DASHAPRAMATHI EDUCATIONAL TRUST (R)

AKSHARA INSTITUTE OF PHARMACY

SY NO . 1 / 4 , PARAGODU VILLAGE , BAGEPALLI TALUK , CHIKKABALLLAPUR DISTRICT , PIN CODE : 561207

HUMAN ANATOMY AND PHYSIOLOGY

IMPORTANT QUESTIONS AND ANSWERS

SYLLABUS

1. CELL & TISSSUE
2. SKELETON SYSTEM
3. BLOOD
4. CARDIO VASCULAR SYSTEM
5. NERVOUS SYSTEM
6. SENSORY ORGANS
7. REPRODUCTIVE SYSTEM
8. URINARY SYSTEM
9. LYMPHATIC SYSTEM
10. ENDOCRINE SYSTEM
11. RESPIRATORY SYSTEM
12. DIGESTIVE SYSTEM

CHAPTER-1

CELL & TISSSUE-

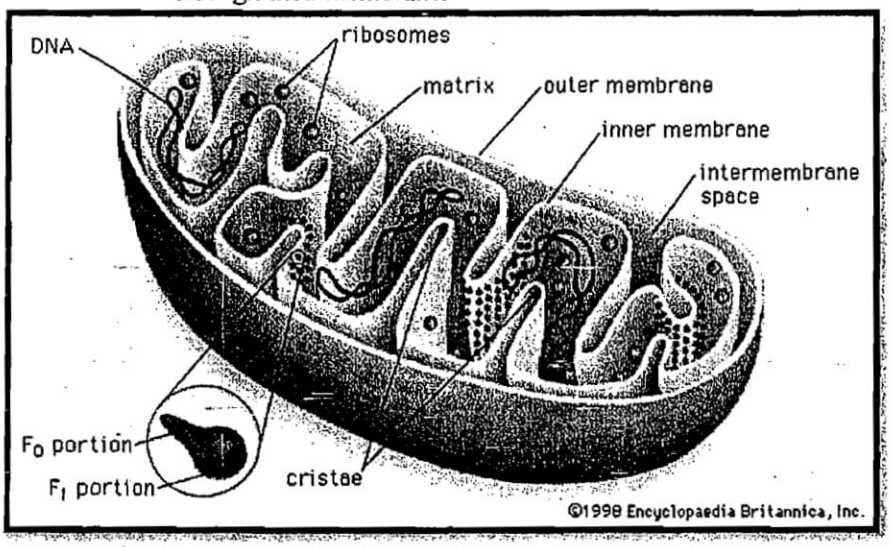
Q.1 Write a note on mitochondria?

Answer - Mitochondria is called as power house of the cell. These are spherical or oval in shape. The size of the mitochondria is about 0.5 to 7 microns. The mitochondria are made of proteins and phospholipids.

Mitochondria are covered with double layer membrane. They are outer and inner membrane. The outer membrane is smooth whereas the inner membrane consists of number of folds called cristae. There cristae help to increase the surface area for biochemical functions. The mitochondrion is filled with a fluid in which the enzymes are seen floating.

Function of mitochondria

- It is the power houses of the cell.
- It contains necessary enzymes for the respiration.
- It synthesis, stores and released ATP molecules for cellular activities.
- It participates in the transportation of any material, enzymes and water to cell through their membrane.



Q.2 Define & Classify tissues

Answer - A group of cell having same origin, similar shape and specify or common generalized function is known as a tissue.

Classification of tissues:-

1. Epithelial tissue
2. Connective tissue
3. Muscular tissue
4. Nervous tissue

Q.3 Write a note on epithelial tissue

Answer - Epithelial tissues form the covering and lining to the free surfaces of the body. They perform vital functions like protection, excretion, glandular secretion and absorption. The epithelial cells contain minimal extra cellular material. But they are arranged on a basement membrane.

Epithelium is further classified as:

1) Simple epithelium
2) Stratified epithelium

1) Simple epithelium

It consists of single layer of cells. It is further divided into

Squamous
Cuboidal
Columnar
Ciliated
Glandular

Squamous epithelium:-

It consists of flat cells arrangement edge to edge as in a mosaic. This type of epithelium covers the alveoli of lungs, pericardial, pleural and peritoneal cavities.

Cuboidal epithelium:-

Here, cells are cubical; they are arranged over a basement membrane. It is found in the distal convoluted tubules of the kidney.

Columnar epithelium:-

It consists of tall, pillar like cells arranged on a basement membrane. It is found in lungs and ducts of glands.

Ciliated epithelium:-

The cells may be cuboids but they contain hair like structure called cilia present in the free border in the free border, e.g. cells lining the trachea.

Glandular epithelium:-

It consists of cylindrical or columnar cells. It is present in secretary glands like salivary glands and breast.

CHAPTER-2
Skeleton System

Q.1. Classify the bones with examples. Write the functions of skeleton system.

Answer - Classification of bones: -

1) Long bones: - Femur, Humerus, Radius, Ulna.
2) Short bones: - Tarsal & Metatarsal, Carpal & Meta carpal.
3) Flat bones: - Skull bones, Sternum, Scapula
4) Irregular bones: - Vertebral bone.
5) Sesamoid (circular) bones: - Patella.

