

BOARD SOLVED QUESTION
WITH ANSWER

Year :2022

Subject :Human Anatomy and Physiology

Subject Code :ER20-14TS

Subject In-Charge :Arun Aniket Das



DO NOT WRITE ANYTHING ON YOUR QUESTION PAPER EXCEPT YOUR ROLL NO.
QUESTION PAPER CONTAINING ANYTHING WOULD BE TREATED AS MALPRACTICE

HUMAN ANATOMY & PHYSIOLOGY (Theory)

Full Mark -80

Time -3 hrs
(5 x 6)

1. Answer any 6 out of 7.
- Define & classify tissue. Write a note on Nervous Tissue.
 - Write down the function of Blood. Discuss about the mechanism of Clotting and write down the Clotting factors.
 - Describe the parts of Respiratory System & discuss the mechanism of respiration.
 - Draw a neat labelled diagram of EYE & write about the physiology of vision.
 - Draw a neat & labelled diagram of female reproductive system. Write a short note on menstrual cycle.
 - Give the location of adrenal gland. Write the function of the hormones secreted by cortex part of adrenal gland.
 - Define joint. Give the classification of joint with suitable example.
2. Answer any 10 out of 11. (10 x 3)
- Write a note on flow of blood through heart.
 - Write about the function of cerebellum & cerebrum.
 - Write a note on structure & function of kidney.
 - Write down the Physiology of Urine formation.
 - Write a note on circulation of Lymph.
 - Write a note on mechanism of Hearing.
 - Explain the role of Renin Angiotensin System in regulation of blood pressure.
 - Give a brief description on human tooth with suitable diagram.
 - Write a note on physiology of pain.
 - Explain the process of Spermatogenesis.
 - Pancreas is known as both endocrine and exocrine gland. Justify your answer. (20 x 1)
3. A) Answer the followings.
- What is Osteomyelitis?
 - Mention the parts of nephron.
 - Enlist two functions of spleen.
 - Write about the function of valve.
 - Name the structures involved in urinary system.
 - Enlist the function of CSF.
 - Write the function of oxytocin.
 - Difference between Tendon & Ligament
 - Write the universal donor & universal recipient Blood group.
 - Mention any two functions of liver.
- B) Define the followings
- | | | | |
|-------------------|---------------------------|----------------------|---------------------|
| i) Endocytosis. | ii) Thrombocytopenia | iii) Atherosclerosis | iv) Erythropoiesis. |
| v) Cardiac output | vi) Rheumatoid arthritis. | vii) Thrombopoiesis | viii) Haematuria |
| ix) Deglutition | x) Endocrine gland | | |

④

(a) Define & classify tissue. Write a note on Nervous tissue.

→ Tissues are the group of cells that are similar in structure & work together to achieve of particular function they are called tissue.

Types of tissue :-

- (i) Epithelial tissue - forms the lining covering of organs, glands & body surfaces
- (ii) Connective tissue - supports, connects & separates tissues & organs
- (iii) Muscle tissue - Responsible for movement, contraction & relaxation
- (iv) Nervous tissue - specialized for communication, control & coordination

Nervous Tissue :-

Nervous tissue exerts the greatest control over the body's responsiveness.

- neurons are the excitable & signaling cell.
- neurons are the unit of neural system

Nervous system have 2 basic system

① CNS

- it consist of brain & spinal cord
- the CNS interprets the signals & transmit it to effect organ

② PNS

- It consist of cranial & spinal nerve
- the PNS first sense the stimulate & send the signal to CNS.

There are 2 types of cells

- ① Neurons (signalling cells)
- ② Neuroglial (supporting cells)

1) Neuron

- It is made up of cell body, axon, dendrites
 - Neurons can't be reproduced
 - The cell body contains nucleus
 - Each nerve cell contains single axon which is thin long & cylindrical process.
 - Axons are surrounded by white fatty substance called the myelin sheath.
 - The Schwann cellular specialised cells of PNS, that produce myeline around this axon.
 - Afferent transmit, impulses from peripheral receptors to CNS.
 - Interneuron serves as a connecting link between the afferent & efferent neurons.
- On the basis of their structure they can be classified as
- (1) Unipolar
 - (2) Bipolar
 - (3) Multipolar

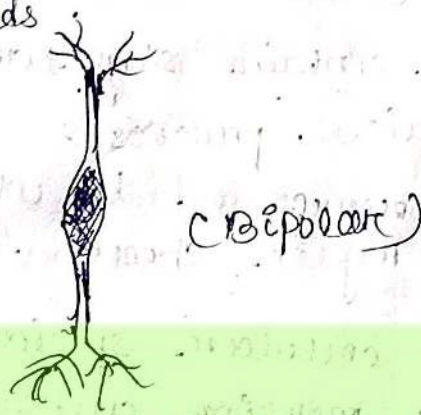
Unipolar :-

Dendrites arise from end of the neurone



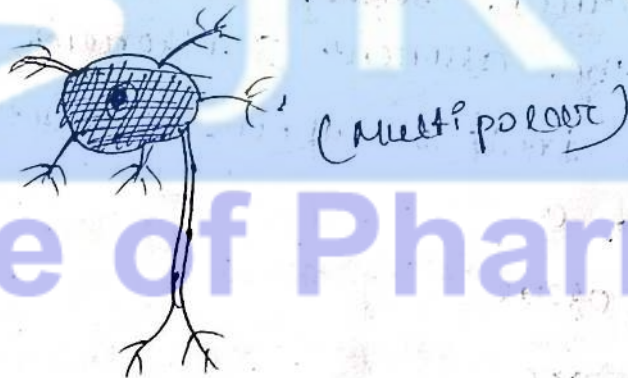
② Bipolar :-

In this neuron the axon emerges from one end of the cell body while the dendrites emerge from other ends.



③ Multipolar :-

Many dendrites arise from the cell body.

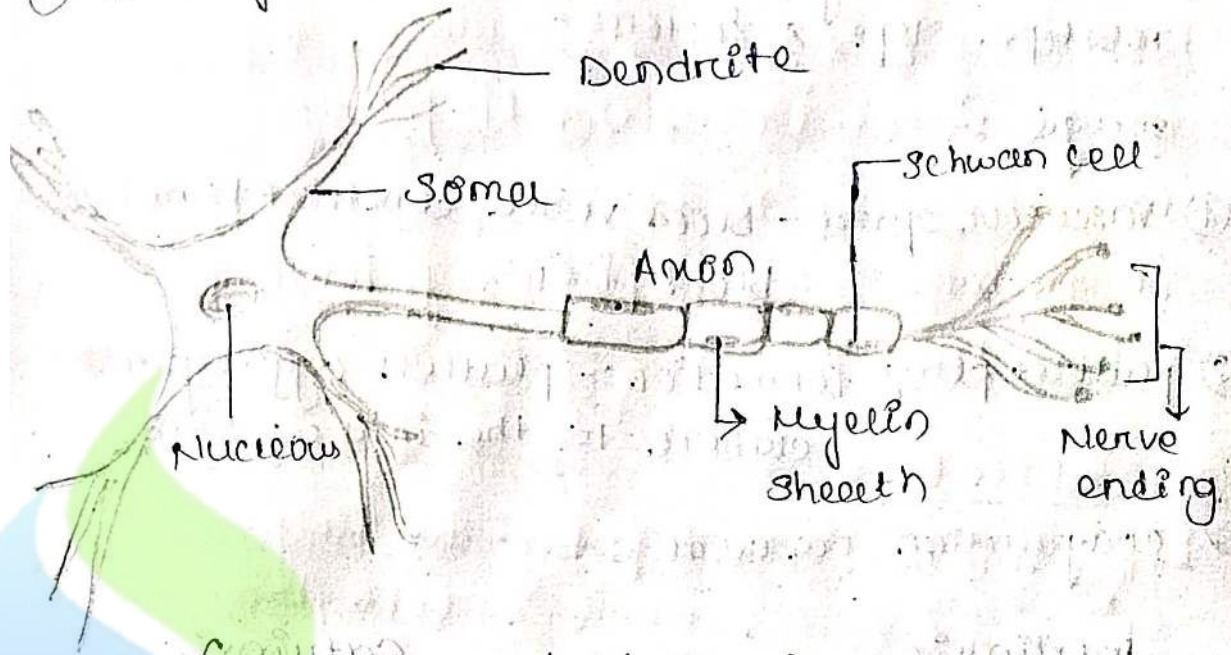


② Neuroglial cell :-

- These cells provide the support & nutrition to the neuron.
- It can reproduce.

