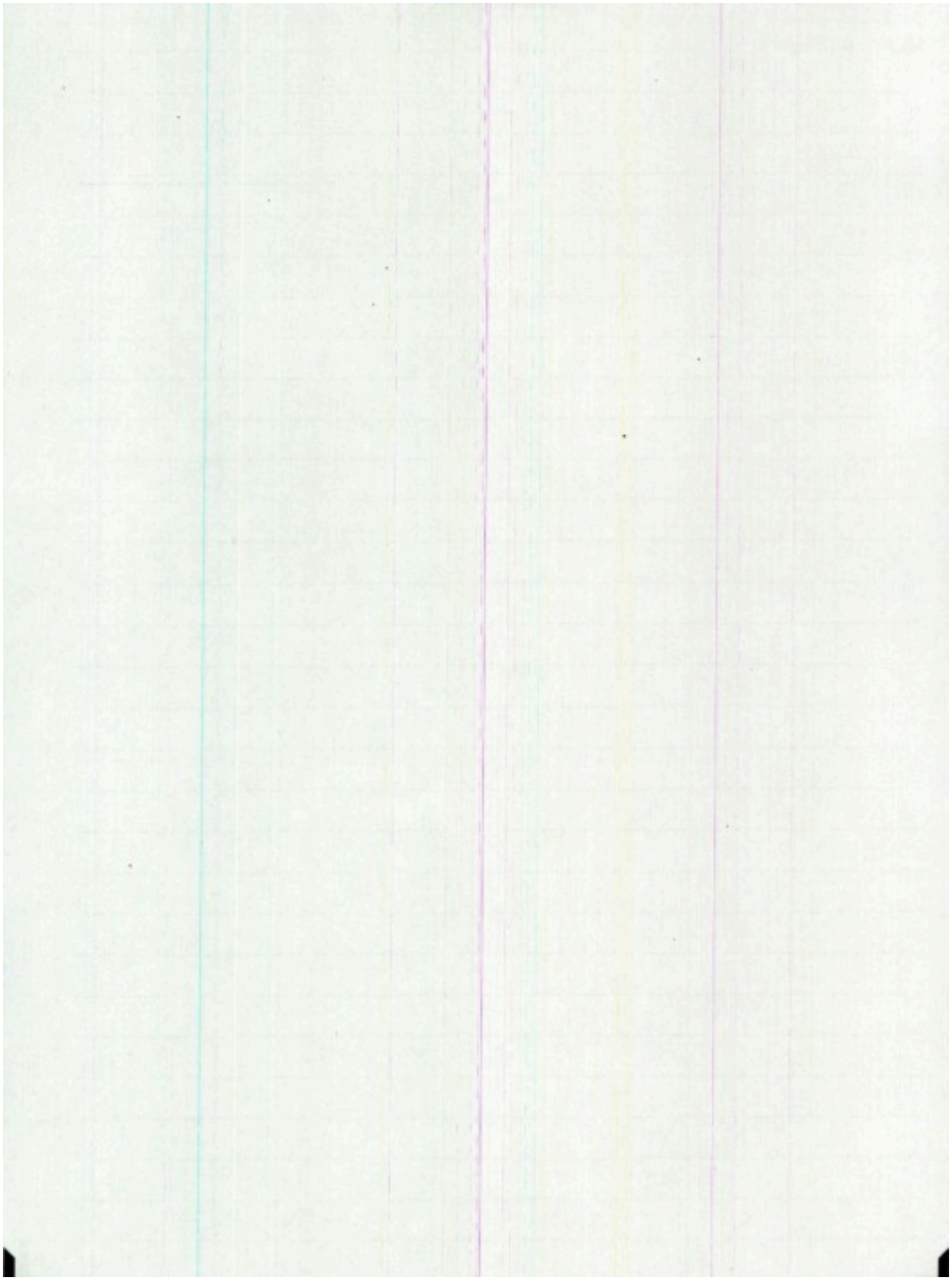