The skeletal system consists of a frame work of bones and cartilage that protect organs and permits movements.

Functions:

1) Protection: - It protects the delicate tissue and vital organs. Example, vertebral column protects spinal cord.
2) Blood cell production: - Bone narrow is an important site for the production of blood cell.
3) Storage: - Important reservoir of minerals, especially calcium.
4) Movement: - It provides wide range of movement.

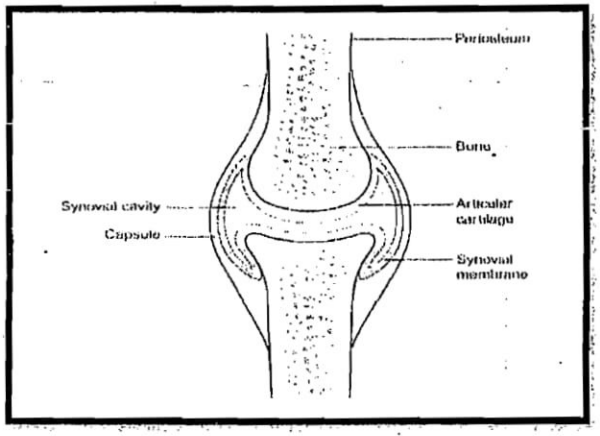
Q.2 What are joints? Explain the Synovial/ movable joints

Joints - It is a junction between two or more bones.

Types of Joints

1) **Fibrous joints (or) Immovable joints: -** Bones are joined by fibrous ligaments or membrane. Example, Joints between the skull bones.
2) **Cartilaginous joints (or) Slightly movable joints: -** Between two bones, there is hyaline cartilage, a tough malarial that acts as shock absorber. Example, joint between the adjacent vertebral bones.
3) **Synovial joints (or) freely movable joints: -** It is freely movable joints. It contains Joint cavity, containing a fluid, called as synovial fluid. Articular ends of the bones are covered by hyaline cartilage. The ends of the bones are held close together by fibrous tissue or synovial membrane.

STRUCTURE OF SYNOVIAL JOINTS



Types of synovial joints: -

1. Ball and socket joint: - Articular end of one bone is ball like. It fits into the socket like cavity of another bone. It allows movement in all directions. Example, Shoulder joint.

2. Hing joint: - Allows the movement in one plane. Example, Elbow joint and knee joint.

3. Condyloid joint: - Allows the movement in two planes. Example, wrist joint

4. Gliding joint: The articular surface is the flat and glide over each other. Example, joint between carpal and tarsal bones.

5. Pivot joint: - The joint allow a bone to rotate. Example, Atlas rotates in relation to axis.

6. Saddle joint: - In this, the joint space has concave – convex articular surface. Allow movement in all direction. Example, saddle joint is at the bone of thumb.

CHAPTER-3
Blood

Q.1 Define blood & write its composition & function

Answer - Blood is a liquid connective in the body and runs through the blood vessels for the transport of oxygen nutrients. Hormones and waste products.

Composition of blood: - Blood contains fluid called plasma in which blood cells are suspended. Blood contains 55% of plasma and 45% of blood cell. Blood cells contains:-

1. R.B.C (red blood cells)
2. W.B.C (white blood cells)
3. Platelets

Composition of plasma:-

1. water =90%
2. Plasma proteins=7-8%
3. Organic substances
4. Inorganic substances

Plasma proteins

1. Albumin
2. Globulin
3. Prothrombin
4. Fibrinogen.

Functions of blood:-

1. It transports oxygen to cells.
2. It contains nutrient to cells.
3. It transports hormones to the cells.
4. It protects the cell or body from infection.
5. It participates in the clothing of blood.
6. It maintains the body temperature.
7. It transports waste products from the cell to excretory organs known as kidney.

Q.2. **Write a note on coagulation or clothing of blood?**

Clothing of blood is a mechanism of the body. It prevents loss of blood from the site of injury. In this process, blood is converted into jelly or thread like substances known as clothing. This prevents the loss of blood.

Mechanism of Blood:-

There are four stages:

1. Formulation of active thromboplastin
   Damaged cell ➡ thromboplastin
   Thromboplastin ➡ active thromboplastin
2. Formulation of thrombin
   Prothrombin Active Thromboplastin ➡ Thrombin
3. Fibrinogen Thrombin ➡ Fibrin
4. Formulation of clot
   Fibrin Blood Cells ➡ clot

Q.3 Write a note on blood groups.

Human body contains blood. In the antigens and antibodies are present antigens are present in the R.B.C.

Antibodies are present in plasma.

Antigens are of two types. They are "A & B"

Antibodies are of the two types. They are "a & b"

Depending upon the types of antigens and antibodies, the blood can be divided into

A - Blood Group

B - Blood Group

AB - Blood Group

O - Blood Group

Blood Group -A:- If blood contains antigen 'A' in RBC and antibody. 'b' in the plasma, they are called as blood group "A".

Blood Group -B:- If blood contains antigen in RBC and antibody 'a' in plasma are called as blood group "B".

(7)

Blood Group -"AB":- Blood contains "AB" antigen in RBC and doesn't contains any antibody in plasma. That is called as blood group "AB".

