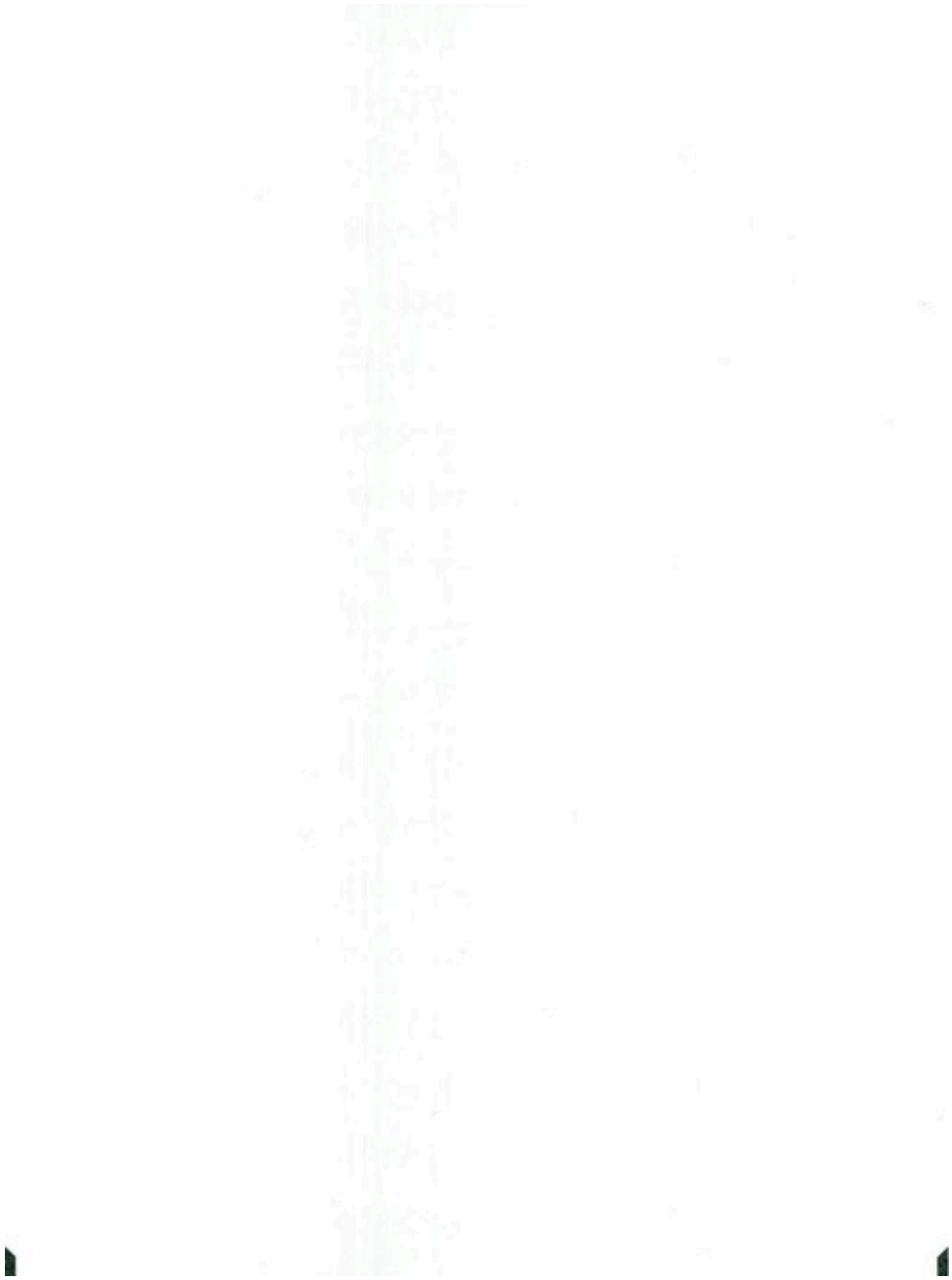






(Section B)

Q. No. 2 Part (i) **Emphysema**:- is a lung disease in which walls of alveoli damage. An obstruction (blockage) develop and air is trapped in the lungs. with fewe less alveoli, less oxygen will transport in the blood.

Causes:- 1) Smoking is the main cause of Emphysema. 2) Vaping 3) Marijuana 4) ~~long term~~ 5) exposure to carcinogens (present in smoke) 6) dust pollution 7) Air pollution.

Impact:- 1) The person having empysema will face shortness of breath. 2) The person will have constant feeling of not being able to get enough air. persistent wheezing. Empysema will also cause fatigue, chest tightidness, cough, It will also damage the lungs as air is trapped in lungs. ~~It will also cause fever, chills~~. The person will also have a feeling of nausea.

