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Answer Sheet No. \_\_\_\_\_

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### BIOLOGY SSC-I (3<sup>rd</sup> Set Solution)

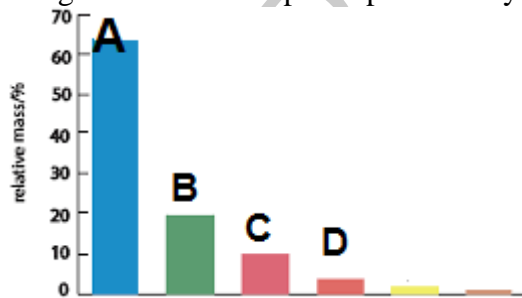
#### SECTION – A (Marks 12)

Time allowed: 15 Minutes

Section – A is compulsory. All parts of this section are to be answered on this page and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. **Do not use lead pencil.**

**Q.1 Fill the relevant bubble for each part. All parts carry one mark.**

- (1) The following graph shows percentage composition of bio-elements by mass of a human being. Which labeled part represents Hydrogen?



- A.  B.   
 C.  D.

- (2) Malarial patient has plasmodium in his blood. What would be the possible explanation if a healthy person who is not having any malarial symptoms shows plasmodium in his blood?

- A. Plasmodia are dead   
 B. Plasmodia are in incubation period   
 C. Plasmodia are not mature   
 D. Plasmodia are inactive

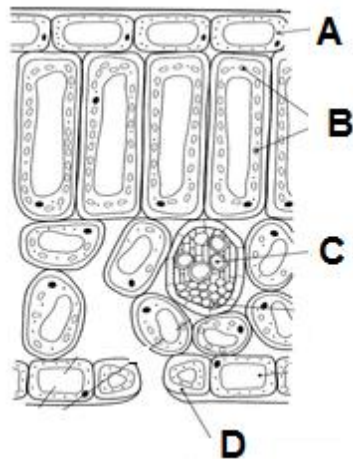
- (3) Which option is correct regarding the mode of nutrition of following organism?

	Animal	Prokaryote	Fungi	Plant
A.	Heterotrophic	Heterotrophic	Ingestive	Autotrophic
B.	Ingestive	Absorptive	Autotrophic	Heterotrophic
C.	Ingestive	Heterotrophic	Absorptive	Photosynthesize
D.	Absorptive	Autotrophic	Ingestive	Autotrophic

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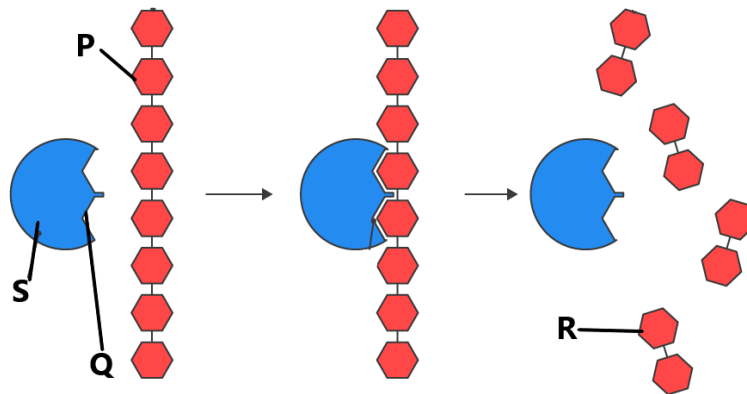
- (4) All of the following are macromolecules **EXCEPT**:
- A. Protein  B. Starch
- C. DNA  **D. Glucose**

- (5) The diagram shows cells in part of the leaf of a green plant. Which region contains cells which are responsible for the transport of water?



- A.  B.
- C.**  D.

- (6) The diagram shows an amylase molecule catalysing the breakdown of a starch molecule.

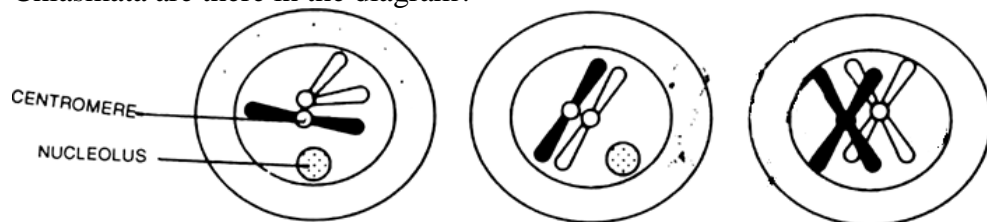


What are the labelled parts P, Q, R and S?

