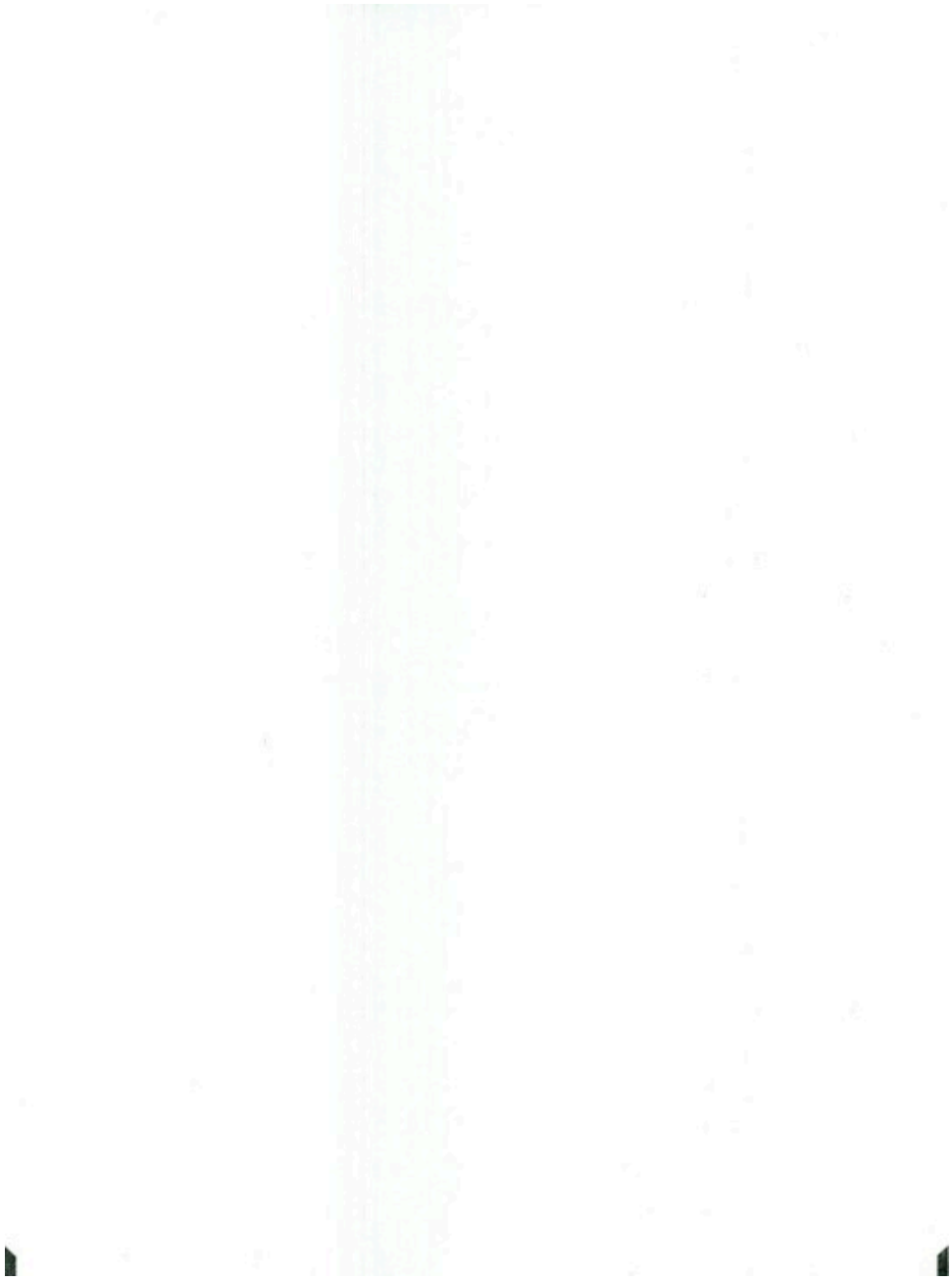





Na^+
+++

K^+
resting membran-
potential

(Section B)

Q. No. 2 Part (i) (a) **Answer:**

Glomerular capillaries: There two capillaries afferent and efferent enters the Glomerulus and distribute to form capillaries known as Glomerular capillaries.

- Here the pressure difference causes the blood to filter.
- The only small molecules like minerals, water and inorganic salts can pass through the Bowman's capsule which is called Glomerulus filtrate.

Peritubular capillaries: It is derived from efferent arteriole.

- Efferent arterioles surrounds distal and proximal convoluted tubules called peritubular capillaries and surround loop of Henle called vasa recta.
- Peritubular capillaries secrete ions and also help in the water balance.