Q. No. 2 Part (ii) The ventilation phase is **Exhalation./Expiration**

Exhalation/Expiration:- It is the removal of air out of the lungs. It is passive phase of breathing. During exhalation, the dome-shaped diaphram relax and gets its full dome shape diaphram. The external intercoastal muscles relax and internal intercoastal muscles contract it will cause ribcage ~~this~~ to move downward and backward. As a result, the space in thoraic cavity decreases so it will also ~~also~~ increases the pressure in thoraic cavity and subsequently in lungs. The pressure in lungs is even greater than atmospheric pressure due to which air is forced to expelled out from lungs.

(Section B)

Q. No. 2 Part (iii) **Role of calcium ion in muscle contraction:-** The calcium ion release from calcium gate in sarcoplasmic reticulum. so calcium ion binds with troponin (TnC). At resting condition, when muscle relax so tropomyosin is disposed in such way that it has block the myosin binding site in actin. so that myosin head donot bind with actin. But when muscle contract so calcium ion bind with troponin and it slightly displace the tropomyosin which will expose the myosin binding site in actin and myosin head attach with myosin binding site in actin and cause muscle contraction.

Impact on Sacromere during contraction: The sacromere is the functional and contraction unit of skeletal muscle. during muscle contraction the segment between two Z-line shortens due to which sacromere also shortens. ~~because~~ because thin filament slide past thick filament due to which sacromere shortens.

Q. No. 2 Part (iv)

Arteries	Veins
⇒ It carry blood away from the heart.	⇒ It carry blood towards the heart.
⇒ Arteries have high blood pressure.	⇒ Veins have low blood pressure.
⇒ All Arteries carry oxygenated blood except pulmonary artery.	⇒ All veins carry deoxygenated blood except pulmonary vein.
⇒ Arteries have no valves.	⇒ Veins have valves.
⇒ Arteries carry thick muscle layers and more elastic fibres.	⇒ Veins carry thin muscles layer with less elastic fibres.

(Section B)

Q. No. 2 Part (v) **Monoclonal antibodies:** are single type of antibody which are produced by identical immune cells (clones). They are artifically engineered in labotary. They are highly specific as it binds to specific antigen therefore they are efficent for diagonostic, research, and theariphy.

Advantages of Monoclonal antibodies:-

1) **Versatile application:-** Monoclonal antibodies have versatile applications.
   - Diagnostic: Monoclonal antibodies used in diagnostic test such as HIV, pregnancy test.
   - Theraphy: Monoclonal antibodies used to treat cancer, autoimmune disorders.
   - Research: Monoclonal antibodies are used in biochemistry, molecular biology and other research area.
2) **Renewable Antibody:** Once a recombinant cell is established, so monoclonal antibodies will produce at exponential rate.
3) **Large scale production:** Monoclonal antibodies can be produce on large scale.

Q. No. 2 Part (vi) **Role of Skin in first line of defence:** Skin is most strongest physical barrier. Skin contain two layers
- epidermis (outer most)
- Dermis (inner most).

⇒ Epidermis consits of tightly pack packed epithelial cells which contain keratin protein which strengthen the skin and prevent them from from water loss and abrasion.

⇒ Epidermis also contain dry dead cells. due to which water and nutrients are not provided to patogen which lead to microbial death.

⇒ Skin has slightly acidic pH of 5.5 which inhabit the grauth of bacteria and pathogen.

⇒ Dermis contain two glands. Sabemous gland, Sweat gland Sabemous gland produce sebum which contain fatty acid and inhabit the growth of pathogen. Sweat gland also contain lysozyme enzyme which breakdown the cell wall of bacteria.

(Section B)

Q. No. 2 Part (vii) **Role of Baroreceptor and volume receptors in regulating blood pressure:**

⇒ When blood pressure increase, so baroreceptor inform the brain hypothalamus which stimulate parasymphatic system. parasymphatic system stimulate vasodilation which increase blood flow as a result blood pressure decrease.

⇒ when blood pressure decrease, so baroreceptor inform the brain which stimulate symphtatic system, symphatic system stimulate vasoconstriction which decrease the blood flow as a result blood pressure increase.

⇒ when blood volume is low, so baroreceptors and volume receptors inform the hypothalamus which stimulate pituary gland to release ADH (Anti-Duretic Hormone) which increase water volume due to which blood volume increase.