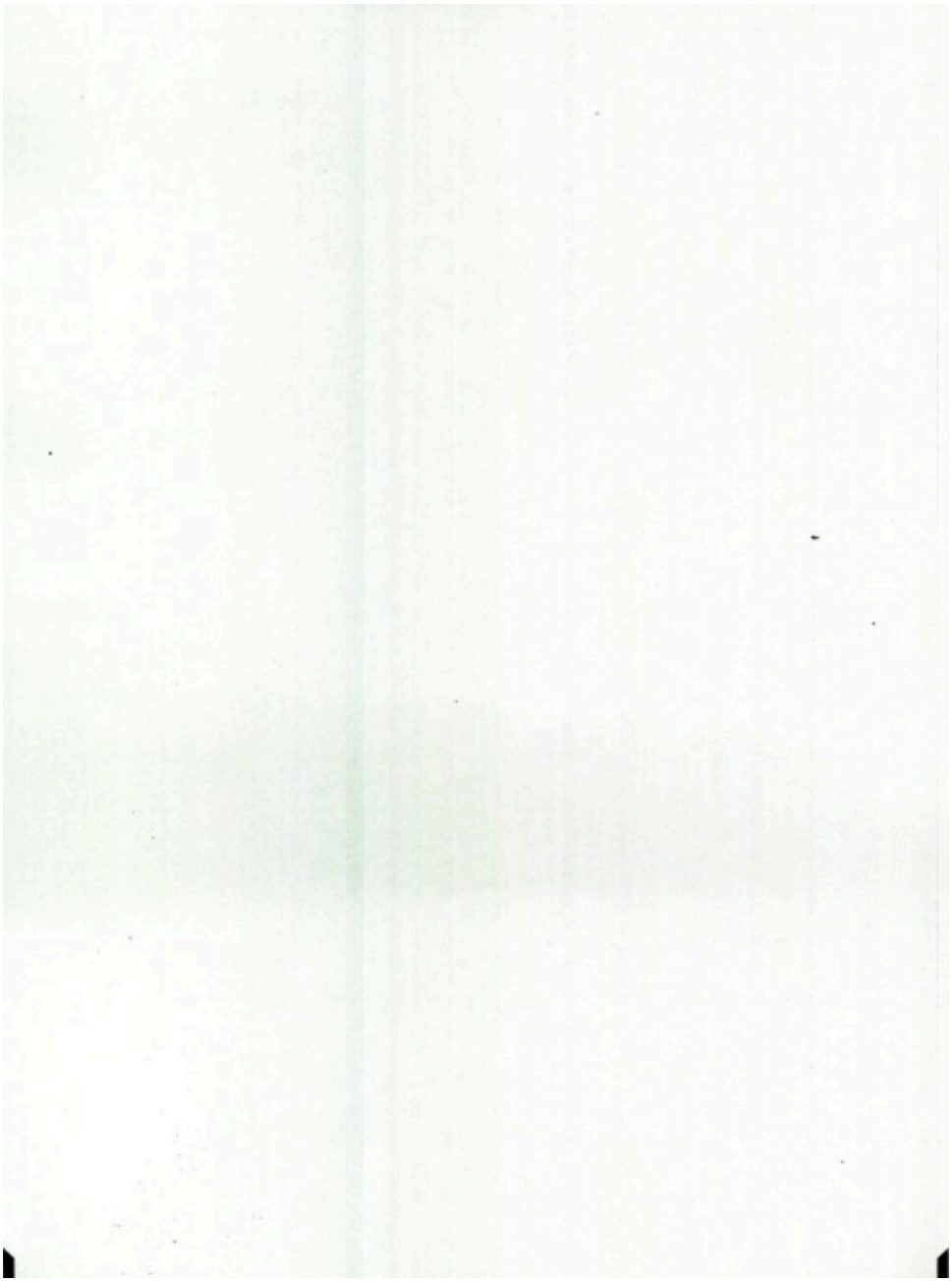