	Enzyme	Product	Substrate	Active site
A	P	Q	R	S
B	R	S	P	Q
C	S	P	Q	R
<b>D</b>	<b>S</b>	<b>R</b>	<b>P</b>	<b>Q</b>

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- (7) Chiasmata formation takes place during prophase I. Find out how many Chiasmata are there in the diagram?



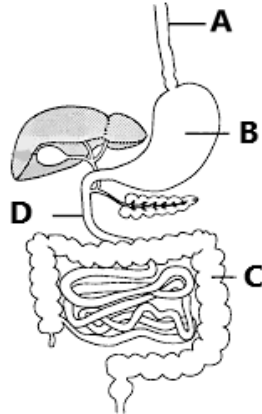
- A. 1  **B. 2**
- C. 3  D. 4

(8) Which of the following substance could be lipid?

Substances	Amino acid	Glucose	Fatty acid	Glycerol
A	✓	x	x	x
B	x	x	✓	✓
C	x	✓	x	x
D	✓	✓	x	x

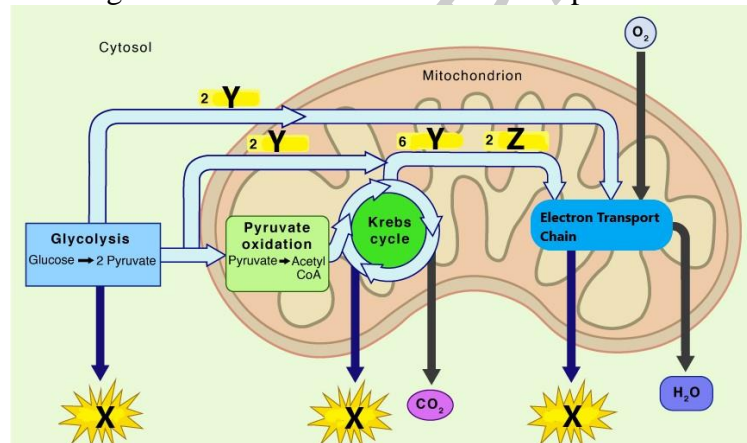
- A  
 B  
 C  
 D

(9) The diagram shows part of human alimentary canal. In which region maximum amino acids are absorbed in the blood?



- A.  B.   
 C.  D.

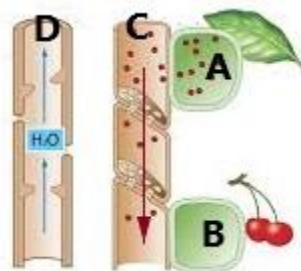
(10) The diagram shows overview of cellular respiration.



Which labelled part represents NADH?

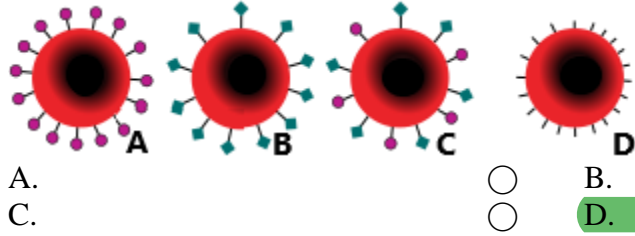
- A. X only  B. Y only   
 C. Z only  D. Both Y and Z

(11) The diagram shows pressure flow mechanism through phloem. Which labelled part will act as sugar sink?



- A.  B.   
 C.  D.

(12) The diagram shows red blood cells with antigens according to ABO blood group system. Which cell represents blood group O?



FBISE SOLVED PAST PAPERS

Federal Board SSC-I Examination  
Biology Model Question Paper  
(Curriculum 2006)

Time allowed: 2.45 hours

Total Marks: 53

Note: Answer any eleven parts from Section 'B' and attempt any two questions from Section 'C' on the separately provided answer book. Write your answers neatly and legibly.