Q. No. 2 Part (viii) **Absorption of fats in small intestine:** After the digestion of fat, into fatty acid and glycerol. so fatty acid and glycerol absorbed in the epithelial cells of intestinal villi. and within epithelial cells, the fatty acid and glycerol combine with fats. fats further mix with cholesterol and protein and form small globules called cyclomicrons. The chylomicrons will move out to go to the lymph by exocytosis. The lymphatic system further drained in to large veins which will return blood back to the heart.

(Section B)

Q. No. 2 Part (ix)

Ectotherm	Endotherm
⇒ are those organism which produce heat at low level which is quickly exchanged with environment.	⇒ are those organism which produce heat at high level ~~do~~ by generating their own body heat from high metabolism.
⇒ They depend on external source for heat.	⇒ They ~~may~~ donot depend on external source for heat because they generate their own body heat.
⇒ They cannot survive in all kinds of habitat.	⇒ They can survive in all kinds of habitat.
example: amphibian, reptile, Invertebrates, fishes.	**example:** birds and mammals.

Q. No. 2 Part (x) **Complement system:** is an important supporter of immune system as it enhance the ability of antibodies and ~~microbes~~ phagocytic cell to clear microbes and damaged cell from our body.

⇒ There are 50 types of complement system of protein which is secreated by liver in inactive state.

Mechanism:

1) lysis: It causes lysis by break down or rupture bacteria cell wall.
2) Induce phagocytosis: They attract macrophages and dendritic cell to site of infection to engulf and digest pathogen.
3) They ~~activates~~ activates cell killing membrane attack complex.
4) They also activates other immune cells to generate the immune response

Example: Membrane Attack complex.

(Section B)

Q. No. 2 Part (xi) Significance of selective Reabsorption:

⇒ Selective reabsorption allows the reabsorption of certain substances which are vital for body and which are filtered out during the steps of pressure filtration are reabsorbed.

⇒ Those certain substances include (glucose, aminoacid, salts, ions, vitamins). These small solute molecules are very essential for body so selective reabsorption allows the reabsorption of these small solute molecules.

⇒ As it involves the reabsorption of certain substances so it is called selective reabsorption.

Q. No. 2 Part (xii) Role of liver:

1) **Production of Bile:** liver manufactured bile which help to carry fat waste away from it. Bile is also responsible for the emulsification of fats.

2) **Conversion of glucose to glycogen:** Liver convert glucose to glycogen for storage. but when cell need glucose so liver again convert glycogen to glucose.

3) **Immunity support:** Liver remove bacteria, toxin, poison from our blood and also produce immune factors which help in fighting infection..

4) **Clearance of Bill rubin:** liver also clear the billrubin by breakdown of old red blood cells.

(Section B)

Q. No. 2 Part (xiii) **Effects of Drug addiction**: The drug addiction leads to depression, sucidal thoughts, isolation, involve in attract to crime.. functioning of nervous system: The depression and stress situation during drug addiction lead to disturb the nervous system. And it disturb all the asmostic regulation in our body. The nervous system produce dopamine to increase happiness and prevent the stress and depression.

Effect of drug Tolerance: The effect of drug tolerance that body become stable, body equilibrium maintain. It overcomes the stress and depression sitution.

efunctioning of nervous system: The nervous system stabilize and stimulate the parasymphatic system to return the body to normal set point.

Q. No. 2 Part (xiv) **Physiologic response to Heat**: The are two main mechanism used by human to lose heat.

1) **Vasodilation**: One way to increase heat loss is to supply blood or cappillaries with greater volume of blood which will decrease increase the heat exchange with enviroment via radiation. During vasodilation, the walls of arterioles relax and their diamer becomes wider and blood flow to cappillaries and heat exchange with environment increases

2) **Sweating**: Sweat is salty in nature. Evaporation of sweat leads to produ from skin surface produce cooling effect. As when sweat evaporate so it take aways all the heat from our body/absorb heat from our body. So it produce cooling effect and regulate internal body temperature.

(Section C)

Q. No. 3 (Page 1) ⇒ **Negative feedback loop:-** is the homeostatic process which tends to change the direction of given stimulus. is called negative feedback.

⇒ In negative feedback, the change in loop given direction cause change in loop in opposite direction.

⇒ e.g if there is increase in concentration of substance, cause feedback which will decrease the concentration of substance.

⇒ It is inverse effector response.

⇒ It is homeostatic response which tend the body to return to normal internal state known as homeostasis.

⇒ It counteract change, and return the body to its normal set point.

⇒ It opposes the the stimulus (whether external or internal stimulus).

Example: Regulation of blood glucose level.