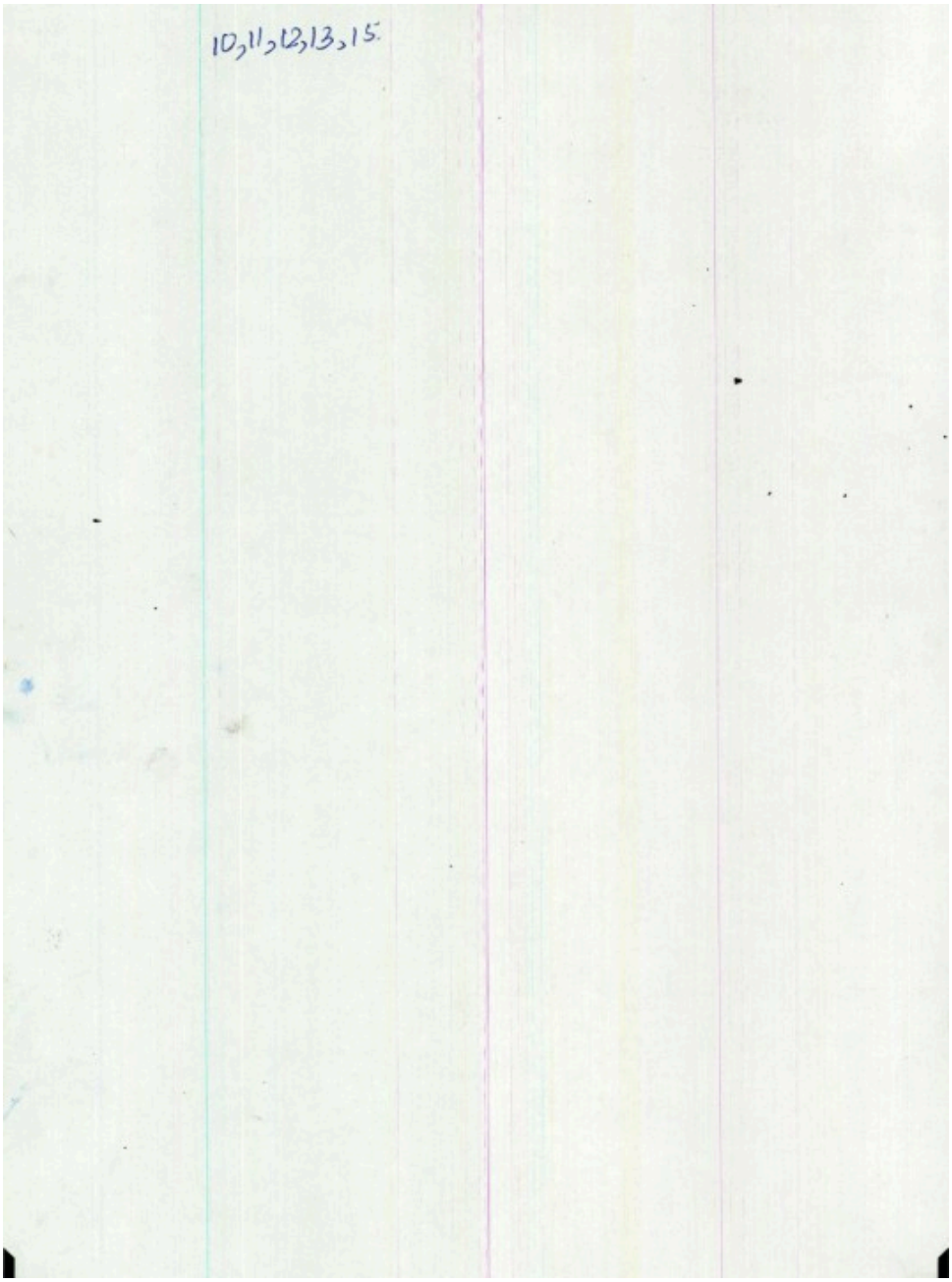