Blood Group -'O':- RBC doesn't contains any antigen and plasma contains antibodies "a and b". That is called as blood group 'O'.

CHAPTER-4

CARDIO VASCULAR SYSTEM

Q.1 Describe the structure of heart with a neat labeled diagram.

Answer - Heart is a muscular pump, its main function is to pump the blood throughout the body.

ANATOMY OF HEART:

Heart is a hollow muscular organ, it lies the center of the thoracic cavity and between the lungs but it is more to the left of the median. It is a cone shape and presents a base above and an apex below. It is about 10cm long and weight about 300g. It is the size of a closed fist of an individual.

LAYERS OF THE HEART

Heart consists of 3 layers:-

1. **Pericardium:** - The outer most layer is called as pericardium. It is made up of 2 sacs (layer) in between the two layers a fluid is present called pericardium fluids.
2. **Myocardium:** - This is the middle layer, main part of the heart, made up of myocytes (cardiac muscular cells) and fibroblast.
3. **Endocardium:** - This is the innermost layer of the heart.

INTERNAL STRUCTURE OF HEART

The human heart consists of four chambers- **Two Atria** and **Two Ventricles**
Two chambers on the right side known as **right atrium** and **right ventricle.**
Two chambers on the left side is the known as **left atrium** and **left ventricle.**
These four chambers are formed by two septum which divide the heart, they are **inter atrial septum** and **inter ventricular septum.**

RIGHT ATRIUM

The right atria receives the blood from **superior** and **inferior venacava,** besides these opening, there is an opening of the **coronary sinus** which brings the blood from the coronary veins of the heart muscle.

RIGHT VENTRICLE

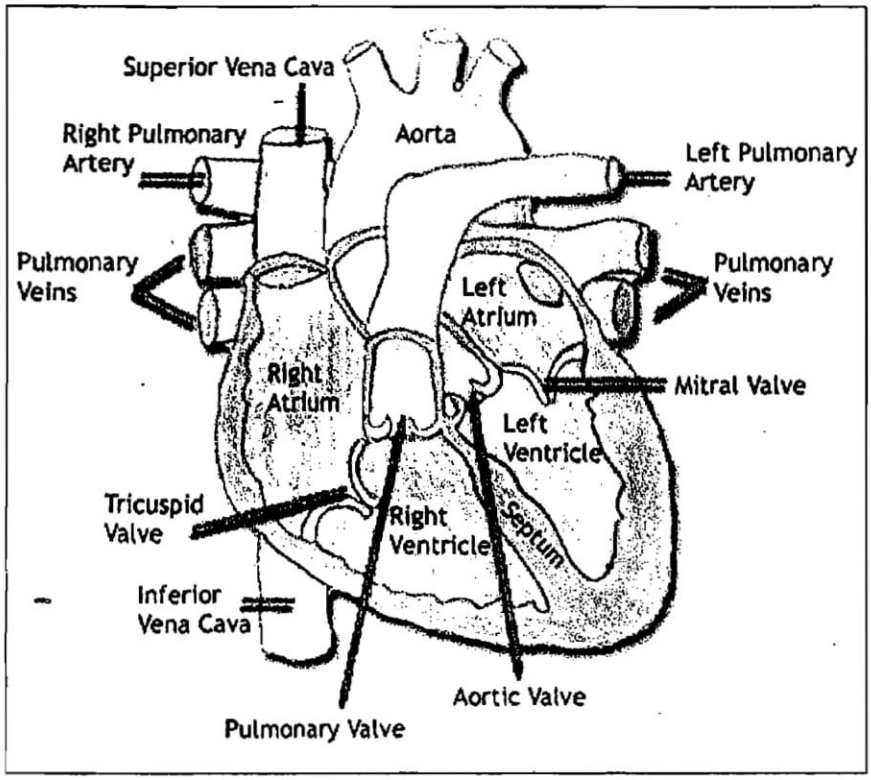
The blood of the right atrium then goes to the right ventricle, between the right atrium and the rightventricle, there is a **right atrio-ventricle orifice** guarded by **right atrio-ventricular valve.** Right ventricle opens to the **pulmonary trunk,** this trunk carries blood to the lungs for oxygenation. The orifice of the pulmonary trunk is guarded by **pulmonary valve.**

LEFT ATRIUM

Left atrium receives the oxygenated blood via four pulmonary veins.

LEFT VENTRICLE

The blood from the left atrium goes into the left ventricle, between the left atrium and the left ventricle, there is a **left atrio-ventricle orifice** guarded by **left atrio-ventricular valve**. The left ventricle pumps the blood into the aorta, guarded by aortic valve.



THICKNESS OF THE CHAMBERS

Two atria are of comparatively thin walled structure act as receivers, besides this contract to deliver blood into the corresponding ventricle. Thus ventricles on other hand thick muscular structure and force of contraction is powerful. The left ventricular wall is much thicker than right ventricle (3:1). The left ventricle pumps the blood in the whole body (systemic circulation) whereas the right ventricle has to pump the blood in the pulmonary circulation.