There are 3 types of glial cells.

- ① Astrocytes
- ② Microglia
- ③ Oligodendrocytes



(Structure of Neuron)

b) write down the function of blood.

Discuss about the mechanism of clotting & write down the clotting factors.

→ Function of blood :-

- It is responsible for the transport of oxygen from the lungs to the tissue & CO₂ from the tissue to the lungs.

- It carries nutrients from GIT to liver, various other tissue.

- It regulate body temp & also water balance.

- It responsible for transport of hormones & salt.

- It provide protection against infection.

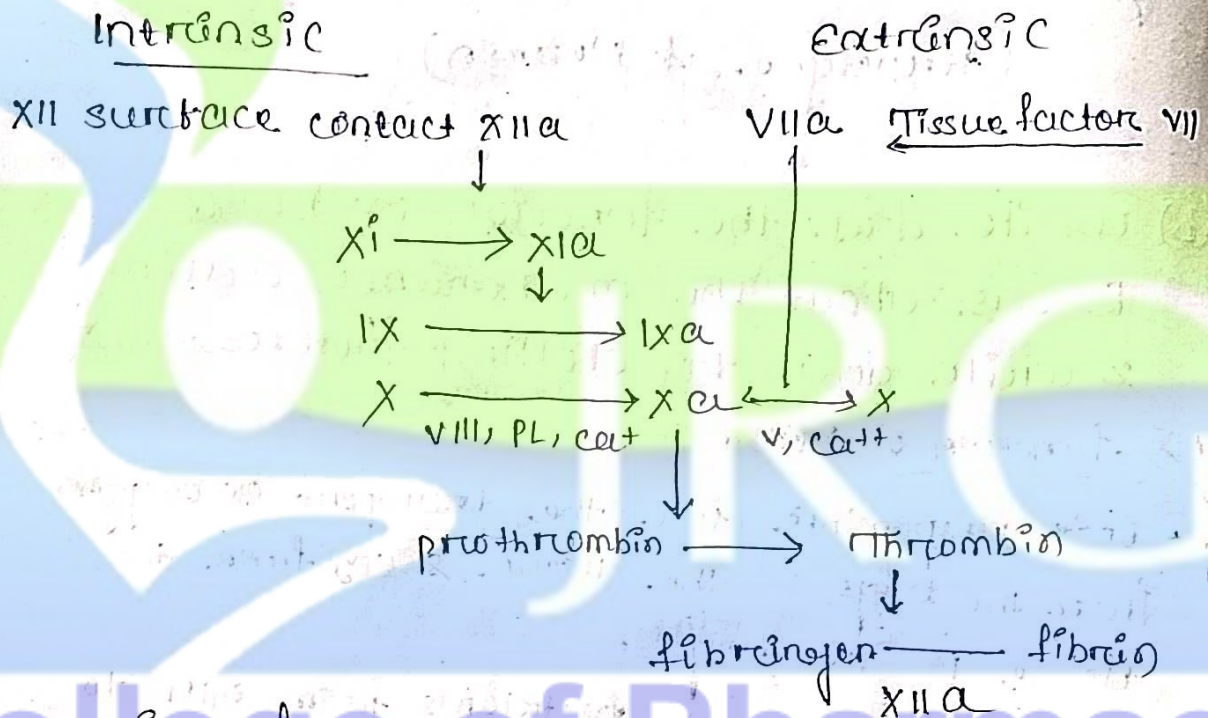
- It help in coagulation & stop bleeding.

Mechanism of clotting :-

- Blood clotting is a complex process involving multiple steps & factors.

stages :-

- ① vascular spasm :- blood vessels constrict to reduce blood flow
- ② platelet plug formation :- platelets aggregate & adhere to the injury site.
- ③ coagulation cascade :-



clotting factors :-

- | | |
|-------------------------|--------------------------|
| ① fibrinogen | ⑧ Antihemophilic factor |
| ② prothrombin | ⑨ Christmas factor |
| ③ Tissue thromboplastin | ⑩ Stuart factor |
| ④ calcium ions | ⑪ plasma thromboplastin |
| ⑤ soluble factor | (iii) Hageman factor |
| ⑥ unassigned | (iii) fibrin stabilizing |
| ⑦ stable factor | |

2) Describe the part of Respiratory System, discuss the mechanism of respiration

→ Respiration is simply defined as process of exchange of gases between body tissues & external environment.

parts of Respiratory system :-

① Nose & Nasal cavity :-

- The respiratory pathway begins from nose.
- cavity of nose is known as Nasal cavity
- Nasal cavity is divided into right & left portions by the nasal septum.
- The anterior portion of nasal chamber is known as nasal vestibule.

② Pharynx :-

- it is the common pathway for respiratory tract & gastrointestinal tract.
- It about 12 cm long & ^{further} divided into 3 parts.

① Nasopharynx ② Oropharynx ③ Laryngopharynx

③ Larynx :-

it lies between pharynx & trachea

it is made up of following cartilages.

- (i) Thyroid cartilage
- (ii) C-cold cartilage
- (iii) Arteroid cartilage

It consist of epiglottis that makes sure that food must be enter into esophagus instead of trachea.

④ Trachea :-

- it is cylindrical tube like structure which is 12 cm long & 2.5 cm in diameter.
- it begins at lower end of pharynx.
- it is made up of 16-20 C shaped incomplete rings.
- it provides a clear pathway for air to enter & exit lungs.

⑤ Bronchi :-

- The trachea ends up by dividing into 2 bronchi named right & left bronchi.
- They further pass into corresponding lungs. The right bronchus is shorter & wider than left.
- it connects windpipe with lungs & allows air to pass into lungs.

⑥ Bronchioles :-

- Bronchi of lungs further divided into small branches known as bronchioles.
- Bronchioles end up to form alveoli hence plays a major role.
- Role in pathway of air from bronchi to alveoli.