10, 11, 12, 13, 15.

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Q. No. 2 Part (I) Properties of Respiratory Surface:

1- It must be **moist** and **permeable** so that gases can pass through.
2- It must be thin because diffusion is only efficient over distance of 1mm or less.
3- It should possess good blood supply.
4- There should be good ventilation mechanism
5- It should possess large surface area so that sufficient amount of gases can be exchanged according to the need.

Q. No. 2 Part (II) Role of respiratory pigments:

They have the following functions
1- The **haemoglobin** transfers the oxygen from lungs to cells for the cellular respiration.
2- The **myoglobin** stores the oxygen in the resting muscle.
3- The myoglobin releases the oxygen when the oxygen is in short supply.
4- The myoglobin serves as an intermediate for the transfer of oxygen.
5- They also transport the other gases like CO_2.
6- The myoglobin stores the O_2 for future

(Section B)

Q. No. 2 Part (iii) **Component of bile in digestion:**

Bile salts: help in digestion of the fats in the body.

Procedure: Bile salts reduce the surface tension of fat globules and emulsify them into small droplets called emulsion. The process is called emulsification. This increases the surface area of the lipids, so that the enzymes can act on these globules. So the digestion of fats become faster and reaction speeds. Sodium taurocholate and sodium glycocholate help in digestion of the fats in body.

.....

Q. No. 2 Part (iv) **a) Heart abnormalities:** The normal ECG shows that heart is functioning normally. When the ECG is not normal, the Doctors can compare the ECG with standard ECG to determine the abnormalities within heart.

b) Conditions Diagnosed:

1) Can detect arrhythmias
2) Conduction defects
3) size and position of chambers
4) impaired blood flow.
5) damage to muscle.
6) Foramen ovale (a hole in septum).

(Section B)

Q. No. 2 Part (v) a) **X:-** It is the depolarization of the nerve membrane. It occurs when the Na^+ ions move in. So inside becomes the more positive. The potential changes to +50mV

Y:- It is the repolarization of membrane. The potassium channels open so they move outside. So outside is more positive. The potential changes to -70mV.

Z: It is hyperpolarization. It is due to slight delay in closing the potassium gates. So the potential changes to -90. mV. This more negative potential than normal.

Q. No. 2 Part (vi) **Macrophages:** They are WBCs. They come from monocytes. They are found in organs like lungs, liver, spleen rather remaining in blood. They persist within free spaces. They perform phagocytosis.

Functions:

1) They engulf and destroy pathogens and display the antigens on their surface to become antigen presenting cells to inform neighbouring cells.
2) They produce proteins that cause maturation of monocytes into macrophages.
3) They also increase the temperature.
4) They stimulate specific immune cells.

(Section B)

Q. No. 2 Part (vii) a) **Double walled sac:** The pericardium consist of two parts.

(i) Visceral Layer: It directly covers the outside of the heart

(ii) Parietal layer: It forms the sac that contains the fluid in pericardial cavity. It forms a sac with two layers so called double walled.

b) **Functions:**

1) It lubricates the heart by producing the serous fluid and prevent friction.
2) It protects the heart
3) It maintains a hallow space for the heart to expand itself when it is full.
4) It prevents overstretching.

Q. No. 2 Part (viii) a) **HCl:** It causes the low pH for the function of pepsin. 2) It also helps to kill the bacteria 3) It also stops carbohydrate digestion by inactivating slivary amylase.
4) It denatures proteins so that proteolytic enzyme can reach internal bonds.

b) **Mucin:**

1) It protects the lubricates the epithelial cells from a pepsin enzyme.
2) It protects the cells from HCl
3) It lubricates cells.

