

CBSE CLASS X
Science (086)**ANSWER KEY***From previous CBSE Board Exam questions***Code: LBQ77T****Questions: 110****Maximum Marks: 205****Generated: 2026-06-15 13:05****SELECTIONS USED**

Source	Previous-year board
Subject	Science
Lessons	Life Processes
Year	2022-2026
Questions selected	110

Composition — Types: 38 MCQ · 27 Very short · 24 Short · 13 Assertion–reason · 6 Long · 4 source_based · 1 Case-based

Q1. § 5.2.1 Autotrophic Nutrition**[3]**

Answer the following:

- (i) What is the internal energy reserve in plants and animals ?
- (ii) How desert plants perform photosynthesis if their stomata remain closed during the day ?

Previously asked in: 2023 31/1/1 Q29(b)

♦ Life Processes Internal energy reserves in plants and animals (starch and glycogen)

Photosynthesis in desert plants with closed stomata (CAM pathway / stomata behaviour)

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- (i) The internal energy reserve in plants is **starch**, and in animals it is **glycogen**. These are used as sources of energy when needed.
- (ii) Desert plants keep their stomata closed during the day to prevent water loss. They take in CO₂ at **night** and store it in the form of organic compounds (as malic acid). During the day, this stored CO₂ is used for photosynthesis when sunlight is available, even though stomata remain closed.

Explanation

- (i) This is a direct factual point — starch (plants) and glycogen (animals) are the standard expected terms. One mark.
- (ii) This describes **CAM (Crassulacean Acid Metabolism)** plants, though the term is not required at this level. Key idea: CO₂ is absorbed at night → stored as organic acid → released during day for photosynthesis. Two marks — mention both the night CO₂ absorption and daytime use clearly.
- Note: The source passages provided do not cover these topics directly; these answers are based on NCERT Class 10 Life Processes (Chapter 6) standard textbook content.

Q2. § 5.2.1 Autotrophic Nutrition

[2]

List the events in proper sequence that take place during the process of photosynthesis.

Previously asked in: 2023 31/5/1 Q23 (a)

♦ Life Processes

Sequence of Events in Photosynthesis

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Model Answer

The following events take place during photosynthesis in sequence:

1. **Absorption of light energy** by chlorophyll.
2. **Conversion of light energy to chemical energy** and splitting of water molecules into hydrogen and oxygen.
3. **Reduction of carbon dioxide to carbohydrates.**

Source: Chapter 5, Section 5.2.1 Autotrophic Nutrition

Explanation

The examiner expects these three steps listed **in order** using the exact phrasing from the textbook. Writing them as a numbered list is ideal for a sequence-based question. Avoid mixing up step 2 and 3 — light reactions (splitting of water) come **before** carbon fixation (reduction of CO₂). Both marks are awarded for all three steps in correct sequence.

Q3. § 5.2.1 Autotrophic Nutrition

[2]

Two green plants are kept separately in oxygen free containers, one in the dark and other in sunlight. It was observed that plant kept in dark could not survive longer. Give reason for this observation.

Previously asked in: 2023 31/4/1 Q24

♦ Life Processes

Photosynthesis and Aerobic Respiration in Plants

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Model Answer

The plant kept in **dark** could not perform **photosynthesis** as sunlight is essential for it. Without photosynthesis, no carbohydrates (food) were produced. The plant used up all its stored starch for respiration and, with no energy reserve left, it could not survive longer. The plant in sunlight continued photosynthesis and stayed alive.

Source: Life Processes, Section 5.2.1 Autotrophic Nutrition

Explanation

- The key idea is that **sunlight is essential for photosynthesis**, which produces carbohydrates that serve as energy reserve (stored as starch).
- The plant in dark exhausts its stored starch through respiration with no way to replenish it — this is the direct cause of death.
- Mention both: *no photosynthesis* → *no food/energy* to get full marks. Saying only "no sunlight" without linking to energy/food loss will lose a mark.

Q4. § 5.2.1 Autotrophic Nutrition

[3]

(b) Write in sequence the steps for experimental verification of the fact that sunlight is essential for photosynthesis.

Previously asked in: 2023 31/2/1 Q29 (b)

♦ Life Processes

Experimental verification that sunlight is essential for photosynthesis

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Model Answer**Steps for experimental verification that sunlight is essential for photosynthesis:**

1. Take a healthy potted plant and keep it in a dark room for **three days** so that all existing starch is used up (destarch the plant).
2. Cover a portion of a leaf on both sides with **black paper strips** to block sunlight, while leaving the rest of the leaf exposed.
3. Place the plant in **bright sunlight for about six hours**.
4. Pluck the leaf; remove the black paper.
5. Boil the leaf in water, then in **alcohol** (using a water-bath) to remove chlorophyll.
6. Dip the leaf in **dilute iodine solution**.
7. **Observation:** The exposed (sunlit) area turns **blue-black** (starch present); the covered area remains brown (no starch).
8. **Conclusion:** Sunlight is essential for photosynthesis, as starch is produced only in areas that received light.