⑦ Alveoli :-

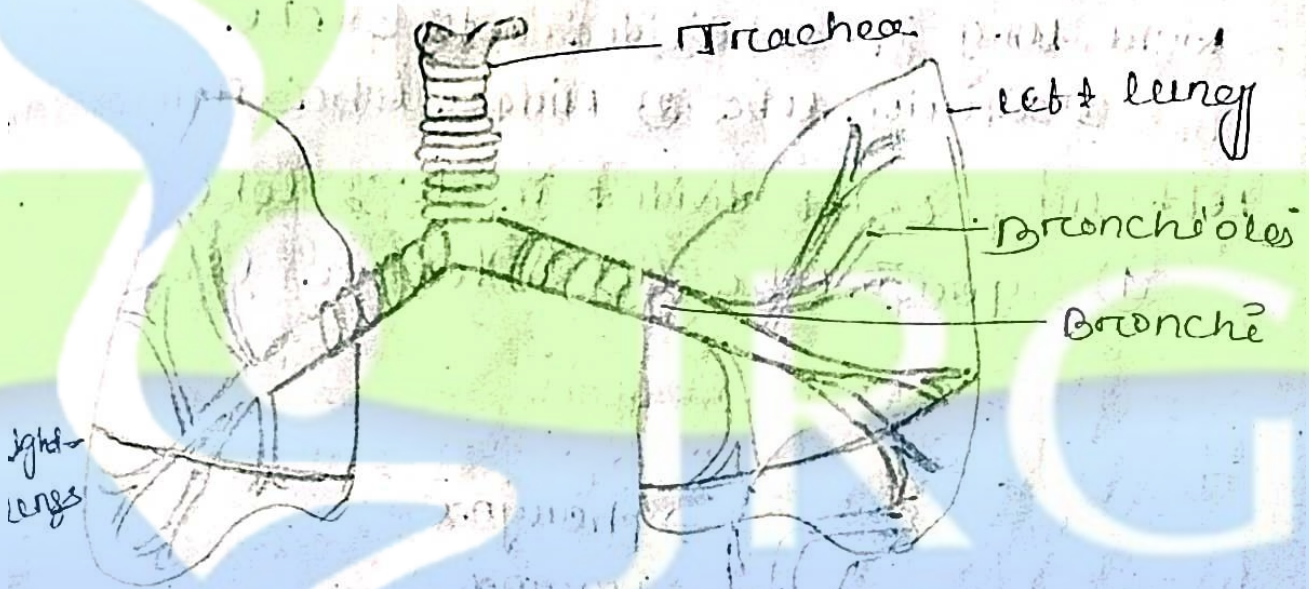
- Alveoli are known as functional units of lung & consist of small hollow area for gaseous exchange.

- There are approximately 300 million alveoli present in both lungs.
- They rich in blood supply.
- They contain 2 types of cells.

① pneumocytes ② Alveolar Macrophages.

- Once the blood receives oxygen it further transport it to all cell of our body.

⑧ Lungs :-



- Lungs are the principle organ for respiration.

- Lungs are pair of spongy air filled cone shape organ located on either side of chest.
- They are present in pair i.e. left lung & right lung.
- Lungs are covered by a double membrane known as pleural membranes.

Outer membrane: parietal pleura

Inner membrane: visceral pleura

- The lungs can be divided into 4 parts.

Apex: Narrow superior portion

Base: Broad inferior portion

Costal: surface against ribs

Surface: lateral boundary of mediastinum

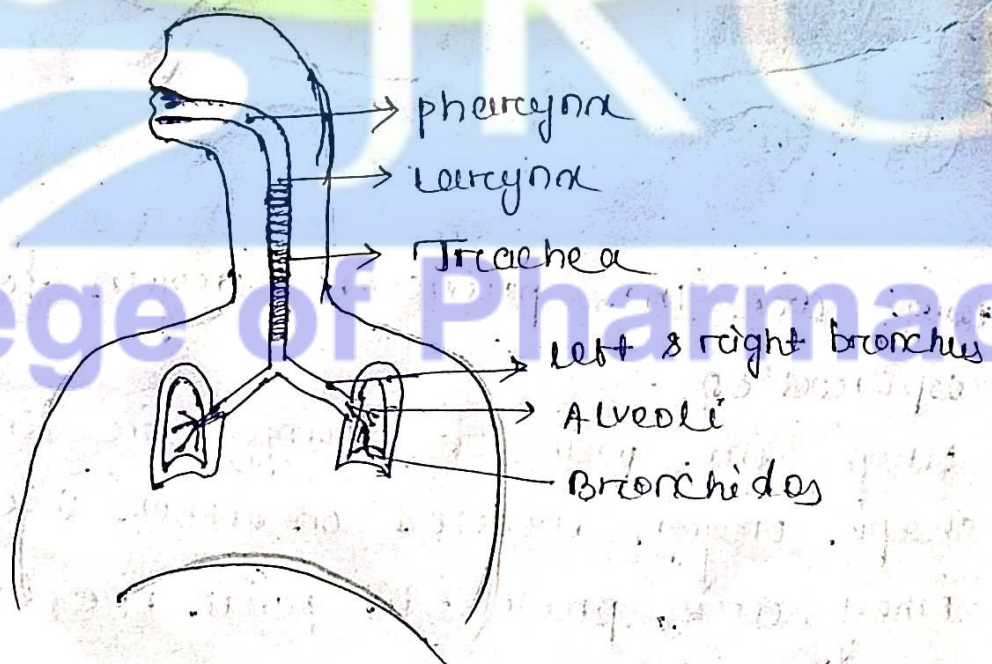
2 lungs of each side contain different no. of lobes.

- Right lung is subdivided into 3 lobes

① superior lobe ② Middle lobe ③ Inferior lobe

- Left lung is divided into 2 lobes

① superior lobe (ii) inferior lobe



Mechanism of Respiration :-

Mechanism of respiration involves two major steps:

- ① Breathing mechanism
- ② Exchange of gases

① Mechanism of Breathing :-

The process in which air moves in & out of the lungs is known as breathing.

① Inspiration :-

The process of intake of atmospheric air is simply known as inspiration.

- In this process air moves from atmosphere to lungs.
- The process is also known as inhalation.
- It is an active process.

contraction of diaphragm muscles

↓
enlargement of thoracic cavity

↓
decrease in pressure inside thoracic cavity

↓
filling of air inside the lungs

Expiration :- The process in which the air moves from lungs to the atmosphere is known as expiration.

- It is also known as exhalation.
- It is a passive process.

Relaxation of diaphragm muscles



Decrease in volume of thoracic cavity



increase in pressure inside thoracic cavity



exhalation of air

(2) Exchange of gasses :-

① Transport of O_2 :-

When O_2 is transferred from alveoli to blood, then it is carried by haemoglobin & then it is further transported to cells for cellular respiration.

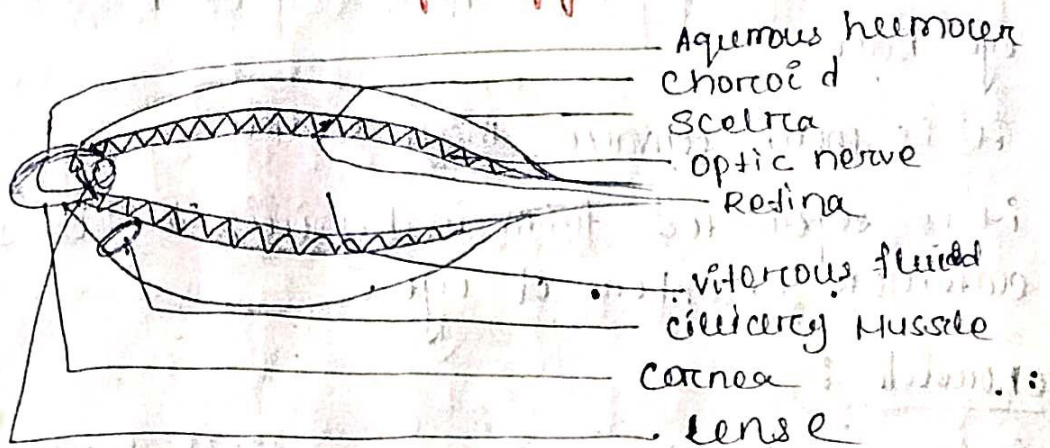
② Cellular Respiration :-

The O_2 received by the cell is further used for the process of cellular respiration in which cells use O_2 to breakdown the glucose into CO_2 & energy should be produced.

(3) Transport of CO_2 :-

Now CO_2 is a waste product hence it is further transferred from cells to blood & then blood to lungs & then finally exhaled out.

(d) Draw a neat labelled diagram of eye & write about the physiology of vision.