Q.2 Describe the pulmonary, systemic and coronary circulations

Answer

1. SYSTEMIC CIRCULATION

It is the circulation involving blood supply to the part of the body except lungs. This circulation starts from aorta which carries oxygenated blood from left ventricles. Aorta breaks up into smaller arteries and finally ends to capillaries, where exchange of materials such as O2 and other nutrients from capillaries to the tissue and waste material such as CO2 from tissues to blood capillaries take place.

The capillaries unite to form venules which join up to finally form large venous trunk namely superior venacava and inferior venacava. This two venous trunk open in the right atrium of heart. This course of circulation from left ventricle to the right atrium is called **systemic circulation**.

2. PULMONARY CIRCULATION

It is the part of circulation involving the purification of blood in lungs. Impure venous blood is pumped by the right ventricle. The pulmonary arteries carry this blood to lungs, where it is oxygenated. Four pulmonary veins carry this oxygenated blood from lungs to the left atrium. This course of circulation from right ventricle to the left atrium is called **pulmonary circulation.**

3. CORONARY CIRCULATION

This circulation involves blood supply to the heart itself. The right and left coronary arteries arise from ascending aorta, supply blood to the heart and the venous blood is collected by the coronary sinus with opening to the right atrium.

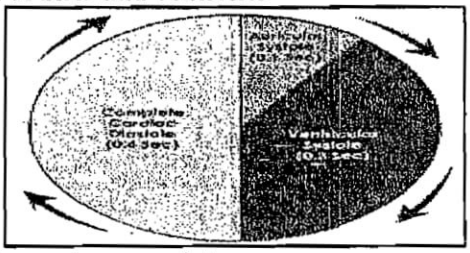
Q.3 Write the events of cardiac cycle?

Answer-

CARDIAC CYCLE: The heart act as a pump and its action consist of a series of mechanical event (such that relaxation and contraction of the atria and ventricle), because they all repeat cyclically that's why it is known as cardiac cycle. As a heart of 72/min, an individual cardiac cycle last for 0.8sec.

Each cycle consist of following events:-

1. Atrial systole – contraction of atria
2. Ventricle systole – contraction of ventricle
3. Complete cardiac diastole – relaxation of atria and ventricles



The sequences of events during the cardiac cycle are as follows,

1. Atrial systole

- The superior venacava and inferior venacava transport deoxygenated blood into the right atrium, simultaneously four pulmonary veins convey oxygenated blood into the left atrium.
- The atrio ventricular valves open and blood flows towards the corresponding ventricles.
- The SA node emits an impulse which stimulates a wave of contraction that spreads over the myocardium of both atria, emptying the atria and completing ventricular filling.
- This event last for **0.1sec** and termed as **atrial systole.**

2. Ventricle systole

- When the wave of contraction reaches AV node, it is stimulated to emit an impulse which quickly spread to the ventricular muscle via bundle of His and purkinje fibres.
- This results in a wave of contraction which sweeps upwards from the apex of the heart and across the walls of the both ventricle and pumping the blood into the pulmonary trunk and the aorta.
- This events lasting for **0.3sec** is termed as **ventricular systole.**

3. Complete cardiac diastole - After contraction of the ventricles there is **a complete cardiac diastole,** lasting for about **0.4sec** during which both atria and ventricle relax.

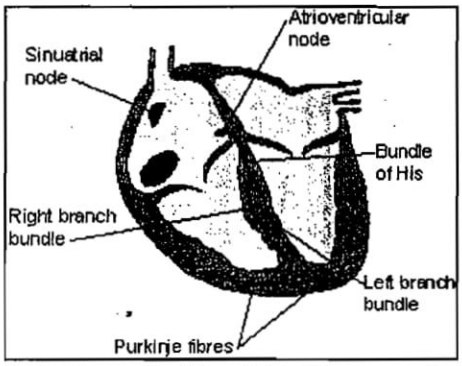
Q.4 Write a note on Junctional tissue of heart (or) Conductivity system of heart?

Answer - CONDUCTING SYSTEM OF HEART

There are some specialised neuro-muscular cells (auto-rhythmic cell) in the myocardium, which initiate and conduct impulse of contraction throughout the muscles of the heart.

They are-

1. **Sino-Atrial Node (SA Node)**
2. **Atrio-Ventricular Node (AV Node)**
3. **Bundle of His**
4. **Purkinje Fibres**



1. SA Node- It is the specialised cells in the wall of the right atrium near the opening of superior venacava. The SA Node is often called **"pacemaker",** because it initiates impulse of contraction of the heart.This cardiac action potential spread over the right and left atria causing them to contract and blood enters into the ventricles.

2. AV Node- It is also the specialised cells situated in the wall of the inter atrial septum near the atrio-ventricular opening. Normally the AV node is stimulated by the impulse of contraction that sweeps from the SA node.

3. Bundle of His- It is a specialised mass fibres that originated from the AV node. It divides into right and left branches.

4. Purkinje Fibres- Right and left branches of bundle of his breaks up into fine fibrous called purkinje fibres. These fibres convey the impulse of contraction from the AV node to the entire ventricle system.