Source: Life Processes, Section 5.2.1 (Activity based on Activities 5.1 & 5.2)

Explanation

- Examiners expect the answer as **sequential steps** — destarching → partial covering → sunlight exposure → destaining in alcohol → iodine test → observation → conclusion.
- Key terms to include: **destarch, black paper, alcohol (chlorophyll removal), iodine test, blue-black colour**.
- The contrast between covered and uncovered portions is the core proof — always state both results.
- "Water-bath" for alcohol heating is a safety detail that can earn an extra half-mark.

Q5. § 5.2.1 Autotrophic Nutrition § 5.5 EXCRETION**[1]**

In the following diagram, identify the cells through which massive amounts of gaseous exchange takes place for photosynthesis :

- (a) I
- (b) IV
- (c) III
- (d) II

Previously asked in: 2023 31/2/1 Q9

♦ Life Processes

Gaseous exchange in leaves – stomata and mesophyll cells during photosynthesis

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Model Answer**(d) II**

The guard cells (region II) surround the stomatal pores, through which massive amounts of gaseous exchange takes place in leaves for the purpose of photosynthesis.

Source: Life Processes, Section 5.2.1

Explanation

The textbook states: *"Massive amounts of gaseous exchange takes place in the leaves through these pores (stomata) for the purpose of photosynthesis."* In a standard leaf cross-section diagram, label II typically points to the **stomatal pore/guard cells** region. Examiners expect you to link gaseous exchange directly to stomata, not to mesophyll or epidermal cells. Remember: guard cells control the opening and closing of stomatal pores.

Q6. § 5.2.1 Autotrophic Nutrition § 5.3 RESPIRATION

[5]

Design an experiment to demonstrate that carbon dioxide is essential for photosynthesis. Write the observation and conclusion of the experiment.

Previously asked in: 2024 31/5/1 Q35 (a)

♦ Life Processes

Role of Carbon Dioxide in Photosynthesis – Experiment Design, Observation and Conclusion

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Model Answer

Aim: To demonstrate that CO₂ is essential for photosynthesis.

Materials Required: Two healthy potted plants, two bell jars, two glass plates, watch-glass, potassium hydroxide (KOH), vaseline, iodine solution, alcohol.

Procedure:

1. Keep both potted plants in a dark room for three days to destarch them.
2. Place each plant on a separate glass plate. Place a watch-glass containing KOH beside **Plant A** (KOH absorbs CO₂). Leave no KOH beside **Plant B**.
3. Cover both plants with separate bell jars. Seal the base with vaseline to make the setup airtight.
4. Keep both plants in sunlight for two hours.
5. Pluck a leaf from each plant; boil in water, then in alcohol to remove chlorophyll. Test with iodine solution.

Observation:

- Leaf from **Plant A** (with KOH) — **no blue-black colour** with iodine (no starch formed).
- Leaf from **Plant B** (without KOH) — turns **blue-black** (starch present).

Conclusion: Plant A, deprived of CO₂, could not perform photosynthesis and hence produced no starch. This proves that **carbon dioxide is essential for photosynthesis**.

Source: Life Processes, Activity 5.2

Explanation

- Examiners expect a **named setup** (bell jar + KOH), a clear **control** (Plant B without KOH), and the **starch test** as the detection method.
- State observations for **both** plants separately — this earns dedicated marks.
- The conclusion must explicitly link absence of CO₂ → no starch → CO₂ essential for photosynthesis.
- KOH's role (absorbing CO₂) should be mentioned; it is a key detail that differentiates Plant A from Plant B.

Q7. § 5.2.1 Autotrophic Nutrition

[1]

The process in which transport of soluble products of photosynthesis takes place in plants is known as :

- (A) Transpiration
- (B) Evaporation
- (C) Conduction
- (D) Translocation

Previously asked in: 2024 31/5/1 Q6

♦ Life Processes

Translocation – Transport of Soluble Products of Photosynthesis

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Model Answer**(D) Translocation**

Translocation is the process by which soluble products of photosynthesis are transported in plants through phloem.

Explanation

The key term here is **translocation** — transport of food (soluble products of photosynthesis) through phloem. Students often confuse it with transpiration (loss of water) or conduction (transport of water/minerals through xylem). Remember: **xylem** → **water & minerals**; **phloem** → **food (translocation)**.

Q8. § 5.2.1 Autotrophic Nutrition

[1]

On the basis of the characteristics of the processes given in the brackets in each case, differentiate between the following :
Respiration and photosynthesis in plants (gas released)

Previously asked in: 2025 31/3/1 Q29 (b)

♦ Life Processes

Differentiation between Respiration and Photosynthesis (Gas Released)

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Model Answer

In **respiration**, CO₂ is released as a by-product of breaking down glucose. In **photosynthesis**, O₂ is released as a by-product when water molecules are split during the process.