(Structure of eye)

EYE :-

- Eye is a specialised sense organ which help us to see the world.
- Eye ball is spherical in shape & has diameter about 2.5 cm.
- It is situated in the orbitall cavity.
- It is 3 concentric coats.
 - 1- Outer (Sclera & cornea) - Fibrous coat
 - 2- Middle (veat track, iris, ciliary body) vascular coat
 - 3- Inner (Nerve coat) Retina

Sclera :-

- It form the posterior 5/6th portion of the eye ball.
- It is opaque in nature is composed of fibrous tissue.
- It maintain the shape of eye ball.
- It is the outer most layer & it is white in colour.

cornea:-

- it is transparent & from 1/6th anterior portion in the eye ball.
- it is more convex than sclera.
- it is separated from sclera by iris by its space anterior chamber of eye.

choroid :-

- it is a thin pigmented layer. it is separated the posterior part of sclera from retina.
- It supply blood vessel to eye & contain dark pigments granules that prevent reflection of eye.

ciliary muscle :-

- it is a thick in the perit uvula track line just posterior to the corneal iris.
- it is the intrinsic in modify the lense shape.

Iris :-

It is the anterior part of uvula track. The colour portion of the eye form by circularly & radially arranged smooth muscle fibres.

- It control amount of light enter into the eye by constricting or dilating the pupil.

Pupile :-

It is the rounded opening of the iris through which light passes.

Retina :-

- It is the thin delicate innermost layer.
- It is continuous posteriorly of optic nerve.
- There are 2 types of cell

① Rod cell ② Cone cell

Optic disk :-

It is the area where optic nerve attached to retina. It does not contain photoreceptor.

Lens :-

It is a flexible by convex & crystalline like structure. It bring ray of light focus & produces image in retina.

Aqueous humour :-

It is the water fluid that provided nutrition to the eye & health to maintain the shape of cornea.

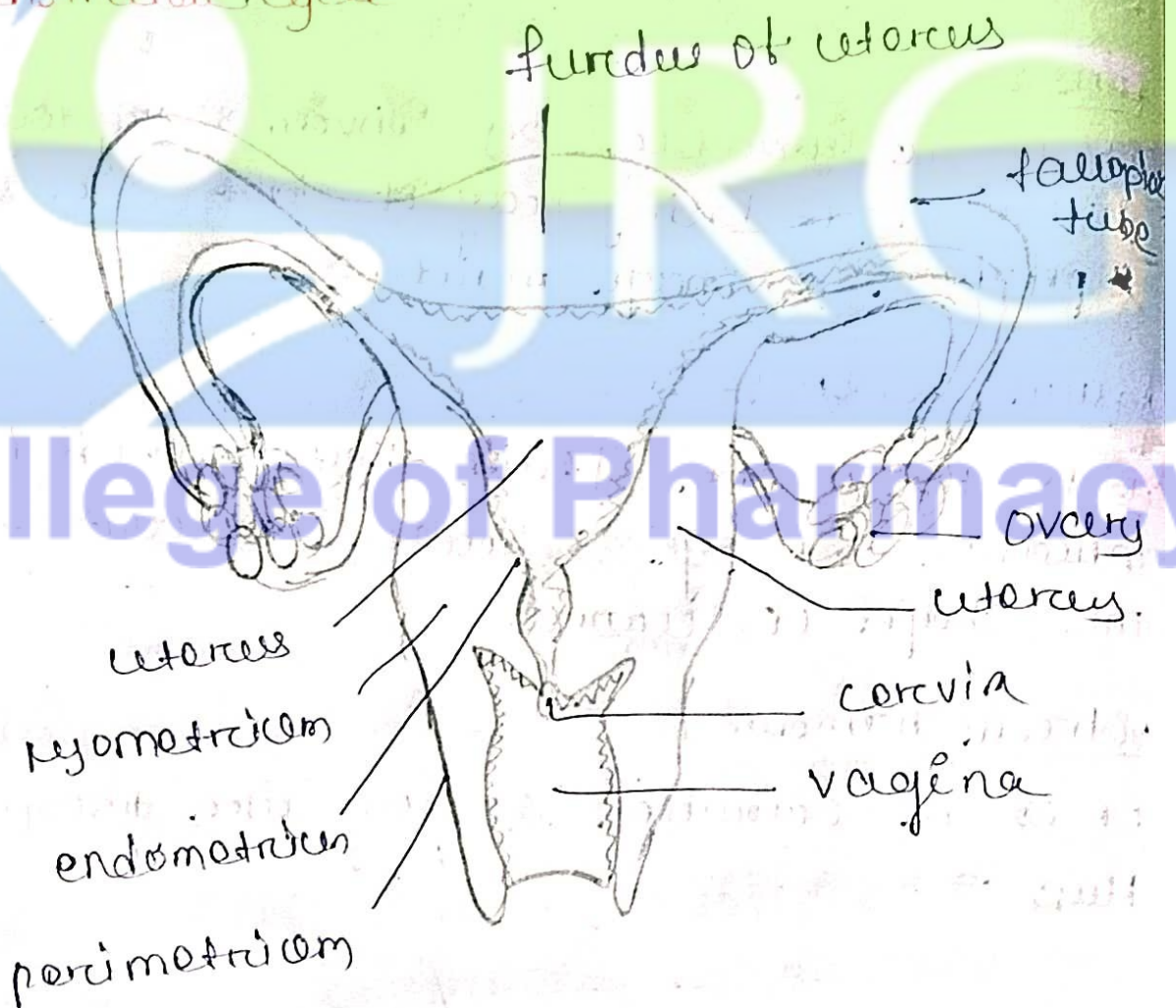
Vitreous humour :-

It is a colourless & jelly like transparent mass.

Physiology of vision :-

Light enters eye, through cornea & refracted by cornea & lens. Regulated by iris. Light focused on retina. Inverted image, formed. Photoreceptors convert light to electrical signals. Electrical signals, transmitted to bipolar cells & optic nerve. Optic nerve carries signal to brain. Brain interprets visual information & recognizes shapes, colors, patterns.

(e) Draw a neat & labelled diagram of female reproductive system. Write a short note on menstrual cycle.



The female reproductive anatomy includes both external & internal parts.

External parts :-

The function of external genitalia are to protect the internal parts from infection & allow sperm to enter vagina.

The main parts of vulva are external genitalia are :-

(i) Labia Majora :-

Labia majora enclose & protect the other external reproductive organs.

During puberty, hair growth occurs on the skin of the labia majora which also contain sweat & oil secreting glands.

(ii) Labia Minora :-

Labia minora can have a variety of sizes & shapes. They lie just inside labia majora, & surround the opening to vagina that

joins the lower part of uterus to the outside of our body. This skin is very delicate & can become easily irritated & swollen.

(iii) Clitoris :-

Two labia minora meet at clitoris a small sensitive protrusion that's comparable to a penis in men or people assigned male at birth.

(iv) Vaginal opening :-

Vaginal opening allows menstrual blood & babies to exit our body.

(v) Hymen :- Hymen is a piece of tissue covering or surrounding part of vaginal opening. It formed during development & present during birth.

(vi) Vagina :- Vagina is a muscular canal that joins the cervix to the outside of the body. It can widen to accommodate a baby during delivery & then shrink back to hold something. It is lined with mucous membranes that help keep it moist.

(vii) Cervix :- Cervix is the lowest part of uterus. A hole in the middle allows sperm to enter & menstrual blood to exit. Cervix opens to allow a baby to come out during a vaginal child birth.

(viii) Uterus :- Uterus is a hollow pear shaped organ that holds a fetus during pregnancy. Uterus is divided into 2 parts cervix & corpus. Corpus is the larger part of uterus.

(ix) Ovaries :- Ovaries are small oval shaped glands that are located on either side of uterus. Ovaries produce eggs & hormones.

(x) Fallopian tubes :- These are narrow tubes that are attached to the upper part of uterus & serve as pathways for egg to travel from ovaries to uterus.