CARDIAC OUTPUT: Amount of blood ejected by each ventricle per minute is called cardiac output. It is expressed in litre per minute. In resting condition the heart beats at the rate of 72times/min. So each beat, it pumps about 70ml of the blood which is known as **stroke volume.**

So the amount of blood pumped each minute, is therefore 72 X 70 (approximately) 5ltr blood. This volume of blood is known as **cardiac output.**

(11)

Cardiac output = Stroke volume X Heart rate

= 70ml X 72/min

= 5ltr/min (approximately)

Q.5 Write a note on E.C.G?

Answer - ELECTRICAL CHANGE IN THE HEART

(OR)

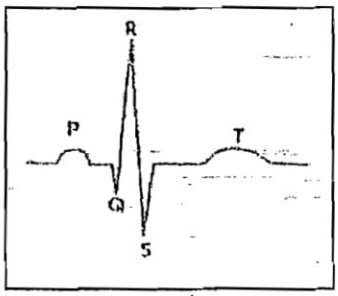
ELECTRO CARDIO GRAM (ECG)

Since the body fluids and tissue is good conductor of electricity. The electrical activity within the heart is detected by attaching electrodes to the surface of the body.

The instrument on which electrical activity is recorded is called as electro cardio graph, and tracing is called as electro cardio gram (ECG)

The normal ECG tracing shows five waves which have been named **P, Q, R, S** and **T**

- The **P wave** arises when the impulse from the SA node sweeps over the atria.
- The **QRS complex** represents the very rapid spread of the impulse from the AV node to bundle of His and purkinje fibres and the electrical activity of the ventricular muscles.
- The **T wave** represents the relaxation of the ventricular muscle.



Q.6 Write a note on Blood pressure.

BLOOD PRESSURE :

Blood pressure is the force or pressure that the blood exerts on the wall s of the blood vessels. When the left ventricle contracts and pushes the blood into the aorta, the pressure produced is called the **systolic pressure.** In adult it is about **120mmHg.** When complete cardiac diastole occurs and the heart in resting position, the pressure within arteries is called **diastolic blood pressure.** In adult it is about **80mmHg.** Atrial blood pressure is measured by use of a **sphygmomanometer** and is usually expressed with systolic pressure written above the diastolic pressure.

Blood pressure = systolic pressure/diastolic pressure

= 120/80 mmHg

Control of blood pressure is very important. If it is too high, blood vessels can be damaged causing clots or bleeding from the site of blood vessel damaged. If it falls too high, then the blood flow through tissue beds may be inadequate, which may be partially dangerous for such as vital organs as heart, brain, kidney etc.

Blood pressure is the result of the two parameters

1. Cardiac output

2. Peripheral resistance

Blood pressure = cardiac output X peripheral resistance

CHAPTER-5
NERVOUS SYSTEM

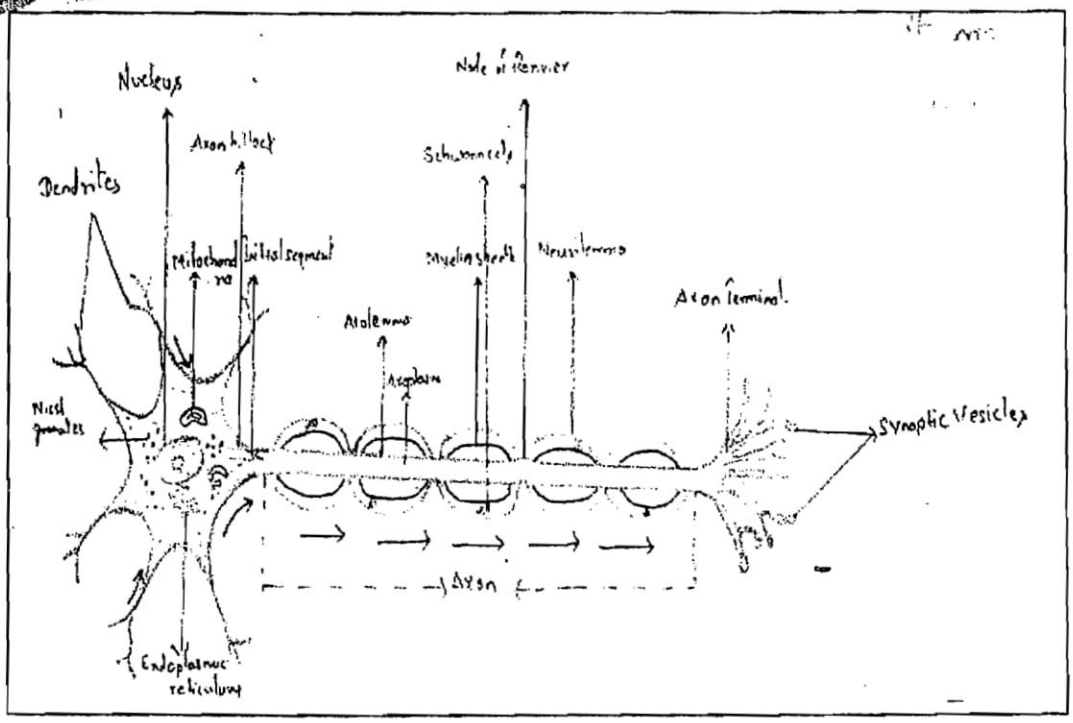
Q.1 Describe the parts of neurons with labelled diagram