(Section B)

Q. No. 2 Part (ix)

Estrogen	Testosterone
i) Female sex hormone	i) Male sex hormone.
2 Produced in females.	2. Produces in males.
3- It secreted by graafian follicle.	3- It is produced by the interstitial cells
4- It acts on ovaries and endometrium.	4- It acts on testes.
5- It stimulates eggs and secondary sex characters.	5- It stimulates the sperm production and sex drive.
6- Steroid in nature	6- Steroid in nature.

Q. No. 2 Part (x) Climate change on ocean biology:

1) The temperature increase can lead to the coral bleaching that can have very harmfull effects for marine animals.
2) It can reduce the metabolism, growth and reproduction of certain fishes
3) It can charm the calcifying organism because acidification can make it hard for these organism to form shells.
4) It can reduce the plankton species, which are food sources of various species.
5) They can impare the ability of fish to smell and navigate.

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Q. No. 2 Part (xi) **Kidney Failure:** A general term for decline kidney function particularly the efficiency of the filtering process.

Chronic renal failure: Is a slowly progressive and irreversible degeneration in kidney function. It occurs over period of years.

Cause of chronic renal failure:

1) Bacterial infection of pelvis and surrounding tissues.
2) Nephritis (inflammation of glomerul).
3) Damage due to high blood pressure
4) Diabetes mellitus
5) Vomitting, diarrhoea.

Q. No. 2 Part (xii) **Extinct Species:**

Bramble Cay melomys (Melomy rebicola):

This small rodent native to tiny island of bramble cay off the coast of Australia is the first mammal to go extinct due to climate change. Storms and sea level wiped out its habitat.

Pinta Island tortois:

→ Chelonoidis abingdonni:-

the last species, lonesome george died in 2012. Human activity contributed to decline but climates change disrupt the ecosystem on island by reducing the water availability for tortoise.

(Section B)

Q. No. 2 Part (xiii)

MRI	CT Scan
1) It is known as magnetic resonce imaging.	1) Known as computerised tomography scan.
2) It use magnetism and radio waves.	2) It uses the x-Rays to form mages.
3) It produces quite detailed picture.	3) It does not produce very detail picture.
4) Detect minute changes.	4) Can't detect minute changes.
5) A giant scanner tube - is used.	5) A topograph produces the images.

Q. No. 2 Part (xiv)

a) **Receptors:** They receive information that something in the environment is changing. It receives the stimulates and passes it to control center. It responds to the changes.

e.g: mechanoreceptors, thermoreceptors.

b) **Control Center:** It analysis and process the information and then controls the response of the body. They process signals.

e.g R(AAS) system
renin angotensin aldosterone system.

(Section C)

Q. No. 3 (Page 1)

Sliding filament Model:

Definition:

"The sliding filament theory of contraction states that during contraction the thin myofilaments slide past the thick ones so that they overlap to greater degree."

Mechanism:

→ In a relaxed muscle fibre, the thin and thick filaments overlap only at the ends of the A bands. They do not overlap to a greater degree but when muscle fibres are stimulated, the myosin heads on to the myosin binding sites on actin on thin filaments and sliding begins.

→ These connections are called cross bridges that are formed and broken several times during contraction acting like tiny ratchets that generate tension and propel the thin filaments towards centre.