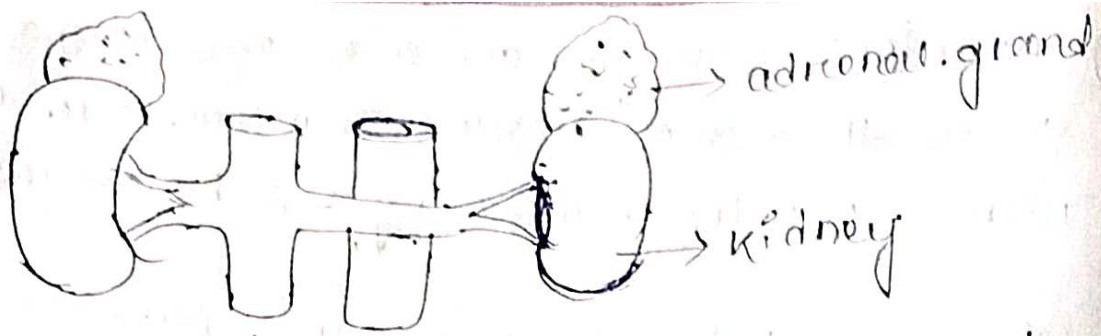
Menstrual cycle :-

Women reproductive age, beginning from 11 to 16 years of age experience cycles of hormonal activity that repeat at about one-month intervals. With every cycle, body prepares for a potential pregnancy, whether or not that's intention. The term menstruation refers to the periodic shedding of your uterine lining when pregnancy does not occur that cycle.

F) Give the location of adrenal gland. Write the function of the hormones secreted by cortex part of adrenal gland.

→ Location :-

These are paired structures located on the top of kidneys. Each adrenal gland has two parts i.e. external adrenal cortex & internal adrenal medulla. The cortex is surrounded by a fibrous capsule.



Adrenal cortex is derived from the mesoderm of the embryo.

Hormone :-

All hormones of adrenal cortex are synthesized from cholesterol that's why called as corticosteroids.

it is of 3 types.

- ① Mineral corticoids
- ② glucocorticoids
- ③ gonadocorticoids.

(i) Mineral corticoids :-

- secreted by the cells of zona glomerulosa
- Regulation of mineral metabolism.
- Aldosterone regulated the sodium contents of the body.
- it is secreted when the Na level is low.

(ii) glucocorticoids :-

It include 3 hormone

- (i) cortisol
- (ii) corticosterone
- (iii) cortisone

iii) Androsteroids :-

- > it is also known as ~~sex~~ sex corticoids.
- > Large quantities of male hormone than female are produced.
- > These male sex hormone are called androgens.
- > These female sex hormone are called oestrogens.

Adrenal Medulla :-

it consists of rounded groups of granular cells which called as chromaffin cells.

Hormone :-

1 secretes two hormones.

Noradrenaline :- works alongside epinephrine to regulate blood pressure & increase alertness.

ii) Epinephrine :- secreted at the time of emergency, because of their hormones the adrenal gland are also called as the glands of emergency.

3) Define joint. Give the classification of joint with suitable example.

Joint is a point where 2 bone are meet to provide movement.

> There are 3 types of joints in our body

A) fibrous joints

B) cartilaginous joints

C) synovial joints

(A) Fibrous Joints :-

They are immovable joint.

- (i) suture (coronal, sagittal, lambdoidal, squamosal)
- (ii) syndesmosis (Tibia, fibula or Radius ulna)
- (iii) epiphysis (Root of tooth to the socket joint)

(B) Cartilaginous joints :-

The bone are joints with the help of hyaline cartilage, which lack of joint cavity but provide a little development.

- (i) synchondrosis
- (ii) symphysis

(C) Synovial joints :-

It is measured type of joint that provide degree of movements.

It is 6 types.

(i) Ball & socket joints :-

one with a ball-shaped articulates with the cap-shaped socket bone.

e.g:- hip & shoulder

(ii) condyloid joints :-

oval shaped condyle of one bone fits in to an elliptical cavity of another.

e.g:- head of radius & capceps, occipital condyle of skull and first cervical vertebra.

iii) gliding joints :-
Articulating surface of gliding joints are nearly flat or only slightly curved.
e.g.:- wrist & ankle

v) Hinge joint :-
convex surface of one bone fits into the concave surface of another.
e.g.:- elbow, knee & phalanges

i) pivot joints :-
A cylindrical surface of one bone rotates within a ring formed of bone & fibrous tissue.
e.g.:- Atlas / axis joint

ii) saddle joints :-
formed between bone whose articulating surface have both concave & convex regions.
e.g.:- carpal & meta carpal of thumb

a) write a note on flow of blood through heart.

* Human heart is located in the center of the thoracic cavity slightly to the left of the sternum. It lies between the lungs & is enclosed in a membrane called the pericardium.

The human heart has 4 chambers.

① Two Atria & two ventricles.

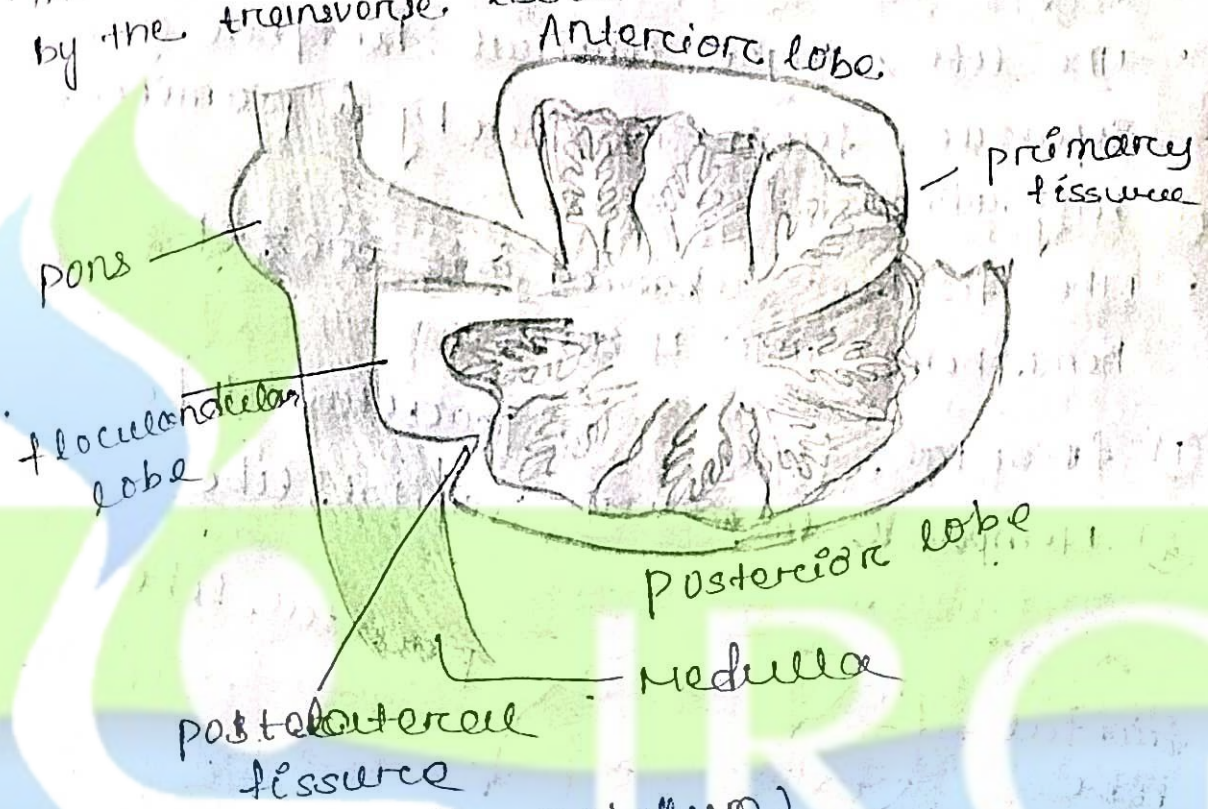
Flow of blood through heart :-

- deoxygenated blood from different organs comes to the right atrium through the vena cava.
- From the right atrium, deoxygenated blood goes to the right ventricle. The tricuspid valve between the right atrium & right ventricle prevents the back-flow of blood.
- From the right ventricle, deoxygenated blood goes to the lungs for oxygenation through the pulmonary artery.
- Inside the lungs, gaseous exchange takes place in which carbon dioxide is removed from the blood & oxygen enters the blood.
- From the lungs, oxygenated blood goes to the left atrium through the pulmonary vein.
- From the left atrium, oxygenated blood goes to the left ventricle. The bicuspid valve between the left atrium & left ventricle prevents the back-flow of blood.
- From the left ventricle, oxygenated blood is pumped into the aorta so it can be supplied to different organs.