Answer - The nervous system is the most important system of the body. It controls almost all the activities of the body. The activity of the nervous system is performed by the nerve cells called as **Neurons. Neurons are the fundamental unit of nervous system.**

The neurons are made up of four basic parts-

1. **CELL BODY**
2. **DENDRITES**
3. **AXON**
4. **AXON TERMINAL**

1. **CELL BODY**- It containing nucleus, mitochondria, nissl granules, ribosomes, and endoplasmic reticulum.
2. **DENDRITES**- Thinner, fibrous, highly branched projection outward from the cell body. It receives signals from the sense organs or from the axon of other neurons.
3. **AXON**- Thin, long, and cylindrical fiber that conduct nerve impulse away from the cell body. The membrane of an axon is called **axolemma**, which contain the **axoplasm**. Most of the neuron is surrounded by a sheath of fatty material called **myelin sheath**. The myelin sheath are covered by **neurilemma**, which contains a **Schwann cells**. The myelin sheath is interrupted at regular intervals and neurilemma comes close to the axis cylinder (axon). This point of break is known as **Nodes of Ranvier.** The axon potential originates at the **axon hillock**, the junction of the axon and the cell.
4. **AXON TERMINAL**- The axon undergoes branching, each branch ending is known as **axon terminal**. These terminals are responsible for transmitting signal from the neurons to the next neurons to a muscle cells. The space between the neurons are filled with a cells called as **neuroglia** that nourishing them and modulating there functions.



FUNCTIONS OF NERVOUS SYSTEM

1. **Sensory functions-** Sensory receptors detect internal and external stimuli and sensory (afferent) neurons carry this information into the brain and spinal cord through cranial and spinal nerves.
2. **Integrative functions-** The nervous system integrates (processes) sensory information by analyzing and storing some of it and making decisions for appropriate responses. An important integrative function is perception, the consciousness awareness of sensory stimuli.
3. **Motor functions-** Once sensory information is integrated, motor (efferent) neurons carry information from the brain toward the spinal cord or out of the brain and spinal cord to the effectors (muscles and glands) through cranial and spinal nerves. Stimulation of the effectors by motor neurons causes muscles to contract and glands to secrete.

Q.2 Write a note on the meanings of brain

Answer - MENINGS (Covering of brain & Spinal cord)

The brain and spinal cord are completely surrounded by three membrane lying between the skull and the brain, and between vertebra and spinal cord. They are named as from outside to inwards

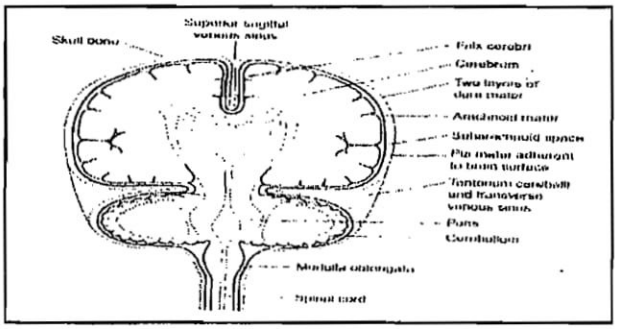
- Dura matter
- Arachnoid matter
- Pia matter

The **dura matter** and **arachnoid matter** are separated by a space called **subdural space**. The **arachnoid matter** and **pia matter** are separated by a **subarachnoid space**, which contains **cerebrospinal fluids (CSF)**.

DURA MATTER- It forms the outer layer, it has two membranes which are in close contact with each other except where the inner layer sweeps inwards.

ARACHNOID MATTER- Situated between the dura matter and pia matter. It is separated from dura matter by subdural space and from pia matter by subarachnoid space. These space contain the cerebrospinal fluid.

PIA MATTER- It is the innermost layer, it contains the minute vessels which supply blood to the brain and spinal cord.



FUNCTIONS OF MENINGS

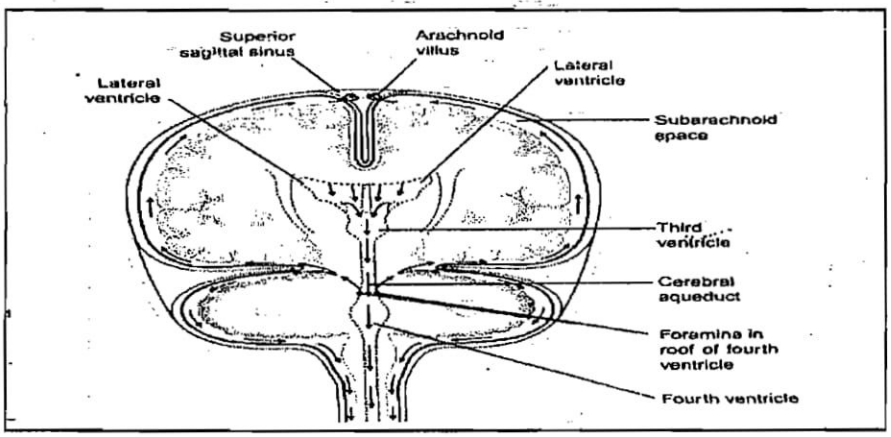
1. To protect and support nervous tissue.
2. To supply blood and nutrients to the central nervous tissue

---

Q.3 Write a note on ventricles of the brain

Answer - VENTRICLES OF BRAIN: Within the brain there are four irregular shape cavities or ventricles containing cerebrospinal fluids. They are:

1. The right and the left lateral ventricle which lies one in each cerebral hemisphere.
2. The third ventricle which present in the midline. It communicates with two lateral ventricles and also the fourth ventricle.
3. The fourth ventricle lies in the front of cerebellum and pons and medulla oblongata. It continues below with the central canal of spinal cord.



