

UNIQUE STUDY POINT

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Class: X	Subject: Science	Session: 2025-26
Chapter: 05 - Life Processes	Time: 1½ Hours	Max. Marks: 40

General Instructions:

1. All questions are compulsory.
2. This question paper contains 20 questions divided into five sections A, B, C, D and E.
3. Section A contains 10 MCQs of 1 mark each.
4. Section B contains 4 questions of 2 marks each.
5. Section C contains 3 questions of 3 marks each.
6. Section D contains 1 question of 5 marks.
7. Section E contains 2 Case Study Based questions of 4 marks each.

SECTION A - Multiple Choice Questions (1 mark each)

1. The process by which Amoeba obtains food is called:
(a) Ingestion
(b) Egestion
(c) Phagocytosis
(d) Both (a) and (c)
2. Which blood cells help in fighting against infections?
(a) Red blood cells
(b) White blood cells
(c) Platelets
(d) All of these
3. The muscular organ that churns and mixes food with gastric juice is:
(a) Oesophagus
(b) Stomach
(c) Small intestine
(d) Large intestine
4. Which of the following is NOT a product of photosynthesis?
(a) Glucose
(b) Oxygen
(c) Starch
(d) Carbon dioxide
5. The rhythmic contraction of muscles in the alimentary canal is called:
(a) Peristalsis
(b) Digestion

- (c) Absorption
 - (d) Assimilation
6. Which structure prevents the backflow of blood in veins?
- (a) Nodes
 - (b) Valves
 - (c) Capillaries
 - (d) Septum
7. The process of reabsorption in nephron occurs in:
- (a) Glomerulus
 - (b) Bowman's capsule
 - (c) Tubular part
 - (d) Collecting duct
8. Plants obtain nitrogen in the form of:
- (a) Nitrogen gas
 - (b) Nitrates and nitrites
 - (c) Proteins
 - (d) Ammonia only
9. The enzyme pepsin works in:
- (a) Acidic medium
 - (b) Alkaline medium
 - (c) Neutral medium
 - (d) Any medium
10. Which chambers of the heart contain oxygenated blood?
- (a) Right atrium and right ventricle
 - (b) Left atrium and left ventricle
 - (c) Right atrium and left ventricle
 - (d) Left atrium and right ventricle

SECTION B - Short Answer Questions (2 marks each)

11. Why is diffusion insufficient to meet oxygen requirements of multi-cellular organisms?
12. What is the role of mucus in the stomach?
13. Differentiate between arteries and veins based on their structure and function.
14. How do desert plants carry out photosynthesis?

SECTION C - Short Answer Questions (3 marks each)

15. Explain how exchange of gases occurs in plants during day and night.
16. Describe the role of diaphragm and ribs in breathing.
17. What are the different methods of excretion in plants? Explain any three.

SECTION D - Long Answer Question (5 marks)

18. Draw a well-labelled diagram of the human heart and explain how it functions as a double pump.

SECTION E - Case Study Based Questions (4 marks each)

19. Case Study 1:

Heterotrophic nutrition involves intake of complex organic food material prepared by other organisms. Different organisms use different strategies. Some organisms like fungi secrete digestive enzymes outside their body and absorb the digested food (saprophytic). Some organisms like cows and buffaloes eat plant material which is digested with the help of bacteria in their rumen (herbivorous). Some organisms like lions eat other animals (carnivorous). Some organisms like cuscuta (amar-bel) derive nutrition from living hosts without killing them (parasitic).

Based on the above information, answer the following:

- (i) What is the difference between saprophytic and parasitic nutrition? (1 mark)
- (ii) Why do herbivorous animals need longer digestive systems? (1 mark)
- (iii) How does cuscuta obtain nutrition from the host plant? What is the effect on the host? (2 marks)

20. Case Study 2:

The kidneys are bean-shaped organs located in the abdomen. Each kidney contains millions of nephrons which filter blood. The filtration occurs in glomerulus where blood pressure forces water, glucose, amino acids, salts, and urea into Bowman's capsule. As this filtrate passes through the tubule, useful substances are reabsorbed. The amount of water reabsorbed depends on the body's hydration level and is regulated by hormones. The final urine contains urea, excess salts, and water. If kidneys fail, waste products accumulate in blood, which can be fatal. Artificial kidney (dialysis) can be used temporarily.

Based on the above information, answer the following:

- (i) What creates the filtration pressure in glomerulus? (1 mark)
- (ii) Name two useful substances that are reabsorbed in the tubule. (1 mark)
- (iii) Explain how dialysis works and how it differs from normal kidney function. (2 marks)

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SECTION A - Answers to MCQs

1. (d) Both (a) and (c)

Amoeba takes in food through ingestion using pseudopodia, and the process of engulfing solid food particles by cell membrane is also called phagocytosis.

2. (b) White blood cells

White blood cells (WBCs) are part of the immune system and help fight against infections and foreign particles that enter the body.

3. (b) Stomach

The stomach is a muscular organ that churns and mixes food thoroughly with gastric juice containing HCl, pepsin, and mucus.