⇒ When the glucose concentration increase in blood. so β-cell of pancreas secreate insulin which work to decrease the concentration of glucose in blood by glycogenesis (conversion of glucose to glucose). By increasing the cell utilization of glucose. By decreasing the cellular respiration. By inhabiting the hydrolysis of glycogen. by decreasing the synthesis of glucose. so that's how negative

⇒ When feedback work to oppose stimule.

⇒ When the glucose concentration decreases in blood so A-cell of pancreas secreate glucagon which work to increase the glucose concentration in blood by stimulating the liver to convert glycogen to glucose, by increasing reabsorption of glucose from intestine. It will also stimulate kidney to increase the

(Section C)

Q. No. 3 (Page 2) reabsorption of glucose. by decreasing the cell utilization of glucose. By increase the cellular respiration. By promote the hydrolysis of glycogen. and all promote the glucose synthesis.

e.g: Negative feedback system also regulate the calcium level in blood. when calcium in blood increase so it produce calcitonin. On the other hand, when calcium in blood decrease, so it produce parathohormone by stimulate thyroid gland.

so this is how negative feedback maintain homeostasis of our body and bring the body to its normal set point.

(Section C)

Q. No. 3 (Page 3)

(Section C)

Q. No. 4 (Page 1) **Location of pancreas:** pancreas is located below the stomach.

⇒ The head of pancreas is attached at C-shaped curvature of duodenum.

⇒ The body of pancreas is behind the stomach and left to superior messentric vessel.

⇒ The tail of pancreas is located at splenic helium (when spleen connect with other structures.)

Pancreas: is a heteroendocrine gland. It contain exocrine and endocrine tissue which perform several function.

⇒ It acts as exochrine gland by secreating pancreatic juice into duodenum for digestion of food.

Pancreas as an endocrine gland:

⇒ The endocrine part of pancreas contain cluster of cell called Islet of langerhans.

⇒ The isel of langerhans produce two hormones that regulate the blood glucose sugar level.

There are two types of islet of langerhans cells.

α-cell: small in number and secreates glucagon

β-cell: large in number and secreate insulin.

Function of Insulin: when glucose level in blood increase so β-cell of pancreas secreate insulin which decreases the glucose level in blood. but when glucose level rise so the insulin secreation will be inhabited.

function of Insulin:

⇒ The insulin decreases the concentration of glucose by promote glycogenesis (conversion of glucose into glycogen)

⇒ By increasing the cell utilization of glucose.

(Section C)

Q. No. 4 (Page 2) ⇒By inhabiting the hydrolysis of glycogen
⇒ By decrease the reabsorption of glucose in intestine.
⇒ By stimulate the kidney to inhabit the absorbtion of glucose.
⇒ By inhabiting the glucose synthesis.
⇒ By decreasing the cellular respiration.

Undersecreation of insulin: The undersecreation of insulin will cause diabetes mallettus, in which blood glucose level so high so that it distorb the nervous system and osmotic regulation of body will also distorband unbalanced.

function of glycogen: when blood glucose level is too low so α-cell of pancreas secreate glucagon which will ~~decrease~~ increase the glucose level in blood. The glucogon work antagonistically to insulin. It perform all opposite function to insulin.
⇒ It stimulate the liver to convert glycogen to liver.
⇒ It increases the reabsorption of glucose from intestine.
⇒ It also increases the absorption of glucose from kidney.
⇒ It decreases the cell utilization of glucose.

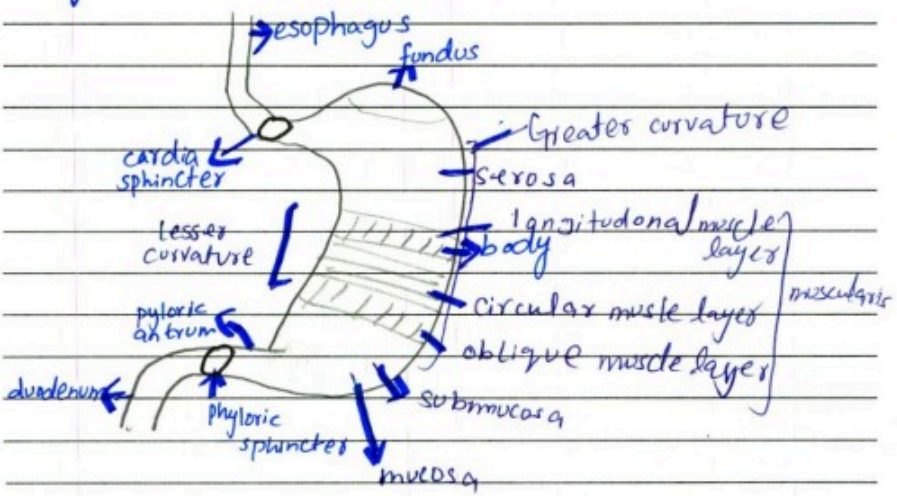
(Section C)

Q. No. 4 (Page 3)

(Section C)

Q. No. 5 (Page 1) **Stomach:** is a elastic J-shape muscular organ. which is present on left side of abdominal cavity.

Diagram:



Chemical digestion: The stomach secreations include HCl, instric factor, pepsinogen, mucus, gastrin.