(15)

Q.4 Write a note on CSF .

Answer - CEREBROSPINAL FLUID (CSF) : It is a clear, colourless, alkaline fluid present in

- Sub arachnoid space
- Ventricles of brain
- Central canal of spinal cord

Cerebrospinal fluid is secreted by a network of blood vessels called **choroid plexus.**

This plexus is situated in the lateral ventricle.

Composition of CSF

It contains, water, glucose, nitrogenous substance, proteins, electrolytes (Na^+, K^+, Ca^{2+}, Cl^-), and few cells (lymphocytes).

FUNCTIONS OF CSF:

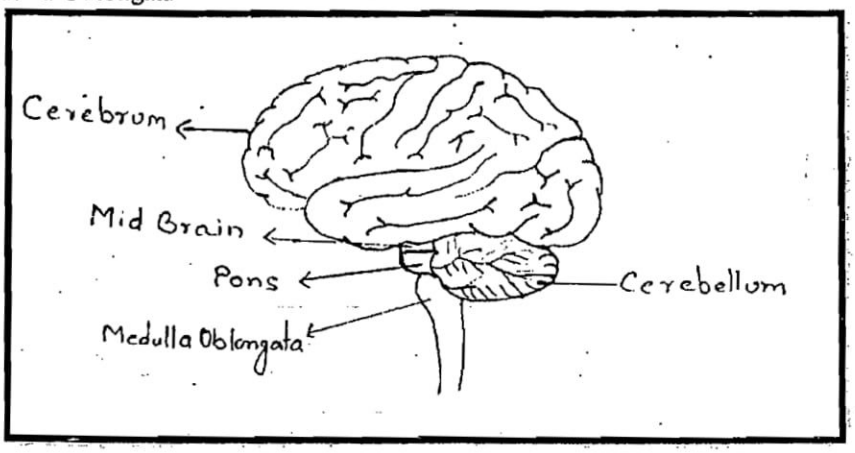
1. It support and protects the delicate structure of brain and spinal cord.
2. It maintains uniform pressure around these delicate structures.
3. It acts as a cushion and shock absorber for brain and spinal cord.
4. It supplies nutrients to the brain and spinal cord.
5. It removes the waste product of brain and spinal cord.

Q.5 List out different parts of the brain.

Answer - PARTS OF BRAIN

Brain is the part of central nervous system which lies within the cranial cavity. It consists of following parts-

1. Cerebrum
2. Mid brain
3. Pons
4. Cerebellum
5. Medulla Oblongata



1. CEREBRUM

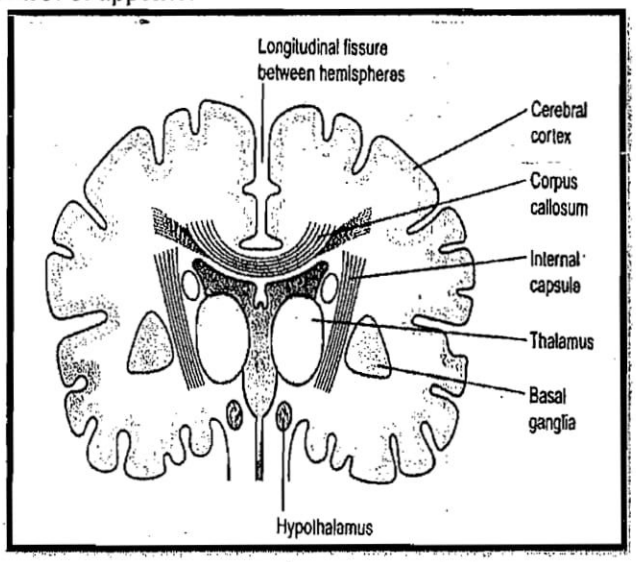
Cerebrum constitutes the largest part of the brain. It is divided into two equal parts by a **central longitudinal fissure.** The two parts formed are the right and left cerebral hemisphere. These two hemispheres are internally connected by a mass of white matter known as a **corpus callosum.** Cerebrum appears as folded ridges and grooves, called **convolutions.** The following terms are used to describe the convolutions:

- **A gyrus (plural, gyri)** is an elevated ridge among the convolutions.
- **A sulcus (plural, sulci)** is a shallow groove among the convolutions.
- **A fissure** is a deep groove among the convolutions.