**SECTION – B (Marks 33)**

**Q.2** Attempt any **ELEVEN** parts from the following. All parts carry equal marks. Be brief and to the point. (11× 3 = 33)

- i. If a student want to investigate the effect of different factors on the activity of salivary amylase. He will design an experiment in order to reach conclusion.
- a. What would be the most appropriate first step to initiate?

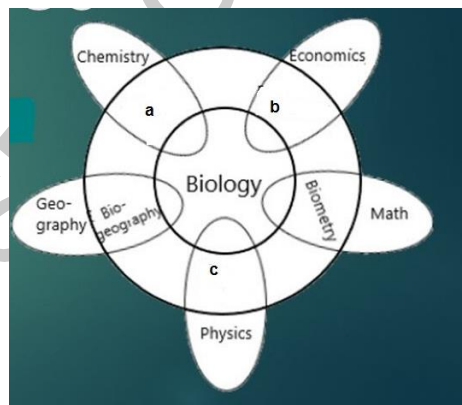
**Ans.** The most appropriate first step to initiate scientific investigation is formulation of hypothesis. Biologist organizes his/her and others' observations into data form and constructs a statement that may prove to be the answer of the biological problem under study. This tentative explanation of observations is called a hypothesis.

- b. What characteristics should be considered for its accuracy?

**Ans.** A hypothesis should have the following characteristics:

- It should be a general statement.
- It should be a tentative idea.
- It should agree with available observations.
- It should be testable and potentially falsifiable.

- ii. Biology is not an isolated branch of science. It has relationship with other branches. Explain with examples the link of biology with a, b & c in the diagram.



**Ans.**

**a. Biochemistry:**

It deals with the study of the chemistry of different compounds and processes occurring in living organisms. For example the study of basic metabolism of photosynthesis and respiration involves the knowledge of chemistry.

**b. Bioeconomics:**

It deals with the study of organisms from economical point of view. For example the cost value and profit value of the yield of wheat can be calculated through bioeconomics and benefits or losses can be determined.

**c. Biophysics:** It deals with the study of the principles of physics, which are applicable to biological phenomena. For example there is a similarity between the working principles of lever in physics and limbs of animals in biology.

iii. Justify viruses are at the borderline of living and non-living things.

**Ans.**

**Status of Viruses:**

Viruses are at the borderline of living and non-living.

**Non-living characteristics:**

- Due to their crystalline nature, they are considered as non-living.
- They are acellular i.e. they do not have cellular organization. They do not have nucleus, cytoplasm, cell organelles or cell membrane.

**Living thing characteristics:**

- Viruses contain either RNA or DNA, normally encased in protein coat.
- They reproduce only inside the living cells, where they cause a number of diseases.

iv. Calculate surface area to volume ratio of the following cells. (2)

Cells	Height	Width	Length	Surface area	Volume	Surface area/Volume
Bacteria	1 $\mu\text{m}$	1 $\mu\text{m}$	4 $\mu\text{m}$	18 $\mu\text{m}^2$	4 $\mu\text{m}^3$	4.5
Guard cell	9 $\mu\text{m}$	9 $\mu\text{m}$	20 $\mu\text{m}$	882 $\mu\text{m}^2$	1620 $\mu\text{m}^3$	0.54

Which cell has highest surface area to volume ratio? (1)

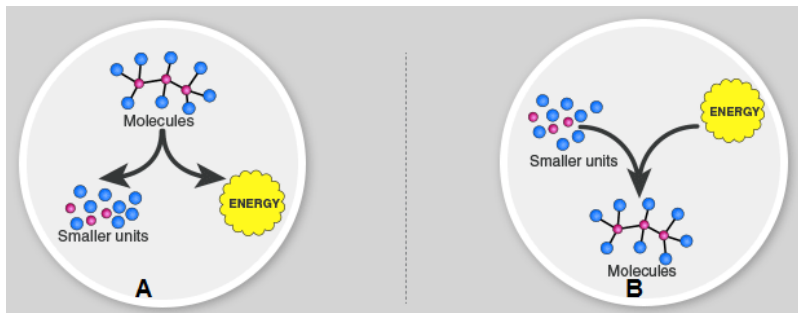
**Ans:** Bacteria have highest surface area to volume ratio.

v. After accident or injury sometime the limb amputation is required. What is the reason behind it?