Changes that occurs: At this process occurs simultaneously in sarcomeres

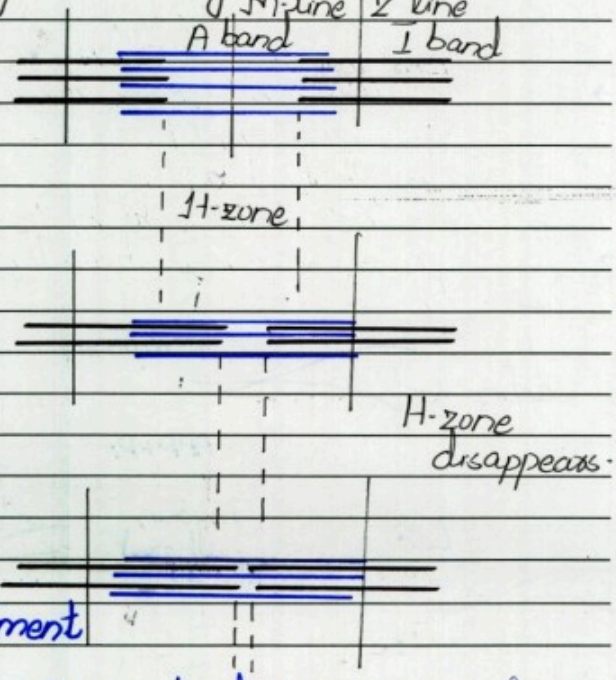
(Section C)

Q. No. 3 (Page 2)

throughout cell

1) Muscle cell shortens
2) I bands shorten
3) H zone disappears
4) Contiguous A band move closer but do not change in length.

Diagram:



Sliding filament model.

Control of Cross bridges: The muscle contraction is initated by nerve impulse at junction. It is carried through the sarcolemma to the T tubule. The calcium gates of the SR open release calcium into cytosol.

(Section C)

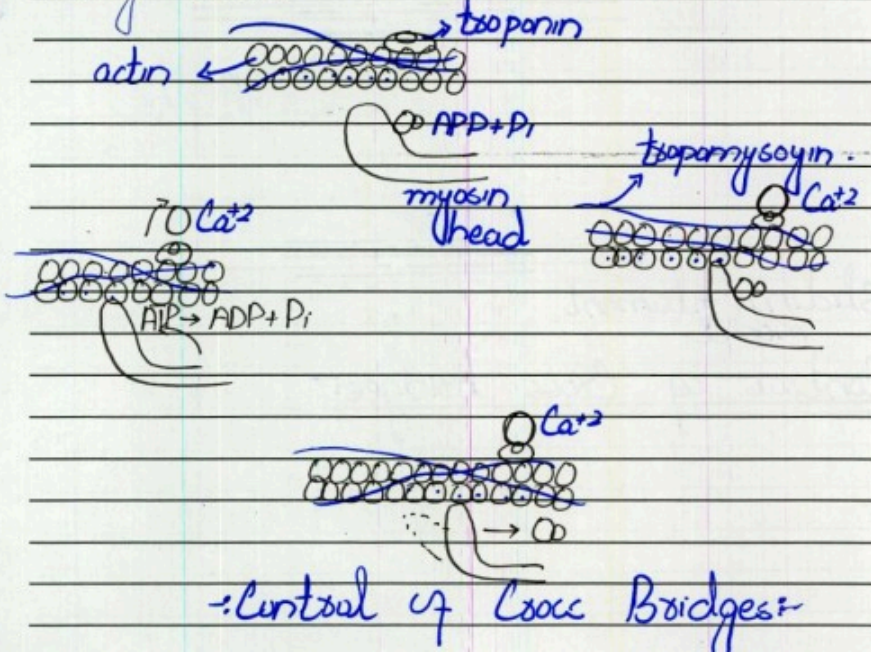
Q. No. 3 (Page 3)

In a relaxed fibre, the tropomyosin is disposed in such way that it covers the sites of actin to which myosin head attach.

→When calcium binds with troponin, they cause them to move slightly. This has effect of displacing the tropomyosin and exposing the binding sites.

→Then the calcium ions bind with troponin C, so the myosin heads attach to the actin. The breaking of cross bridges requires the ATP which is hydrolyzed.

→The formation and breaking occurs many times.



:Control of Cross Bridges:-

(Section C)

Q. No. 4 (Page 1)

a) **Antibody Molecule:**

They are proteins that circulate in blood and bind to antigen, thereby attacking microbes. They are transported through blood and lymph to the pathogen invasion site

Structure

An antibody is Y-shaped molecule which is made up of **4 polypeptide chains.**

→ Two are long chains and are known as heavy chains

→ Two are short chains are know as light chains.