The fissure divides the each hemisphere into 5 lobes- **the frontal lobe, the parietal lobe, the temporal lobe, the occipital lobe and the insula.**

A cross section of cerebrum shows three distinct layers of nervous tissues

1. The **cerebral cortex** is a thin outer layer of gray matter
2. The **cerebral white matter** underlies the cerebral cortex
3. **Specialized structure of gray matter-** Deep in the cerebral hemisphere, there are some collection of gray matter which form specialized structure. They are:
   - **Basal nuclei-** It is a group of nerve cell present in the white matter of cerebrum. Basal nuclei influence the tone of skeletal muscle.
   - **Thalamus-** It consist of two ovoid mass separated by the third ventricle. Thalamus is an important relay station for the incoming fibers of spinal cord and brain stem on their way to cerebral cortex.
   - **Hypothalamus-** It present below and in the front of the thalamus. It performs following **functions-**
     - ❖ It regulates and controls the release of hormones from pituitary gland.
     - ❖ It regulates body temperature.
     - ❖ Co-ordination of autonomic nervous system.
     - ❖ Control of appetite.



(17)

2. MID BRAIN: It is the connection between cerebrum and other parts of nervous system. The nerve cells of mid brain act as relay station for the ascending and descending nerves fibres.

3. PONS: It is present in the front of cerebellum and below the mod brain and above medulla oblongata. Pons acts as a relay station for ascending and descending nerve impulse.

4. CEREBELLUM: It is situated behind pons and immediately below the posterior portion of cerebrum.

FUNCTIONS

- It maintains the muscle tone
- Co-ordination of muscular movement.
- Maintenance of balance and equilibrium

5. MEDULLA OBLONGATA

Answer - It is an important part of the brain because all the vital centers are present in medulla oblongata. The vital centers are

a) Cardiac centre

b) Respiratory centre

c) Vasomotor centre

d) Reflex centre of vomiting, coughing, sneezing, and swallowing.

FUNCTIONS OF MEDULLA OBLONGATA

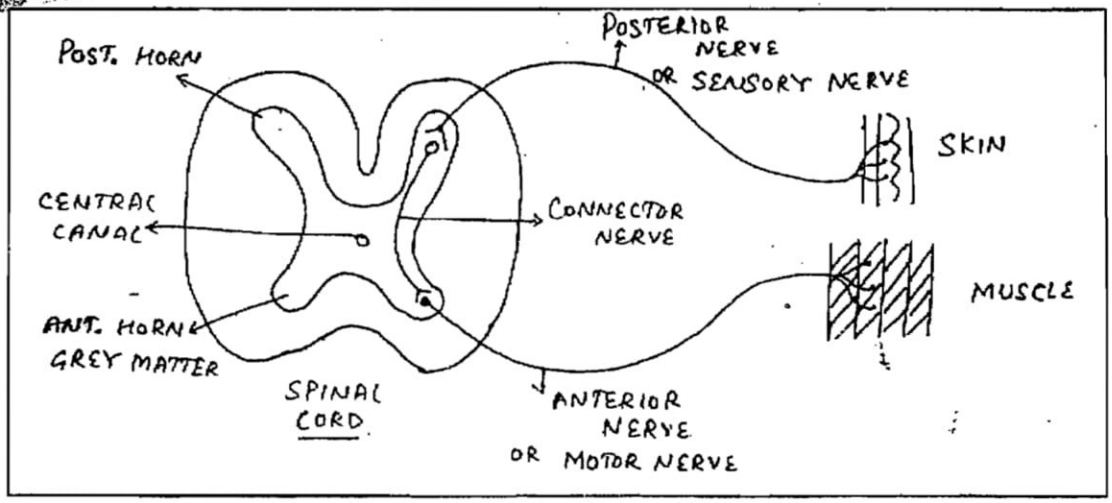
- Cardiac centre controls the rate and force of cardiac contraction
- Respiratory centre controls the rate and depth of respiration.
- Vasomotor centre controls the caliber of blood vessel
- The reflex centre protect the body from uneven situations.

Q.7 Explain a reflex action.

Answer - REFLEX ACTION: It is the defence mechanism manifesting as a quick and automatic response for a sensory stimulus. Reflex action occurs independent of our will.

REFLEX ARC - It consists of structures which are involved in the production of a reflex action. These structures are-

- A sensory organ like skin which receives the sensory stimulus.
- Sensory nerves which arise from sensory organ, it terminates at the posterior nerve root of spinal cord.
- The spinal cord
- The motor nerves which commences from the anterior horn cells of the spinal cord. Motor nerve transmits the impulses to the motor organ such as muscles.



IMPORTANCE OF REFLEX ACTION

The impulses of reflex action are carried only to the spinal cord and not to the brain. The impulses from the spinal cord are then transported to the motor organ, so the response is quick and immediate.

DIFFERENCE BETWEEN SYMPATHETIC & PARASYMPATHETIC DIVISION OF ANS

	Sympathetic component	**Para sympathetic component**
1. Origin	Thoracolumbar (T_1 to L_{2or3})	Craniosacral (III, VII, IX, X, S_2-S_4)
2. Distribution	Wide	Limited to head, neck and trunk
3. Ganglia	Away from the organ	On or close to the organ
4. Post ganglionic nerve	Long	Short
5. Transmitter	Nor-adrenaline (major), Acetylcholine (minor)	Acetylcholine
6. Important functions	Deal with exciting and stressful situation	concerned with the vegetative functions

(19)