**Ans.** Sometimes after accident or injury the wound does not heal due to poor blood supply. Cells die by necrosis. This accidental death of cells causes severe cell swelling, cell rupture and release of toxins, which damage the neighbouring cells and cause inflammation.

Amputation can be necessary to keep an infection from spreading through the limbs and control pain.

vi. Classify the following metabolic reactions A and B. (1)



**Ans.** A is catabolic reaction, B is anabolic reaction

Draw a table to show differences between them. (2)

**Ans.**

Characteristics	Catabolic reaction	Anabolic reaction
Definition	Biochemical reactions in which larger molecules are broken down.	Biochemical reactions in which larger molecules are synthesized
Energy	Energy is released	Energy is utilized
Example	Respiration	Photosynthesis

(vii) A child had weak and soft bones which lead to bending of bones. The doctor advised him to spend more time in sun and drink milk regularly. Name the disease and cause of the disease.

**Ans.** In children, vitamin-D deficiency leads to **rickets**, a condition in which bones weaken and bow under pressure. It is caused by long-term deficiency of vitamin D. Vitamin D is mainly found in fish liver oil, milk, ghee, and butter etc. It is also synthesized by skin when ultraviolet (UV) radiations from the Sun are used to convert a compound into vitamin D.

(viii) a. According to starch sugar hypothesis which organelle of guard cells performs its function during day to keep stomata open? (1)

**Ans.** Chloroplasts are present in guard cell. During the day they synthesize the glucose by photosynthesis.

b. How does it regulate the opening and closing of stomata? (2)

**Ans.** Stomata (openings) in leaf epidermis are surrounded by guard cells. During daytime guard cells are making glucose and so are hypertonic (have higher concentration of glucose) than their nearby epidermis cells. Water enters them from other cells and they swell. In this form, they assume a rigid bowed shape and a pore is created between them. At night when there is low solute concentration in guard cells, water leaves them and they become flaccid. In this form, both guard cells rest against one another and the opening is closed.

(ix) 'Having perfect vision in the day light but blind at night' would it be considered as a disease? Assess the cause and suggest the treatment and diet.

**Ans.** It is deficiency disease called as night blindness. It is caused by deficiency of vitamin A. Vitamin A combines with a protein called opsin to form rhodopsin in rod cells of the retina of eye. When vitamin A is inadequate, the lack of rhodopsin makes it difficult to see in dim light. Such patients should take vitamin A and include in their diet leafy vegetables (spinach, carrots), yellow fruits, fish, liver, egg, milk and butter to get vitamin A.

(x) Write down the importance of redox reactions in bioenergetics?

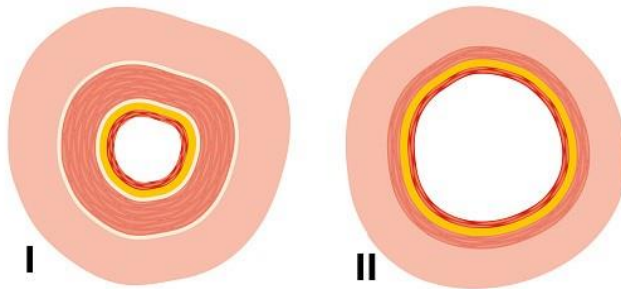
**Ans.** Electrons can be an energy source.

- Energy stored in chemical bonds can be transferred to new bonds, with electrons shifting from one energy level to another.
- Redox reaction plays a key role in energy flow through biological system because electrons that passes from one atom to another carry their potential energy.
- These electrons transfers, which are equivalent to energy transfers, are an essential part of cellular respiration and photosynthesis etc.

(xi) A cell works as an open system. Comment on it.

**Ans.** A cell works as an open system i.e. it takes in substances needed for its metabolic activities through its cell membrane. It takes up food, oxygen, water and salts for survival, growth and division, and energy for metabolic processes. Products and by-products are formed in metabolism. Cell either utilizes the products or transports them to other cells. The by-products are either stored or are excreted out of cell.

