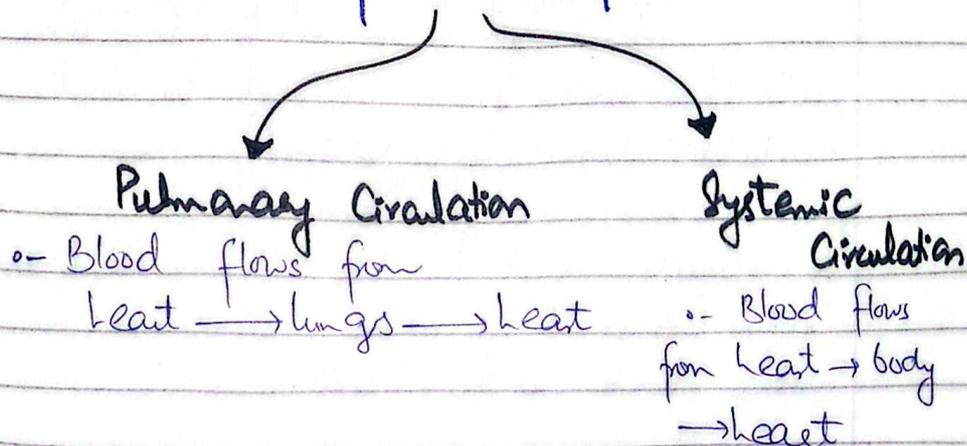
It is defined as;

A network of heart, blood, and blood vessels that transports oxygen, nutrients, hormones and waste products throughout the body.

It plays a pivotal role in maintaining homeostasis, body temperature and immunity.



2. Circuits of blood flow

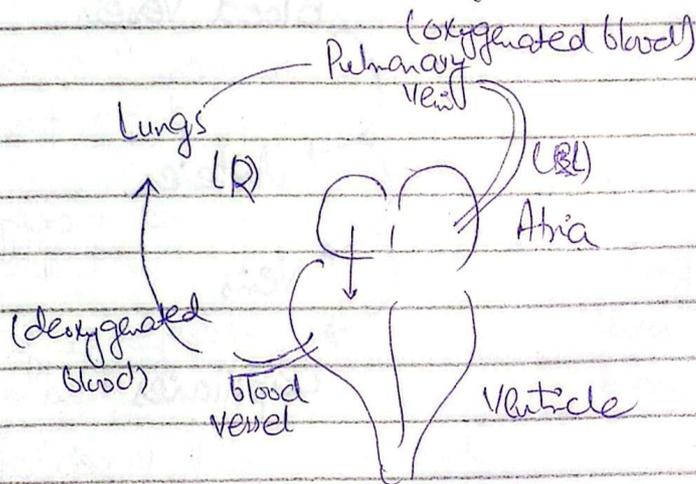


The two circuits - pulmonary and systemic circulation are called as double circulation as the blood passes through the heart twice during a complete cycle of the body.

3. Two Circuits of double Circulation

a) Pulmonary Circulation

In this deoxygenated blood is pumped from the heart to the lungs, and blood becomes oxygenated.



b) Systemic Circulation

In systemic circulation, left atria contract and pumps blood to left ventricle. From left ventricle, aorta arises that carries oxygenated blood from the heart and supplies it to the heart body and then returns deoxygenated blood back to the heart.

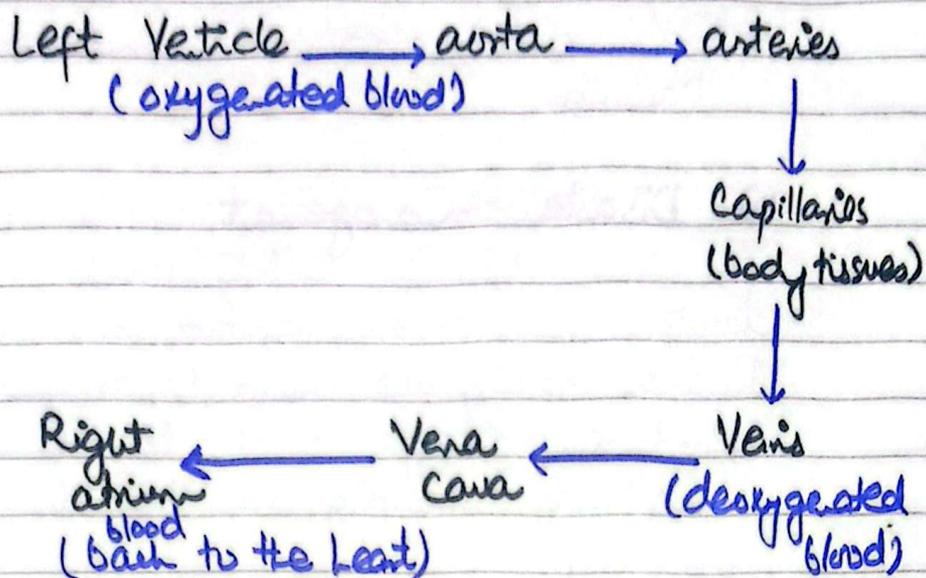


Fig - Pathway of Systemic Circulation

Part (c) :

1. Environmental applications of GIS

Geographic Information System (GIS)

is a powerful tool used to collect, store, analyze and display spatial environmental data.

It is vital in environmental planning, management and monitoring of environmental conditions.

Environmental applications of GIS are;

a) Natural resource management

GIS helps in the sustainable management of natural resources such as forest, water, land and minerals.

Can be used for;
→ Forest cover assessment and deforestation tracking

b) Disaster management

GIS is widely used in disaster preparedness, response and recovery. Evacuation routes, earthquake hazard assessment, flood risk zoning and landslide susceptibility mapping can be done by using GIS.

c) Biodiversity Conservation

GIS aids in identifying biodiversity hotspots, wildlife habitats and migration patterns. Wildlife conservation strategies can be done using GIS.

d) Urban Environmental management

By using GIS, environmental challenges in the cities can be managed, like solid waste management, green space planning and urban heat island analysis is performed using GIS.

e) Land use and land cover analysis

GIS is used to analyze changes in land use patterns such as urbanization, desertification and

agricultural expansion.

Part (a)

a. Importance of Carbohydrates

Carbohydrates are the primary source of energy for the human body. They are organic compounds made up of carbon, hydrogen, oxygen.

- Carbohydrates provide quick energy, 1 g of carbohydrates yield 4 kcal of energy.
- Carbohydrates regulate blood glucose level.
- Dietary fibre - a form of carbohydrate helps in digestion.

b. Disorders of Carbohydrates:

- Due to deficiency of carbohydrates, hypoglycemia occurs - a condition of low blood glucose level that causes fatigue and dizziness.
- Deficiency of carbohydrates led to ketoacidosis, a condition in which excess fat breakdown results in the formation of ketones in the blood.
- Causes muscle loss and weakness as proteins of body start breaking down as source of energy.

2. Importance of Proteins

Proteins are compounds made up of natural acids. They are building blocks of the body and are required for growth, metabolism and repair of body tissues.

- Protein is needed for growth of body to repair and replace worn-out tissues.
- Most of the enzymes are protein in nature that speed up a chemical reaction taking place in living organisms.
- Antibodies are protein in nature that help to fight against antigen and prevent diseases.

Deficiency disorders of proteins:

1. Kwashiorkor

- occurs due to severe protein deficiency in children
- results in swollen belly, thin muscles, hair and skin changes

2. Marasmus

- caused by deficiency of both proteins and calories
- results in severe weight loss, muscle wasting, weakness

3- Stunted growth

- delayed physical and mental development