(b) write down the function of cerebellum & cerebrum

Cerebellum :-

- cerebellum appears as a distinct structure forming lower part of the brain beneath the cerebral hemisphere.
- The cerebrum is separated from the cerebellum by the transverse fissure



(Diagram of cerebellum)

function :-

- Body posture & equilibrium is maintained by the cerebellum. The muscles, joints, eyes & the ears bring in the sensory input for these functions.
- In order to maintain the balance & equilibrium of the body, the cerebellum acts to influence impulses leading to the skeletal muscle contraction.
- The coordination of voluntary muscular movement is carried out by the cerebellum. Activities of the cerebellum can't be controlled voluntarily.

Cerebrum :-

- Cerebrum is the major portion of the brain it is divided into 2 hemispheres known as cerebral hemisphere.
- The outer rim of cerebrum made up of grey matter and known as cerebral cortex.
- The left & right cerebral hemisphere are separated from each other by a prominent longitudinal fissure.
- The fissure subdivided into each of 2 hemisphere into 4 lobes.

① Frontal lobe

③ parietal lobe

② Temporal lobe

④ Occipital lobe

Diagram of cerebrum :-



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Function :-

A) Frontal lobes :-

- controls voluntary activities of opposite half of the body.
- control the spoken speech.
- control emotional, concentration, attention and judgement.

B) parietal lobes :-

perception of exteroceptive (touch, pain & temp)

C) Occipital lobes :-

Reception and perception of isolated visual impression of color, size, form, motion;

d) Temporal lobes :-

- Reception and perception of isolated auditory impressions of loudness, quality and pitch.

impressions
c) write a note on structure & function of kidney

- The kidney lie on the posterior abdominal wall on each side of vertebral column.
- Behind the peritoneum & below the diaphragm.
- The right kidney is usually slightly lower than the left.
- Kidney is bean shaped organ, about 11 cm length 6 cm wide, 3 cm thick & weigh about 150 gm.

cross structure of kidney :-

- A fibrous capsule surrounding the kidney
- The cortex, a reddish brown layer of tissue immediately below the capsule & outside the pyramids.
- The innermost layer, consisting of pale conical shaped, the renal pyramids.

Function :-

① Excretes waste :- The kidneys get rid of toxins, urea & excess salts. Urea is a nitrogen-based waste product of cell metabolism that is produced in the liver & transported by the blood to the kidneys.

② Maintain water balance :-

The kidneys help maintain water & electrolyte balance in the body. They react to changes in the water level, which may increase or decrease throughout the day.

③ Regulates acid levels :-

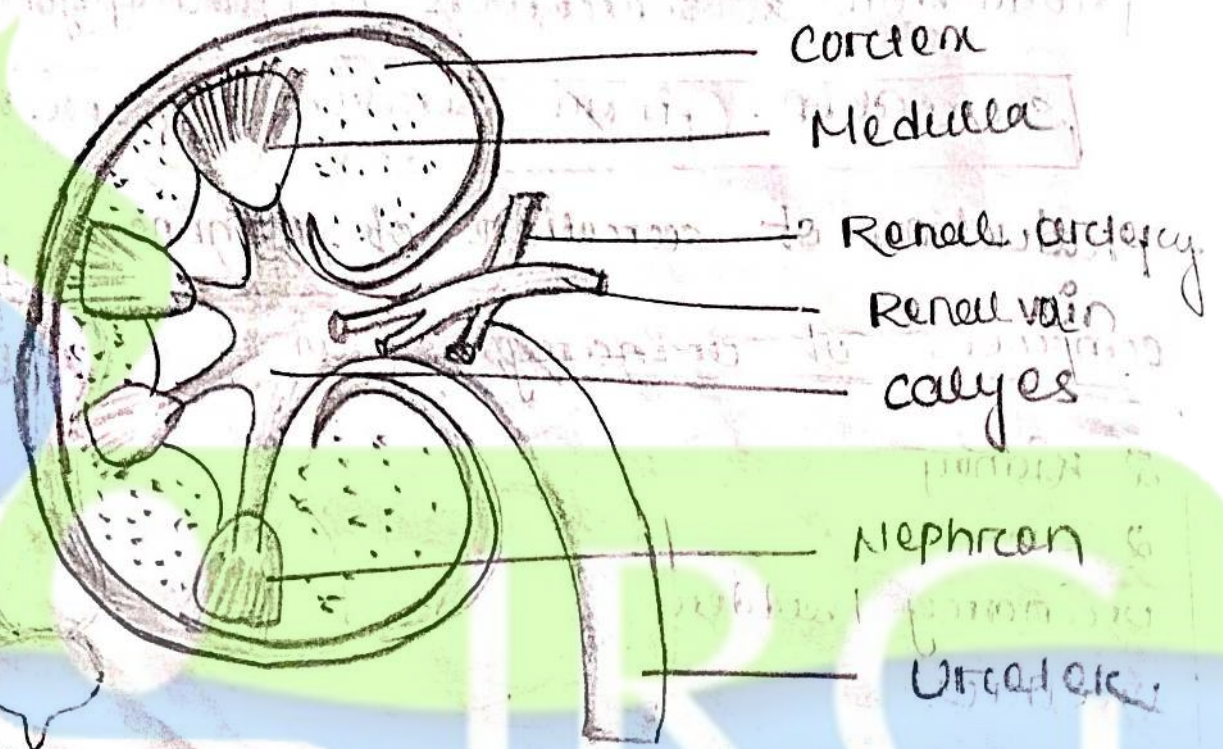
Acids are products of metabolism. The kidneys help maintain proper acid-base balance to keep the body healthy.

④ Regulates red blood cells :-

The kidneys produce erythropoietin, a hormone that stimulates bone marrow to produce more red blood cells.

⑤ Regulates blood pressure :-

The kidneys help regulate blood pressure by producing angiotensin, a substance that constricts blood vessels & signals the body to retain water & sodium when blood pressure is low.



Structure of kidney

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1) Write down the physiology of urine formation.

> Urine formation takes place in the kidney. It involves the following steps.

1) Glomerular filtration

2) Tubular reabsorption

3) Tubular secretion

i) Glomerular filtration :-

> Beginning of the process.

> A process by which the blood passes through the glomerule, much of its fluid, contains both useful chemicals & desire waste materials seeps out the blood through membranes when it is filtered

& flows into Bowman's capsule

> filtration is assisted by difference between the blood pressure in the glomerules & the pressure of the filtrate in the glomerule capsule.

i) Tubular reabsorption :-

- A amount of substances out of the henle's tubules back in to the blood capillaries located around the tubules.

- some constituent of glomerule filtrate :-

(glucose, amino acid don't normally appears in urine because they are complete reabsorbed unless blood level excessive

(ii) Tubular secretion :-

- > Depositing of substances not already on-filtrate
- > Eliminating or desirable substance that has been reabsorb by passive process (Urea & uric acid)
- > Ridding the body of excess potassium ions
- > by secretion of hydrogen ions for controlling blood pH.

e) Write a note on circulation of lymph :-

- It is a complex fluid drainage system.
- Normal blood circulation forces fluid out of the bloodstream where it is filtered by lymph nodes to get rid of bacteria & abnormal cells. Then the lymph vessels carry this fluid back into the blood stream.
- When the interstitial fluid reaches lymph capillaries, it is called lymph.
- Lymph moves from lymphatic vessels to lymphatic trunks collecting ducts, and ultimately in to the subclavian vein.