Q. No. 2 Part (ii) (a) **Exhalation:**

The given diagram show the process of exhalation During exhalation the external intercostal muscle relax internal. internal coostal contracts results in relaxation of the ribcage. The Dome shaped diaphram relaxes increases the pressure in the thoracic cavity to decreases than atmospheric pressure so air is exhale out.

(a) (Section B)

Q. No. 2 Part (iii) Calcium ions in muscle contraction.

Calcium ions attached to the ~~troponin~~ troponin C which are present on tropomyosin it exposed the ~~myosin heads to~~ actin binding sites to the myosin heads by pushing tropomyosin that ~~it~~ inhibits the actin binding sites to attach with myosin heads.

(b): During contraction thick and thin filaments overlaps at A band. Due to which the Z lines on the thin filaments become close to each other. The H zone disappears because H zone is the part where no overlapping occur At A Band thick and thin filaments overlap again and again. so the sarcomere size decreases I Bands become close to each other.

(a)

Q. No. 2 Part (iv) **Mean**

For ungrouped data

$$\text{Mean} = \frac{\Sigma x}{n} \Rightarrow \frac{3+12+6+18+9+15+12}{7} \Rightarrow \frac{84}{7}$$

$$= \bar{X} = 12$$

Median: Arranged the data in ascending order

3, 6, 9, 12, 15, 18, 21

Median for (odd number) $= \frac{(n+1)^{th}}{2}$

$= \frac{(7+1)^{th}}{2}$

$= \frac{8^{th}}{2}$

$=$ 4th value so the media is 12

(Section B)

Q. No. 2 Part (v) (a) Monoclonal antibodies: Monoclonal antibodies are artificial cloned antibodies prepared in laboratories to get the copies of the desired antibody.

Advantages on conventional drugs.

Monoclonal Antibodies are high specific to their

(b)

Sprain: It is the torn around break out of ligament due to fall, blown or any other trama to the joint. pain while

Symptoms: the symptom include severe pain, ~~creaking sounds~~ when move up and down the chair, difficulty to walk due to pain all time, discomfort in walking.

Treatement: It culdes Dressings, physiotherapy, surgery for stretched ligaments

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Q. No. 2 Part (vi) (b) **Skin as first Line of defense**

Skin has chemical and physical barriers that prevent skin from infections. The skin

Physical barriers: The skin has a good bacteria called Flora bacteria that competes with harmful bacteria It give nutritional deficiency to the bacteria so the bacteria dies. Also, desquammation is the removing of the dead layer of the skin ~~which~~ due to which many bacterias and germs are also removed with it.

Chemical barrier: Our skin dermis layer has subeasceous glands that produce sebum. subem maintain the pH of the skin Our normal skin pH is [illegible]

(Section B)

Q. No. 2 Part (vii) (b) Baroreceptors and Volume receptors.

Baroreceptors are the receptors present in the coronary sinus that sense the increase and decrease in the blood pressure if blood pressure rises it give signal to the hypothalamus to do vasodilation similarly if blood pressure decreases it do vasoconstriction by giving signal to the brain.

Volume receptors detects the blood volume if the blood volume decreases due to lack of water it give signal to the hypothalamus to secrete ADH that Antidiuretic hormone that act on kidney to do maximum reabsorbtion of water so the blood volume increases so blood pressure rises.

Q. No. 2 Part (viii) (a) Nerve impulse.

Nerve impulse is the chemical signal that passes through the neuron to generate a specific response by after recieving a stimuli.

Nerve impulse is generated when the stimuli produce a nerve impulse equal to the threshhold if so after recieving a threshhold stimulus the membrane of the neurons become depolarize but for a short time the depolarization is reversed by repolarization so a wave of nerve impulse is generated in the neuron.

But stimuli should be capable to generate nerve impulse in neuron which is equall to threshhold

(Section B)

Q. No. 2 Part (ix) (a) Hormones secreted by Anterior pituary gland.

- Growth hormone or somatotrophin hormone
- ADH (Adrenocorticosteroid hormone)
- TSH (Thyroid stimulating hormone)
- LH (Leutinizing hormone in females and in males it is called ICSH Interstitial cell stimulating hormone
- FSH (Follicle stimulating hormone
- Prolactin.

Q. No. 2 Part (x) (a) Complement System

It is a subgroup of 90 proteins that is secreted by liver and spleen and kidney) that remains in inactive state until a pathogen enters the body.
It destroy pathogens in that way.
→ By presenting the p and label the pathogen to the phagocytic cell so they come and destroy them

→ The other example is MAC's that punctures add water and solute into the bacteria the bacteria become swollen and burst.