Mucus: The mucus is produce by mucus cells of stomach which protect the lining of stomach wall and ~~protein~~ ~~protect them~~ protect them from digested by acidic chyme and pepsin.

instric factor: The parietal cell secreate instric factor which is glycoprotein which bind with vitamic B-12 and make the vitamin readily absorbed in the ileum.

HCl: The HCl is secreated by parietal cell which

⇒ low the pH of stomach ~~usually~~ normally (1-3) usually close to 2. which provide pH environment for the action of pepsin enzyme.

⇒ It also kill bacteria / microorganism that is ingested

(Section C)

Q. No. 5 (Page 2) from every food human put in their mouth.

⇒ It converts inactive (pepsinogen) to active pepsin.

pepsinogen: The pepsinogen is secreated by chief cell of stomach. and pepsinogen is packaged in zymogenic granules which is release by exocytosis..

⇒ when pepsinogen enter the lumen of stomach so it convert in to active pepsin by HCl.

⇒ The pepsin will breakdown protein in to peptide chains.

gastrin: The gastrin hormone is secreated by endocrine cell which stimulate the secretions of gastric juice.

(Section C)

Q. No. 5 (Page 3)

(Section C)

Q. No. 6 (Page 1) **Transport of CO_2 in blood:** ~~when~~ The carbondioxide is transported from tissue to lungs. via blood by three ways.

1- **Bicarbonate ion:**

Almost 70.1. carbondioxide is transport as bicarbonate in blood.

⇒ The carbondioxide from tissue enter in blood and then ~~Hydrogen~~ water Red blood cell where it will combine with to form carbonic acid

$$CO_2 + H_2O \longrightarrow H_2CO_3$$

The ~~b~~ carbonic acid is weak acid it readily dissociates into H & bicaronate and Hydrogen ion

$$H_2CO_3 \longrightarrow HCO_3^- + H^+$$

The accumulation of hydrogen ion increase acidity in blood which decreate the pH of blood so heamoglobin act as buffer to maintain blood PH. The heamoglobin will associate the hydrogen ion with oxyheamoglobin to form heamglobular acid and oxygen is released to tissue cell.

$$HbO_2 + H \rightarrow HHb + O_2$$

⇒ The bicarbonate ion will diffuse out of red blood cell into blood plasma.

⇒ This will balance by the opposite movement of chloride ions in opposite direction in to Red blood cell.

⇒ with the help of bicarbonate-chloride carrier protein

⇒ These protein move both ions in opposite direction

⇒ As the ~~charge~~ ions balance on both either side of ~~membr~~. This phenomena is known as chloride shift or Hamberberg phenomena.

⇒ The HCO_3 (bicarbonate) will combine with sodium in

(Section C)

Q. No. 6 (Page 2) blood plasma to form sodium bicarbonate

$Na + HCO_3 \rightarrow NaHCO_3$

⇒ The Chloride will combine with potassium to form KCl. (potassium chloride

$K^+ + Cl^- \rightarrow KCl$

So this is how blood PH ismaintain. through buffer mechanism. and carbondioxide is transported in the form of bicarbonate. Near the lung this process is reverse where bicarbonate will combine with oxygen to form carbonic acid which dissociate again carbondioxide and water and carbondioxide is released from lungs.

2- Carboaminohaemoglobin:

⇒ Almost 23.1. of carbondioxide is transported as carboaminohaemoglobin.

⇒ The carbondioxide combine with globin part of haemoglobin.

⇒ This reaction depend on partial presure of carbondioxide. As carbondioxide pressure is high in tissue then blood so carbondioxide enter in blood. and then RBC (Red blood cell) and combine with globin part of heamoglobine. and carboamino heamoglobin formation occurs in red blood cell due to which it pressure of carbondioxide increase in red blood cells. than tissue so it carries carboaminoheamoglobin carbondioxide is transport from blood to lungs. where carboamino haemoglobin release the carbondioxide in lungs.

3- Dissolved Carbon dioxide:

Almost 7.1. carbondioxide is transport as dissolved carbondioxide in blood plasma. thes process is inefficent but still it carried.

(Section C)

Q. No. 6 (Page 3)