(xii) The diagrams show sections through two types of blood vessel.



a. Name the blood vessel I and II (1)

**Ans.** Blood vessel I is artery and Blood vessel II is vein.

b. Give comparison between them. (2)

Characteristics	Arteries	Veins
<b>Function</b>	Carry blood away from heart	Carry blood towards heart
<b>Thickness and Elasticity in walls</b>	Thick and elastic	Thin and less elastic
<b>Muscles in walls</b>	Thick	Thin
<b>Blood pressure</b>	High BP	Low BP
<b>Valves</b>	No valves	Valves present



(xiii) Dark reaction of photosynthesis is not dependent on light. If a plant is kept in darkness then dark reaction will not occur. Why? Give reasons.

**Ans.** Photosynthesis occurs in two phases. First phase is light dependent reactions and second phase is light independent reactions i.e. dark reactions. If a plant is kept in darkness then dark reaction will not occur because:

During first phase, light energy is captured and is used to make high-energy molecules ATP and NADPH.

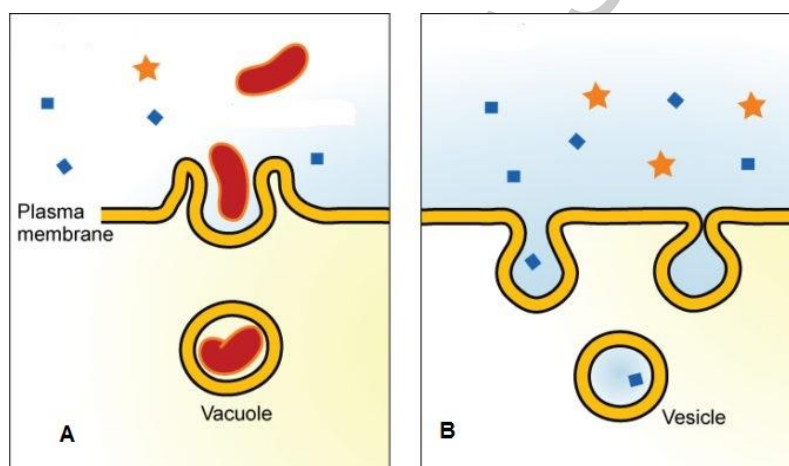
During second phase, carbon dioxide is reduced by NADPH to make glucose.

This reaction requires energy which is provided by ATP. Since these reactions do not use light directly, they are known as dark reactions. But this reaction cannot occur without using NADPH and ATP that are synthesized during light reactions. So light is required for light reaction and the products of light reactions are required for dark reactions to proceed.

(xiv) a. Identify the type of endocytosis in diagrams A and B. (1)

**Ans.** Diagram A is showing phagocytosis and Diagram B is showing pinocytosis

b. Explain both the processes with the help of examples. (2)



**Ans. Phagocytosis:** In phagocytosis cell takes in solid material e.g. Amoeba engulfs paramecium and some WBC take up bacteria by phagocytosis.

**Pinocytosis:** In pinocytosis cell takes in liquid in the form of droplets e.g. in humans this process occurs in cells lining the small intestine and used primarily for absorption of fat droplets.

(xv) Define cofactor. Categorize it into different types.

**Ans.** Some enzymes require non protein molecules or ions for their proper working are called as **cofactors**. There are three types of cofactors: activator, prosthetic group and coenzyme.

**Activator:** Many enzymes require ions such as zinc, copper iron and chloride etc. For example salivary amylase activity is increased in the presence of chloride ions.

**Prosthetic group:** If the cofactor is tightly bound to enzyme it is called as prosthetic group. Prosthetic groups are organic molecules. For example haem group.

**Coenzyme:** When the cofactor is detachable organic molecule it is called as coenzyme. Examples are NAD, coenzyme A and vitamin A.