4. (d) Carbon dioxide

Carbon dioxide is a raw material (reactant) used in photosynthesis, not a product. The products of photosynthesis are glucose, oxygen, and starch (stored form of glucose).

5. (a) Peristalsis

Peristalsis is the rhythmic contraction of muscles in the alimentary canal that pushes food forward along the digestive tract in a regulated manner.

6. (b) Valves

Veins have valves that ensure one-way flow of blood toward the heart and prevent backflow due to low blood pressure in veins.

7. (c) Tubular part

Selective reabsorption of useful substances like glucose, amino acids, salts, and water occurs in the tubular part of the nephron.

8. (b) Nitrates and nitrites

Plants obtain nitrogen from soil in the form of inorganic nitrates or nitrites, or as organic compounds prepared by nitrogen-fixing bacteria.

9. (a) Acidic medium

Pepsin is a protein-digesting enzyme that works effectively only in acidic medium (pH 1-2) created by hydrochloric acid in the stomach.

10. (b) Left atrium and left ventricle

The left side of the heart (left atrium and left ventricle) contains oxygenated blood received from the lungs, which is then pumped to the body.

SECTION B - Answers to Short Answer Questions

11. Limitation of diffusion

Answer: Diffusion is insufficient to meet oxygen requirements of multi-cellular organisms because:

- In multi-cellular organisms, not all cells are in direct contact with the environment
- Diffusion is a very slow process that works effectively only over very small distances
- Large organisms have many cells far from the surface, so diffusion alone cannot supply oxygen quickly enough to meet their high metabolic needs
- Therefore, specialized respiratory and circulatory systems are needed to transport oxygen efficiently to all cells

12. Role of mucus

Answer: Mucus plays a protective role in the stomach:

- Mucus is secreted by gastric glands in the stomach wall
- It forms a thick protective layer on the inner lining of the stomach
- This layer protects the stomach walls from the corrosive action of hydrochloric acid (HCl) and from being digested by pepsin enzyme
- Without mucus, the acid would damage the stomach lining, causing ulcers

13. Arteries vs Veins

Answer: Differences between arteries and veins:

Arteries	Veins
Carry blood away from heart to organs	Carry blood from organs back to heart
Have thick, elastic walls to withstand high pressure	Have thin walls as blood is under low pressure
Do not have valves (except at heart base)	Have valves to prevent backflow
Blood flows in pulses	Blood flows smoothly

14. Photosynthesis in desert plants

Answer: Desert plants have adapted their photosynthesis process to conserve water:

- Desert plants face extreme heat and water scarcity
- They cannot keep stomata open during day as they would lose too much water through transpiration
- Therefore, they take up carbon dioxide at night when temperatures are lower and water loss is minimal
- CO₂ is converted into an intermediate compound and stored
- During the day, stomata remain closed to prevent water loss
- The stored intermediate is broken down using light energy absorbed by chlorophyll to complete photosynthesis

This adaptation allows them to survive in harsh desert conditions.

SECTION C - Answers to Short Answer Questions

15. Gas exchange in plants

Answer: Exchange of gases in plants occurs differently during day and night:

During the day:

- Both photosynthesis and respiration occur simultaneously
- Photosynthesis produces oxygen and consumes CO₂
- The rate of photosynthesis is much higher than respiration
- CO₂ produced during respiration is used up immediately for photosynthesis
- Therefore, there is no CO₂ release; instead, excess oxygen is released through stomata

- Net gas exchange: CO₂ intake and O₂ release

During the night:

- Only respiration occurs as photosynthesis requires light
- Oxygen is taken in from air through stomata
- Carbon dioxide produced during respiration is released into the air
- Net gas exchange: O₂ intake and CO₂ release

In both cases, exchange occurs through stomata, and the direction depends on the concentration gradient between the plant cells and the surrounding air.

16. Role of diaphragm and ribs in breathing

Answer: Diaphragm and ribs work together to facilitate breathing through changing chest cavity volume:

Inhalation (breathing in):

- Ribs move upward and outward
- Diaphragm (a dome-shaped muscle below lungs) flattens and moves downward
- These movements increase the volume of the chest cavity
- This creates lower pressure inside the lungs compared to atmospheric pressure
- Air rushes into the lungs through nostrils to equalize pressure
- Alveoli expand and fill with air

Exhalation (breathing out):

- Ribs move downward and inward
- Diaphragm relaxes and returns to its dome shape, moving upward
- These movements decrease the volume of the chest cavity
- This increases pressure inside the lungs
- Air is forced out of the lungs

This rhythmic process continues automatically, controlled by the respiratory center in the brain.