Flow of lymph :-

Blood capillaries

Flow of lymph :-

Blood capillaries



Interstitial spaces



Lymphatic capillaries



Lymphatic vessel



Lymphatic nodes



Lymphatic duct



Junction of internal jugular & subclavian veins (blood)

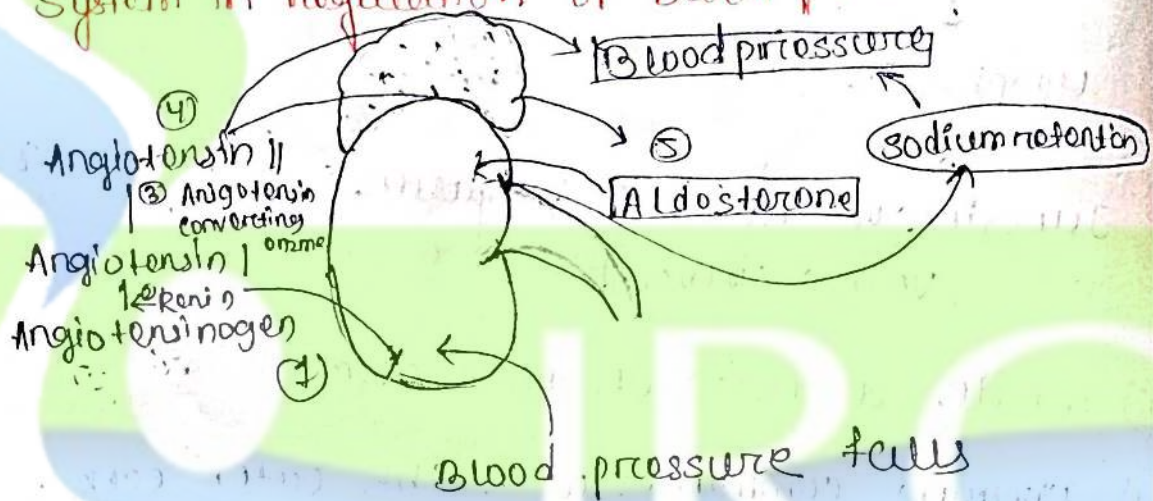
(F) Write a note on mechanism of hearing.

- 1) Hearing commences with the outer ear.
- 2) The sound reaches the outer ear, the sound waves or vibrations travel down the external auditory canal & can reach the tympanic membrane.
- 3) The tympanic membrane vibrates these vibrations reach the three tiny bones in the middle ear called ossicles.
- 4) These ossicles amplify the sound. The sound waves then reach the inner ear to the fluid-filled hearing organ cochlea.

- 5) On reaching the inner ear, the sound waves get converted to electric impulses.
- 6) These electric impulses are sent to the brain via auditory nerve.
- 7) The electric impulses get translated to sound by brain.

Hence we recognize the sound waves.

(9) Explain the role of Renin-Angiotensin system in regulation of blood pressure.



→ When blood pressure falls the kidneys release the enzyme renin into the bloodstream.

→ Renin splits angiotensinogen, a large protein that circulates in the bloodstream, into pieces. One piece is angiotensin I.

→ Angiotensin I, which is relatively inactive, is split into pieces by angiotensin-converting enzyme. One piece is angiotensin II, a hormone which is very active.

→ Angiotensin II causes the muscular walls of small arteries to constrict, increasing blood pressure. It also triggers the release of the hormone aldosterone from the adrenal gland.

→ Aldosterone & vasopressin causes the kidneys to retain sodium. Aldosterone also causes the kidneys to excrete potassium.

(h) Give a brief description on human teeth with suitable diagram.

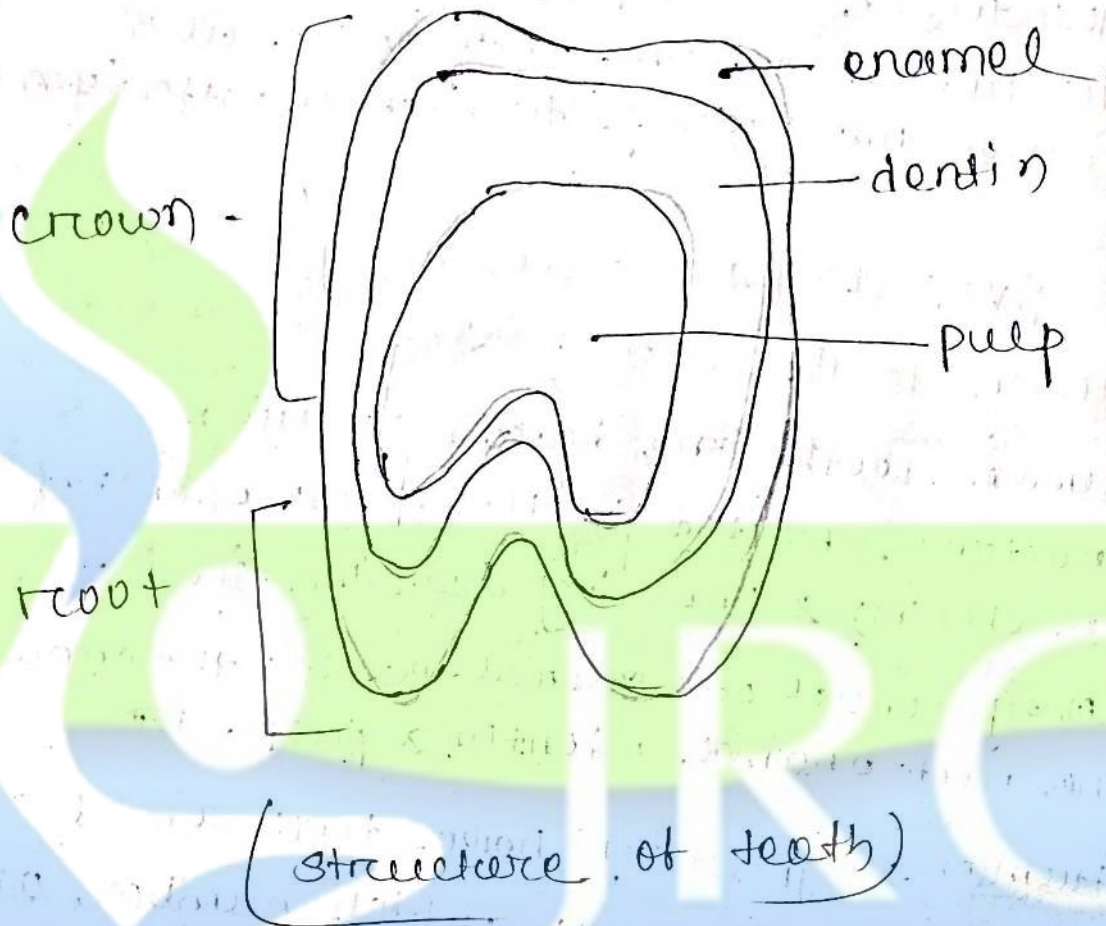
- Human teeth are hard, calcified structure located in the mouth essential for chewing & breaking down the food.
- They consist of several parts: the crown, the root enamel, dentin & pulp.
- Humans typically have two sets of teeth: primary teeth, which number 20 & permanent teeth usually totaling 32.

Types of permanent teeth include :-

- Incisors :- sharp, flat teeth at the front used for cutting food
- Canines :- pointed teeth next to incisors used for tearing food
- Premolars :- flat-topped teeth behind canines used for crushing & grinding.