(Section B)

Q. No. 2 Part (xi) (a) **Plasmid** : It is the extra-chromosomal ring in the bacteria which has restriction site, origin of replication and resistance genes

Plasmids act as a vector in genetiny engineering due to its unique structures such as they it has restriction sites for different endonucleases enzymes, it has + resistance gene, have origin of replication A Also it have the ability to clone in a host cell. so give the copy of desired gene.

Q. No. 2 Part (xii) (a) **Role of liver**

- It store glycogen and convert it into glucose whenever needed for the body.
- It converts ammonia into urea
- Production of plasma proteins

(a)

(Section B)

Q. No. 2 Part (xiii)

Homologous	Analogous
• Have same structure	Same Function
• They ~~have~~ share same ancestor but ~~to~~ different in structure	they share same ancestor but different in function
Example	Example
If myoglobin	Wings of birds.

Q. No. 2 Part (xiv) **(a) Mechanisms**

(a): Vasodilation.

The arterioles do vasodilation releasing blood to the capillaries so the heat is released from the blood. The blood to capillaries is controlled by ~~At~~ muscles present in ~~t~~ the Arteries

(b): Sweating:

By sweating heat is released Because evaporation of sweat ~~it~~ absorbs a large amount of ~~water~~ ~~heat~~ ~~from the body~~ heat from the body ~~it~~.

(Section C)

Q. No. 3 (Page 1) (a) Impact of Climate Change on Flora.

• Changes during growth period

Plants require a special environmental climate specially during its development phase. Any ~~small change~~ plants during growth and development cannot ~~delete~~ with the change in the environment and human activities change the climate also natural factors are involved in the climate change But ~~if~~ highly ~~if~~ impacts the plant ~~during~~ it and the plant is unable to reproduce and grow during its development ages.

• Disturbance of Food chain

If one plant is affected due to the climate changes this plant may be a food for another animals and may the plant has a good impact on the ecosystem so if one plant is removed or affected due to climate change the whole food chain is disturbed The plants are the home for many living things so it also disturb the ecosystem and biodiversity.

Migration of Plant.

The plants cannot migrates like animals but the seed can migrate with wind, air and rain the seed that is adopted

(Section C)

Q. No. 3 (Page 2)

grow in the specific climate ~~it~~ cannot will not grow in another environment.

Extinction of species

The plant that is adapted to cold environment and can only grow in a cold environment if climate changes occur ~~mainly~~ causes rise in temperature of that region will cause the plant species to be extinct.

Impact of ~~plan~~ climate changes on Animals-

Migration: climate change is the great ~~co~~factors that influence both-animals and plants ~~Ar~~ Many animals are adapted to certain environment like polar bears are adapted to the cold environment also it ~~g~~ nutritional source is from cold environment if the ~~d~~temperature changes the animals will be migrate to another unsuitable environment which will ~~b~~ effect the biodiversity

Food chain disturbance.

If one specie become extinct the whole food chain is disturb because every animal on in the ecosystem is very important for another and every animal depend on another

(Section C)

Q. No. 3 (Page 3)

Loss of Habitat -

Due to climate change many animals loss their Habitat ~~v~~ to which they were adopted This cause disturbance ~~on~~ the ecosystem For example ~~Many~~ Many trees are destroyed due to wind which are habitats of the birds, squirrels so they all loss their habitats.

Extinction: The climate change also cause extinction of the species Because due to climate change many animals lose their Habitats they face nutritional ~~dif~~ deficiency ~~due to which~~ they cannot tolerate with the climate change and become extinct.

(Section C)

Q. No. 4 (Page 1)

(a) Location and Function of Pancreas.

Location: Pancreas is located where the stomach ends and duodenum starts the duodenum surrounds the pancreas.

Pancreas has head, neck and tail. Pancreas has both exocrine function and endocrine function.

Endocrine Gland.

Pancreas is endocrine gland. Endocrine Gland is those which do its secretion directly in the blood. Pancreas endocrine structure is divided into patches called islets of langerheans. Islets of langerheans has α cell, β cell and δ cell. The function of both these cell is to maintain the glucose level in the blood.

High sugar level

When there is high sugar level in blood the pancreas is stimulated by hypothalamus to secrete its hormone insuline. Insolin boosts the sugar level & convert into fat cell and use it in another cellular activities.

Low sugar level.

When there is low sugar level. Glucagon is secreted from α cell that convert glycogen into glucose

(Section C)

Q. No. 4 (Page 2)

(b) Formation of Human Insulin

Isolation of Gene of Interest

Gene of interest is isolated from human gene through endonucleases enzyme or is formed artificially. Human insulin gene is bonded by disulphide bond bridge and is located in the β-cell of Islets of Langerhans Human insulin gene is located in the 11p 15-5.