Heavy chains are joined by disulphide bonds.

Constant and Variable Segment: → Each chain has constant, functional and variable segment

→ In the constant segment of heavy chains the amino acid sequence is constant within the particular immunoglobin class.

→ In the variable segments, the amino acid sequence is variable in every antibody. Therefore they act as **antigen binding site.**

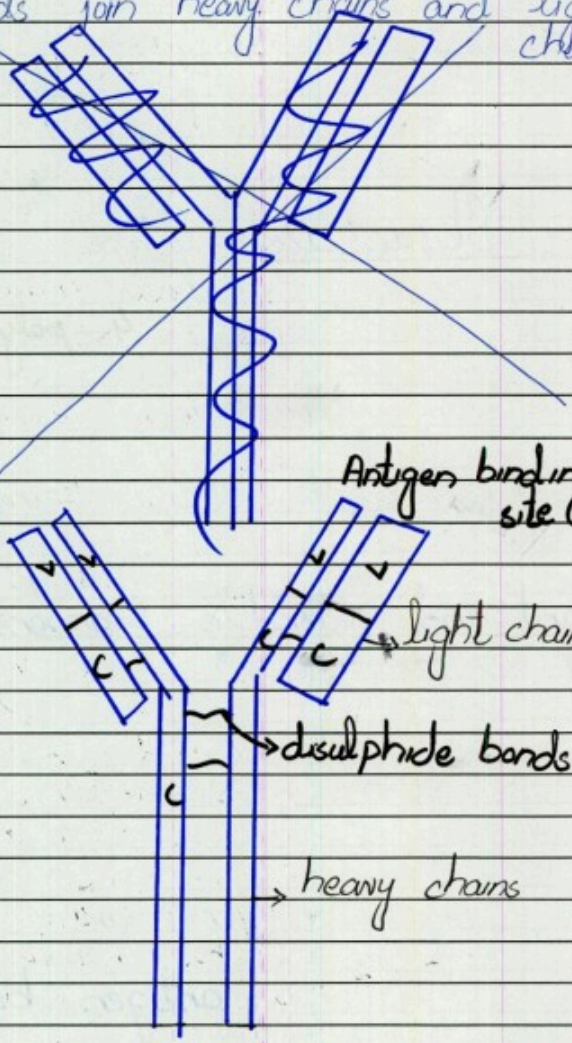
→ Each has two antigen binding site.

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Q. No. 4 (Page 2)

The two chains are linked by disulphide bonds.
The bonds join heavy chains and light chains.

Diagram:



Antibody

(Section C)

Q. No. 4 (Page 3)

Active immunity	Passive immunity
1) It is obtained as a result of infection by some pathogen.	1) When we inhale or ingest the vaccine it is when antibodies are passed from one person to other.
2) They do not give immediate protection.	2) They give immediate protection.
3) It takes several days to become functional.	3) They are functional immediately.
4) They provide protection for long time.	4) They provide protection for short time.
5) eg infection by measles is active immunity.	5) eg Clostrum, which is secretion of first milk ejection provides passive immunity.
6) Produces produces antibodies against pathogens.	6) Antibodies are produced against antigens.

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Q. No. 5 (Page 1)

Swallowing:

It involves the reflex mechanism and consist of three steps.

1) Oral phase:

This process is only voluntary part of swallowing. Food is mastered with saliva and food bolus is formed. The torque pushes it toward back of throat. It starts with lip closure.