**SECTION – C (Marks 20)**

**Note:** Attempt any **TWO** questions. All questions carry equal marks.

**(2×10 = 20)**

**Q.3 a.** What is the difference between cytokinesis of a plant cell and an animal cell? (4)

**Ans.**

<b>Characteristics</b>	<b>Plant cytokinesis</b>	<b>Animal cytokinesis</b>
<b>Definition</b>	It is the cytoplasmic division of plant cell, bringing about the separation into two daughter cells.	It is the cytoplasmic division of animal cell, bringing about the separation into two daughter cells.
<b>Major events</b>	Cytokinesis occurs via the formation of a cell plate at the middle of the cell.	Cytokinesis occurs via the formation of a cleavage furrow.
<b>Constriction of cell membrane</b>	Constriction of the cell membrane does not occur	Constriction of the cell membrane occur
<b>Process</b>	Golgi apparatus releases vesicles that contain cell wall materials, which fuse at the equatorial plane to form the cell plate during plant cytokinesis.	A cleavage furrow develops where the metaphase plate used to be. The furrow deepens and eventually pinches the parent cell into two daughter cells.

**b.** Explain various types of cells which contribute to the functioning of the human body. (Write any three types of cells only) (6)

**Ans. Connective tissue**

As the name shows, connective tissue serves a “connecting” function. It supports and binds other tissues. Unlike epithelial tissue, connective tissue has cells scattered throughout an extracellular matrix. Common examples of this tissue are cartilage (found around the ends of bones, in external ear, nose, trachea etc.), bone and blood. The adipose tissue (found around kidneys, under skin, in abdomen etc.) is also a type of connective tissue. It provides energy and support organs.

**Nervous tissue**

An animal’s survival depends on its ability to respond appropriately to the stimuli from its environment. This ability requires the transmission of information among the parts of body. Nervous tissue forms a communication system and performs this task. This tissue is mainly composed of **nerve cells** or **neurons**, which are specialized to conduct messages in the form of **nerve impulses**. Nervous tissue is found in brain, spinal cord and nerves.

**Muscle Tissue**

Muscle tissue consists of bundles of long cells called muscle fibers. It is the most abundant tissue in an animal. The cells of this tissue have ability to contract. There are three kinds of muscle tissue.

**Skeletal muscles** or striated muscles are attached to bones. Their cells are striated (striped) and contain many nuclei. They are responsible for the movements of bones.

**Smooth muscles** are found in the walls of alimentary canal, urinary bladder, blood vessels etc. They contain smooth (non-striated) cells, each with a single nucleus. They are responsible for the movement of substances.

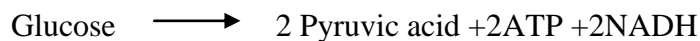
**Cardiac muscles** are present in the wall of heart. Their cells are also striated but there is a single nucleus in each cell. They produce heartbeat. Skeletal muscles are voluntary in action i.e. their contraction is under the control of our will. Smooth and cardiac muscles are involuntary in action i.e. their contraction is not under the control of our will.

**Q.4** a. Elaborate the phases of aerobic respiration by means of word and symbol equation. (6)

**Ans. Mechanism Of Respiration**

The process of respiration involves complex series of reactions. For the study of all the reactions of glucose oxidation, we will go into the mechanism of aerobic respiration. Aerobic respiration is a continuous process, but for convenience we can divide it into three main stages; 1- glycolysis, 2-Krebs cycle and 3- electron transport chain.

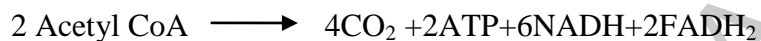
**Glycolysis** occurs in cytoplasm and oxygen is not involved in this stage. That is why, it occurs in both types of respiration i.e. aerobic and anaerobic. In glycolysis, glucose (6C) molecule is broken into two molecules of pyruvic acid (3C).



**In Krebs cycle**, the pyruvic acid molecules are completely oxidized, along with the formation of ATP, NADH and FADH<sub>2</sub>. Before entering in Krebs cycle, pyruvic acid is changed into a 2-carbon compound called acetyl-CoA.