Selection of vector

Now next step is the selection of plasmid so PBR322 is used as a plasmid because it has resistance gene of tetracycline and ampicylline, restriction site, origin of replication.

Formation of Recombinant Plasmid

The PBR322 is not much powerful to produce both chains A and B of Easter Insulin so they use seperately into the two plasmid by the side of Galactosidase restriction site.

Transformation into the Host cell

The recombinant plasmid is inserted into host cell is now called recombinant Bacteria because host cell is bacteria.

Formation of Insulin chain.

The Bacteria is grow in beverages to provide culture ~~for the~~ medium for bacterial growth. So as bacteria grow the plasmid also divides forming the gene clones

Extraction of Insulin genes

Now the ~~insulin~~ bacteria are collected ato extract the ~~en~~ insulin gene The two

(Section C)

Q. No. 4 (Page 3) Chains A-insulin-galactosidase & is formed and B-insulin-galactosidase is formed the chain are possible to seperate by treating it with cyanogen bromide. The 2 strands are seperated by adding methionine condon at N-terminal to seperate the A and B chains of insulin. from fusion proteins.

Folding and disulphide Bridge

The Extracted insulin chains are seperated and the disulphide Bridge is formed ~~bet~~ by adding cysteine residues. ~~to~~ so ~~to~~ An active insulin is formed

Purification and Quality Test

Tests are perform to check Quality to ~~s~~ market it

so ~~Recombi~~ Recombinant biotechnology involves following steps

→ Isolation of Gene of interest

→ Selection of plasmid ~~with~~ which have high copy number, restriction sites ~~are~~ and resistant genes all are present

→ Formation of Recombinant ~~plasmid~~ DNA

→ ~~Expression~~ ↓

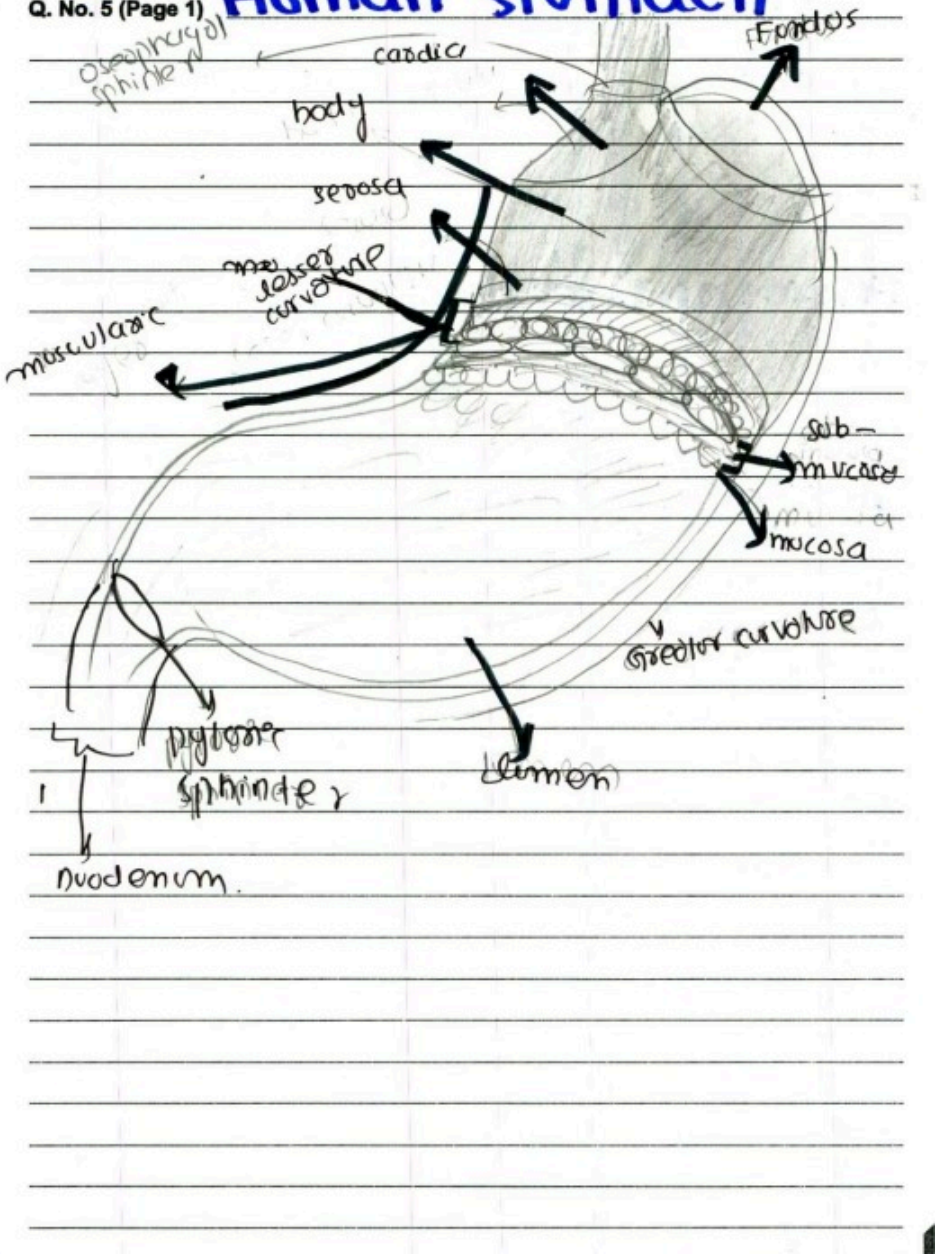
→ All these steps are involved in Recombinant DNA which are explain by example of Human insulin gene