• Molar: - large tooth at the back, designed for grinding & chewing food.

Teeth are crucial not only for eating but also for speech & maintaining the structure of the face.



i) Write a note on physiology of pain.

Pain is associated with tissue damage & has a physiological basis. Not all tissues, however, are sensitive to the same type of injury.

e.g.:- skin is sensitive to burning & cutting, the visceral organs can be cut without generating pain.

1) Sensitization:- it is a neurophysiologic response in which the pain pathways become more sensitive.

2) Hyperalgesia:-

Hyperalgesia & allodynia are clinical markers used to detect the presence of sensitization there are 2 types of sensitization.

- (i) peripheral sensitization
- (ii) central sensitization

Peripheral sensitization:-

- it occurs in response to the release of inflammatory molecules such as histamine, prostaglandins & pro-inflammatory cytokines.
- Under normal circumstances, peripheral hypersensitivity returns to normal when inflammation subsides or the source of the injury is removed.

Central sensitization:-

- nociceptive-specific neurons progressively increase their response to repeated non-painful stimuli, develop spontaneous activity.
- The hyperalgesia of central sensitization usually develops as part of ongoing pathology, such as damage to peripheral or central nerve fibres.

Acute pain:-

- Acute pain is often successfully treated with patient education, mild pain medication, environmental change & stress reduction. It comes on quickly & although it can be severe

lasts a relatively short time.

Chronic pain :-

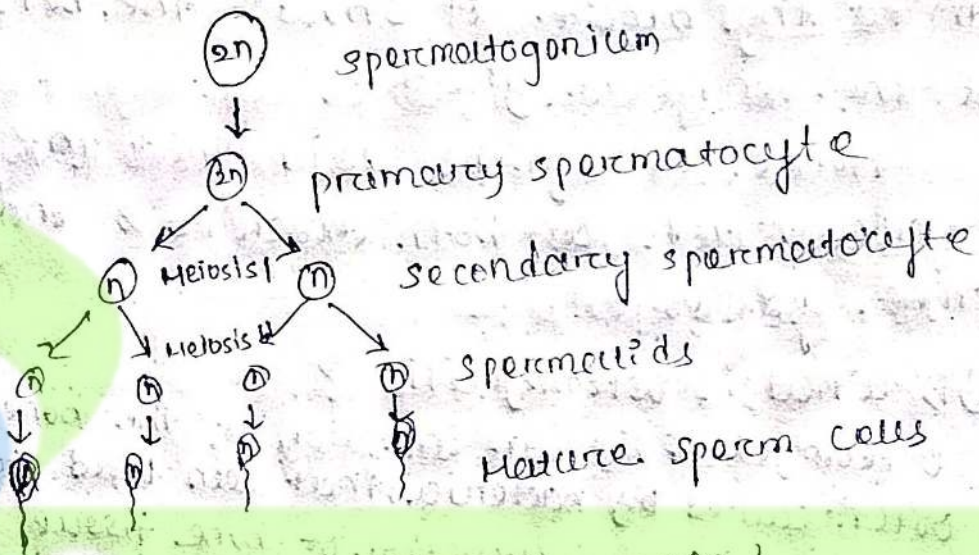
- It refers to pain that exists for 3 or more months & does not resolve with treatment.
- Chronic pain can be difficult to distinguish from acute pain & can be difficult to treat.
- Chronic pain affects 1 in 5 adults & is more prevalent among women & older adults.
- Chronic pain is also a symptom of many diseases like a cancer patients suffer from chronic pain.

(j) Explain the process of spermatogenesis.

- Spermatogenesis is the process of the production of sperm from the immature germ cells in males.
- It takes place in seminiferous tubules present inside the testes.
- During spermatogenesis, a diploid spermatogonium increases its size to form a diploid primary spermatocyte.
- The diploid primary spermatocyte undergoes 1st meiotic division & form 2 equal haploid secondary spermatocytes.
- Each secondary spermatocyte then undergoes 2nd meiotic division to form 2 equal haploid sperm.

- Hence a diploid spermatogonium produces 4 haploid spermoids.
- These spermoids are transformed into spermatozoa by the process called spermiogenesis.

Spermatogenesis



(Process of spermatogenesis)

(K) Pancreas is known as both endocrine & exocrine gland. Justify your answer.

Pancreas

Pancreas located in the abdomen region is an elongated & tapered organ. It secretes both digestive enzymes collectively called pancreatic juice & hormones including insulin for the maintenance of the body.

Pancreas is an endocrine & exocrine gland.

A part of the pancreas secretes its enzyme known as pancreatic juice into the pancreatic ducts, which then releases them into the duodenum for its action.

It shows the behaviour of the exocrine gland.

- In contrast, another part of the pancreas is also known to secrete various hormones like insulin & glucagon, which regulate the sugar concentration of the body directly in to the blood. It shows the behaviour of the endocrine gland.

Hence, it can be said that the pancreas acts as both exocrine & endocrine glands.

(3A) i) What is osteomyelitis?

Osteomyelitis is an infection of the bone, often caused by bacteria, that can lead to inflammation & destruction of bone tissue.

ii) Mention the parts of nephron?

parts of nephron are

- ① Glomerulus
- ② Bowman's capsule
- ③ proximal convoluted tubule
- ④ Loop of Henle
- ⑤ Distal convoluted tubule
- ⑥ Collecting duct

(iii) enlist two function of spleen?

- spleen is the largest lymph organ. It lies in the left + hypochondriac region of the abdominal cavity between the fundus of the stomach & diaphragm
- It is purplish in colour & varies in size in different individuals.

(iv) write down the function of valve

A valve controls the flow of fluids by opening or closing passages.

(v) Name the structures involved in urinary system.

→ 2 kidney

→ 2 ureters

→ urinary bladder

→ urethra

(vi) Enlist the function of CSF

→ cerebrospinal fluid protects brain & spinal cord from trauma.

→ CSF removes waste products from cerebral metabolism.

(vii) write the function of oxytocin

Oxytocin stimulates uterine contractions during childbirth & promotes milk ejection during breastfeeding.

(viii) Difference between tendon & ligament

Tendon: Tendons connect muscles to bones

Ligaments: Ligaments connect bones to other bones at joint.

(ix) write the universal donor & universal recipient blood group

Blood group O is called universal donor &

blood group AB is called universal recipient

(a) Mention any two functions of liver.

- The liver detoxifies harmful substances, produces bile for digestion.
- Liver regulates metabolism & nutrient storage.

(Bi) Endocytosis :-

It is the process by which cells engulf external substances enclosing them in a membrane bound vesicle to bring them into the cell.

(ii) Thrombocytopenia :-

Thrombocytopenia is a medical condition characterized by a low platelet count in the blood.

(iii) Atherosclerosis :-

Atherosclerosis is a condition in which fatty deposits build up in the arterial walls, leading to reduce blood flow.

(iv) Erythropoiesis :-

Erythropoiesis is the process of producing RBC in the bone marrow.

(v) Cardiac output :-

Cardiac output is the volume of blood pumped by the heart per minute typically measured in liters.

(vi) Rheumatoid arthritis :-

Rheumatoid arthritis is a chronic autoimmune disease that causes inflammation in the joints resulting in pain, swelling & loss of function.

(vii) Thrombopoiesis :-

It is the process of producing platelets from megakaryocytes in the bone marrow.

(viii) Haematuria :-

Haematuria is the presence of blood in the urine which can be a sign of various medical conditions affecting the urinary tract.

(ix) Deglutition :-

Deglutition is the process of swallowing, involving the coordinated movement of the tongue, throat & esophagus to move food from mouth to stomach.

(x) Endocrine gland :-

Endocrine gland is a type of gland that secretes hormone directly into the blood stream to regulate various body functions.