CoA is released from Acetyl group and is passed through series of reactions. Final products are:



**Electron transport chain** is the final step of cellular respiration. It is the transfer of electron on an electron transport chain. In this step, NADH and FADH<sub>2</sub> release electrons and hydrogen ions. These electrons are taken up by a series of electron carriers. When electrons move through the series of electron carriers they lose energy, which is used to synthesize ATP. At the end of chain, electrons and hydrogen ions combine with molecular oxygen and form water.

b. State the symptoms, causes, treatment and prevention of diarrhea and ulcer. (4)

**Ans. ULCER**

Ulcer (peptic ulcer) is a sore in the inner wall of gut (in oesophagus, duodenum or stomach). In ulcer, the acidic gastric juice gradually breaks down the tissue of the inner wall. Ulcer of stomach is called gastric ulcer.

The **causes** of ulcer include excess acid, infection, long term use of anti-inflammatory medicines (including aspirin), smoking, drinking coffee, colas, and eating spicy foods.

The **symptoms** of ulcer include abdominal burning after meals or at midnight. Severe ulcers may cause abdominal pain, rush of saliva after an episode of regurgitation, nausea, loss of appetite and weight loss.

Ulcer is **treated** with medicines, which neutralize the acidic affects of gastric juice.

Spicy, acidic foods and smoking should be avoided as **preventive measures**.

**DIARRHOEA**

Diarrhoea is a condition in which the sufferer has frequent watery, loose bowel movements. This condition may be accompanied by abdominal pain, nausea and vomiting. It occurs when required water is not absorbed in blood from colon.

The main **causes** of diarrhoea include lack of adequate safe water. Diarrhoea is also caused by viral or bacterial infections of large intestine. If sufficient food and water is available, the patient of diarrhoea recovers in a few days. However, for malnourished individuals diarrhoea can lead to severe dehydration and can become life-threatening.

The **treatment** for diarrhoea involves consuming adequate amounts of water (to replace the loss), preferably mixed with essential salts and some amount of nutrients. Antibiotics may be required if diarrhoea is due to bacterial infection.

**Preventions** of diarrhoea include taking clean water and essential salts, eating regularly and taking hygienic measures.

Q.5 a. i. Complete the checker board for donor and recipient blood groups showing cross matching for blood transfusion. (3)

	A	B	AB	O
A	✓	✗	✓	✗
B				
AB				
O				

✓ means: Can be transfused, ✗ means: Agglutination (Can't be transfused)

Ans.

		Recipient Blood Groups			
		A	B	AB	O
Donor Blood Groups	A	✓	✗	✓	✗
	B	✗	✓	✓	✗
	AB	✗	✗	✓	✗
	O	✓	✓	✓	✓

**Blood Transfusion: Cross matching**  
 ✓ : can be transfused  
 ✗ : agglutination

ii. Analyze the consequences when a person having blood group O receives blood group AB from a donor. (3)

**Ans.** A person with blood group O, does not have antigen A and antigen B i.e. both are absent. So their blood serum will contain both antibodies i.e. anti-A & anti-B. In person with blood group AB, antigens A & B are present i.e. neither is absent. So their blood serum will contain no antibody.

When a person having blood group O receives blood from a donor having blood group AB then **agglutination** (clumping of cells) results in the blood of recipient. As antibodies of recipient's blood will destroy the corresponding antigen-containing RBCs of donor.

b. Enlist the characteristics of two kingdom and five kingdom classification. (1+3)

**Ans. Two-Kingdom Classification System**

It is the oldest system and classifies all organisms into two kingdoms i.e. Plantae and Animalia

- According to it, all organisms that can prepare food from simple inorganic materials and thus can store energy, are autotrophs and are included in kingdom plantae.

- On the other hand, the organisms that cannot synthesize their food and depend on autotrophs or others are heterotrophs and are included in kingdom animalia.

According to this system, bacteria, fungi and algae were included in kingdom plantae.

### **Five-Kingdom Classification System**

In 1967, **Robert Whittaker** introduced the five-kingdom classification system. This system is based on;

- The levels of cellular organization i.e. prokaryotic, unicellular eukaryotic and multicellular eukaryotic
- The principle modes of nutrition i.e. photosynthesis, absorption, and ingestion.

On this basis, organisms are classified into five kingdoms: monera, protista, fungi, plantae and animalia.

In 1988, **Margulis and Schwartz** modified the five-kingdom classification of Whittaker. They considered genetics along with cellular organization and mode of nutrition in classification. They classified the organisms into the same five kingdoms as proposed by Whittaker.

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