(a).

(Section C)

Q. No. 5 (Page 1)

Human stomach



(Section C)

Q. No. 5 (Page 2)

Chemical digestion.

The churning action of the stomach produce muscular waves that ~~and~~ mix to stomach juices with the bolus make it liquide like mass called chyme.

Mucosa layer of Stomach.

the ~~the~~ layers of the stomach is collectively called tunics. These are four layers of the stomach "serosa, muscularis, submucosa and mucosa. Mucosal layer is glandular

the stomach inner layer is formed of epithelium that ~~has~~ there are gastric pits on the mucosal surface that are the tubular openings of the gastric glands. The mucosal layer secretes the mucus which protects the stomach lumen from the acidic chyme and pepsin. these are glands on the mucosal layer called these are parietal which are ~~The~~ ~~the~~ found on proximal end of ~~parietal~~ parietal layer is also called (oxyntic layer), chief cells also called (zygomenic cell) and the other cell called endocrine cell.

Parietal cell: Parietal cell secretes HCl that maintain the pH of the stomach HCl has not many function but it kill bacteria that comes in the food also it secrete intrinsic factor ~~that~~ that help in the vitamins

(Section C)

Q. No. 5 (Page 3)

absorbtion in the ~~small~~ large intestine.

Chief cell: chief cells are also called ozymogenic cells that secretes pepsinogen in inactive form that is converted into pepsin by HCl and other pepsin. ~~Chief cell secrete the pepsinogen pepsinogen in zyg zymog~~

Endocrine cell: It secretes Gastrin that controls the secretion of other glands * Gastrin is not included in ~~gastric~~ gastrin juices but is considered in gastric secretion so all these juices mixes with bolus ~~mixes~~ convert the bolus into chyme

Three glands are exocrine and one gland is endocrine in mucosal layer

(Section C)

Q. No. 6 (Page 1)

(a)

Transport of carbondioxide.

• In the form of bicarbonate.

70% of the carbondioxide travel in the form of bicarbonate ions. CO_2 due to the high partial pressure diffuse out from the tissue to the blood where it combines with water to form carbonic acid in the presence of carbonic anhydrase enzyme

$$CO_2 + H_2O \longrightarrow H_2CO_3$$

This carbonic acid is unstable and breaks into hydrogen ion and bicarbonate ion.

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

Now accumulation of H^+ ion in the blood cause the blood pH to drop upto 1–2 so this acidity is buffer by Haemoglobin (HbO_2) which combine H^+ to itself and release oxygen to the tissues to form Haemoglobinic acid.

$$HbO_2 + H^+ \longrightarrow HHb + O_2$$

Now to balace the charge there are special protein pumps in the membrane HCO_3^- exigoest out and Cl^- enters the blood so the charge is balance and called the process is called chlorine shift and Hamburger's shift.

(Section C)

Q. No. 6 (Page 2)

In the form of blood plasma

7% of carbondioxide travels in the form of blood plasma.

Carbaminohaemoglobin
Carboxyhaemoglobin.

CO_2 from the surrounding tissues diffuce and combine with the globin part of the haemoglobin. to form carboxyhaemoglobin the haemoglobin NH_2 is converted in to NH.

N_COOH ~~thats why it~~ Carboxylic groups is formed thats why it is called carboxyhaemoglobin. 23% of the CO_2 travel in the form of carboxyhaemoglobin.

(Section C)

Q. No. 6 (Page 3)