17. Excretion in plants

Answer: Plants use various methods to get rid of waste products:

1. Storage in vacuoles:

- Many waste products are stored in cellular vacuoles
- These wastes remain isolated from active protoplasm
- When the cell dies, these wastes are removed along with dead cells

2. Leaf fall:

- Plants store many waste products in leaves
- These leaves eventually fall off, removing the wastes
- This is particularly evident in deciduous trees that shed all leaves seasonally

3. Storage as resins and gums:

- Some waste products are converted into resins and gums
- These are stored in old xylem tissue
- Examples include gum from acacia trees, latex from rubber trees
- These products are commercially useful to humans

4. Excretion through stomata:

- Gaseous wastes like oxygen (during photosynthesis) and CO₂ (during respiration) are excreted through stomata

5. Excretion into soil:

- Some waste substances are excreted into the soil around the roots

SECTION D - Answer to Long Answer Question

18. Human heart structure and function

Answer: [Note: Students should draw a labeled diagram showing: Aorta, Vena Cava, Pulmonary artery, Pulmonary vein, Right atrium, Right ventricle, Left atrium, Left ventricle, Valves, Septum]

Structure:

- The heart is a muscular organ about the size of a fist
- It has four chambers: two upper atria (thin-walled) and two lower ventricles (thick-walled)
- A septum (dividing wall) completely separates the right and left sides
- Valves are present between atria and ventricles, and between ventricles and arteries

Function as Double Pump:

Right side pump (for pulmonary circulation):

- Deoxygenated blood from the body enters the right atrium through vena cava
- When the right atrium contracts, blood moves through a valve into the right ventricle
- The right ventricle contracts and pumps this deoxygenated blood to the lungs through the pulmonary artery
- In the lungs, blood gets oxygenated

Left side pump (for systemic circulation):

- Oxygenated blood from the lungs enters the left atrium through pulmonary veins
- When the left atrium contracts, blood moves through a valve into the left ventricle
- The muscular left ventricle contracts powerfully and pumps oxygenated blood to all body parts through the aorta

Why it's called a double pump:

- The heart pumps blood through two different circuits in one complete cycle
- Right side pumps blood to lungs (pulmonary circulation)
- Left side pumps blood to body (systemic circulation)
- Both pumping actions occur simultaneously
- This ensures complete separation of oxygenated and deoxygenated blood, providing efficient oxygen supply to tissues

SECTION E - Answers to Case Study Based Questions

19. Case Study 1 - Heterotrophic Nutrition

(i) Difference between saprophytic and parasitic (1 mark):

Saprophytic nutrition involves obtaining food from dead and decaying organic matter (like fungi on dead leaves), while parasitic nutrition involves obtaining food from a living host organism without killing it immediately (like cuscuta on living plants). Saprophytes do not harm living organisms, whereas parasites

harm their hosts.

(ii) Longer digestive system in herbivores (1 mark):

Herbivorous animals eat plant material rich in cellulose, which is very difficult to digest. The longer digestive system, including a longer small intestine and sometimes additional chambers like rumen, provides more time and surface area for cellulose to be broken down completely by enzymes and bacteria.

(iii) Nutrition in cuscuta (2 marks):

How cuscuta obtains nutrition:

- Cuscuta (amar-bel) is a parasitic plant with yellow thread-like stems
- It has no leaves and cannot perform photosynthesis
- It wraps around the host plant and develops special structures called haustoria
- Haustoria penetrate into the stem tissues of the host plant
- Through haustoria, cuscuta absorbs water, minerals, and ready-made food from the host's phloem and xylem

Effect on host:

- The host plant becomes weak as its nutrients are being taken away
- Growth of the host plant is stunted
- The host's food production and storage are reduced
- Heavy infestation can even kill the host plant
- The host's yield and health are significantly affected

20. Case Study 2 - Kidney Function and Dialysis

(i) Filtration pressure (1 mark):

The filtration pressure in glomerulus is created by the high blood pressure with which blood enters the glomerular capillaries from the renal artery. This high pressure forces water and small dissolved substances through the thin capillary walls into Bowman's capsule.

(ii) Two reabsorbed substances (1 mark):

Two useful substances reabsorbed in the tubule are:

- Glucose (completely reabsorbed as it's needed for energy)
- Amino acids (completely reabsorbed as they're needed for protein synthesis)

(Other acceptable answers: water, salts/minerals)

(iii) Dialysis explanation (2 marks):

How dialysis works:

- An artificial kidney machine contains numerous tubes with semi-permeable membranes
- These tubes are suspended in a tank filled with dialyzing fluid
- The dialyzing fluid has the same composition as blood plasma but without nitrogenous wastes
- Patient's blood is pumped through these tubes
- Waste products (urea, uric acid, excess salts) diffuse from blood into the dialyzing fluid through the semi-permeable membrane
- The cleaned blood is then pumped back into the patient's body

Difference from normal kidney function:

- Dialysis only performs filtration based on concentration gradient; it does not involve selective reabsorption
- Normal kidneys filter about 180 liters daily and reabsorb most of it; dialysis doesn't have this reabsorption mechanism
- Dialysis must be done periodically (2-3 times per week) while kidneys work continuously
- Dialysis cannot regulate water balance and blood pressure as precisely as normal kidneys
- Normal kidneys also produce hormones; dialysis cannot perform this function

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