2) Phasyngeal phase:

1) Phasynx is cavity behind mouth. It starts with the stimulation of tactile receptors during swallowing. The swallow reflex are initiated.
2) Soft palate lifts to close the nasal airways.
3) Bolus moves over back torque and torque block oral cavity to prevent food from going to oral cavity.
4) Epiglottis is pushed back-ward over lasynx.
5) The lasynx and vocal fold contract covering the entry of trachea, the respiration arrested.
6) Upper sphincter opens to allow

(Section C)

Q. No. 5 (Page 2) passage to esophagus.

3. Esophageal phase: Bolus is propelled down esophagus by peristalsis. The larynx moves down back to original position.

Peristalsis

It involves the contraction of muscles. It is wave like contraction that propels food and fluid through the digestive system. It is rythmic, involuntary process that moves contents along in a anterograde forward direction, starting from esophagus.

Functions:

1) **Propulsion:** Peristalsis pushes food and fluid through the GIT and tubes.
2) **Mixing:** In small intestine, peristalsis help mix food with digestive juices and exposes to absorptive surfaces.
3) **Waste Removal:** In large intestine, it drives the waste products towards rectum for elimination.

4) **Other systems:**
Urinary tract: moving urine from kidney to bladder)
Bile ducts: moving bile from gall bladder to duedenum.

(Section C)

Q. No. 5 (Page 3)

Mechanism:

1) **Muscle Contraction:** It occurs by contraction of circular and longitudinal muscles.

2) **Involuntary:** It is controlled by nervous system particularly, meyentrix plexus in GIT.

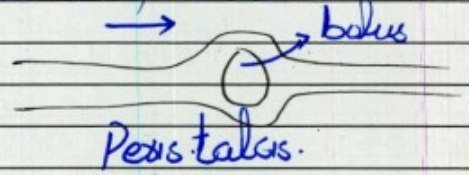
3) **Wave like:** These contractions create wave like motion.

Examples

1) **Swallowing:** When you swallow, the muscles contract in peristaltic wave to move food.

2) **Digestion:** In stomach, it moves food along allowing nutrients to absorb.

3) **Waste removal:** It removes the waste products.



(Section C)

Q. No. 6 (Page 1)

Response to Heat:-

1) VASODILATION:-

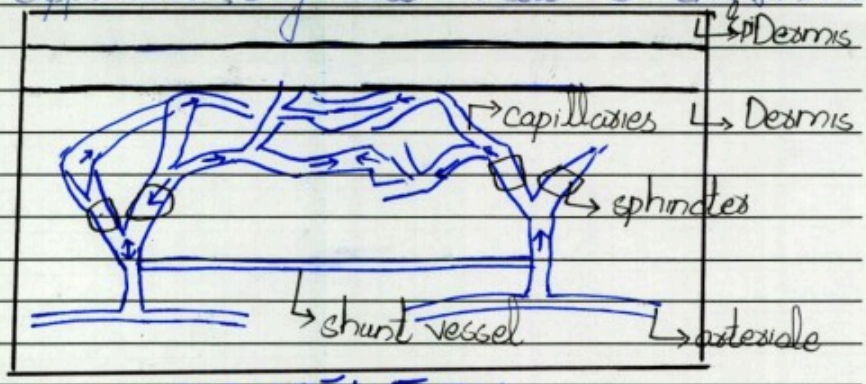
→ One way to increase the heat loss is to supply the cappillaries in skin with greater volume of blood which then loses heat via radiation.

→ The arterioles have muscles in their walls that can contract or relax to allow more or less blood to flow through them.

→ During vasodilation, these muscles relax, causing the arterioles near skin to dilate.

→ The low volume of blood passes through shunt vessel.

→ When more blood flow through cappillaries, they lose heat to environment.



VASODILATION

(Section C)

Q. No. 6 (Page 2)

b) Sweating: Sweat is salty solution made by sweat glands.
Evaporation of sweat from skin surface leads to cooling.
As the sweat evaporates, it absorbs the heat from body, therefore it provides the cooling effect to body.

1) Dry air: In dry air, humans can tolerate the temperature of 65°C for several hours.

2) Humid air: In humid air when the sweat can not evaporate, the temperature of 56°C cause overheating.

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Q. No. 6 (Page 3)