Explanation

The examiner expects one clear contrasting line naming the gas released in each process. Respiration → releases CO₂; Photosynthesis → releases O₂. Avoid writing lengthy descriptions; just the gas and the process are enough for 1 mark.

Q9. § 5.1 WHAT ARE LIFE PROCESSES?

[4]

The maintenance functions of all living organisms must go on even when they are not doing anything particular. Even when we are just sitting in a class or even asleep, this maintenance job has to go on. These maintenance processes require energy to prevent damage and break-down of cells and tissues, which is obtained by the individual organism from the food prepared by the autotrophs, called producers.

Read the passage carefully and answer the questions that follow.

- (a) Name and define the process by which green plants prepare food. [1]
 (b) Write chemical equation involved in the above process. [1]
 (c) Answer the following : [2]

Previously asked in: 2025 31/1/1 Q38

♦ Life Processes

Photosynthesis – definition, process and chemical equation

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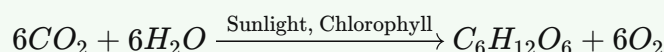
I notice sub-question (c) is incomplete — no actual question is stated under it. I will answer (a) and (b) fully, and note the issue for (c).

Model Answer

(a) The process is **Photosynthesis**.

It is the process by which green plants (autotrophs) use sunlight, carbon dioxide, and water to prepare food (glucose) in the presence of chlorophyll.

(b) Chemical equation for photosynthesis:



(c) The sub-question (c) appears to be **incomplete/missing** in the paper as provided — no question text follows "Answer the following." Please check the original question paper and re-submit the missing part so it can be answered correctly.

Source: *Life Processes, Chapter 6 (Class 10 Science, NCERT)*

Explanation

- (a) Examiners want the **name + one-line definition** of photosynthesis. Mention raw materials (CO₂, H₂O), energy source (sunlight), and site (chlorophyll).
- (b) Write the **balanced chemical equation** with reactants, products, and conditions (sunlight/chlorophyll) shown above the arrow. Losing the balance or omitting conditions costs marks.
- (c) Since the question text is missing, no answer can be given. In an exam, if a question is partially printed, inform the invigilator — never leave it blank without attempting what is visible.

Q10. § 5.2.1 Autotrophic Nutrition

[4]

Not all plants carry out photosynthesis by the same mechanism. In most plants, it depends directly on gaseous carbon dioxide that diffuses into the leaf. However, some plants can store carbon dioxide in the vacuole of the leaf cells as part of a complex carbon compound. This compound is transported to the chloroplast and releases carbon dioxide when required for photosynthesis. This special mechanism is believed to have evolved as an adaptation in such plants which do not open stomata during the daytime to conserve water for survival in dry conditions (desert conditions).

Read the following passage and answer the questions that follow :

- (a) Attempt either (a) or (b) : (a) (i) Which process in these plants is minimised to help the plants survive in dry conditions ? (ii) Which part of the leaf is responsible for exchange of gases during photosynthesis ? [4]

Previously asked in: 2026 31/3/1 Q15

♦ Life Processes

CAM/C4 photosynthesis – CO₂ storage and transpiration minimisation in dry conditions

Photosynthesis – stomata and gas exchange

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Model Answer

(i) In these plants (desert plants), **transpiration** is minimised to help them survive in dry conditions. They do not open their stomata during the daytime, which reduces water loss through transpiration, enabling survival in desert conditions.

(ii) The **stomata** (stomatal pores) present on the surface of the leaf are responsible for the exchange of gases during photosynthesis. Carbon dioxide enters and oxygen exits through these tiny pores. In most plants, stomata open during the day, allowing CO₂ to diffuse directly into the leaf for photosynthesis.

Source: *Life Processes, Nutrition — Photosynthesis section*

Explanation

- (i): The passage clearly states these plants "do not open stomata during daytime to conserve water." Stomata closing = less transpiration. Examiners expect the word **transpiration** specifically.
- (ii): This is standard textbook knowledge linked to the passage — stomata are the gas-exchange structures. Even though the passage focuses on the special mechanism, the question asks about gas exchange in general during photosynthesis.
- Always quote or paraphrase the passage directly in source-based questions to show you've read it carefully.

Q11. § 5.2.1 Autotrophic Nutrition

[1]

The following events occur during the process of photosynthesis. Choose the option that indicates the correct events.

- (i) Oxidation of carbon dioxide to carbohydrates
- (ii) Conversion of light energy into chemical energy
- (iii) Absorption of light energy by chlorophyll
- (iv) Conversion of hydrogen and oxygen into water

- (A) (i) and (ii)
- (B) (ii) and (iii)
- (C) (iii) and (iv)
- (D) (i) and (iv)

Previously asked in: 2026 31/2/1 Q5

♦ Life Processes

Photosynthesis – correct sequence of events

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Model Answer

(B) (ii) and (iii)

The correct events are: (iii) Absorption of light energy by chlorophyll, and (ii) Conversion of light energy to chemical energy (along with splitting of water into hydrogen and oxygen). Carbon dioxide is **reduced** (not oxidised) to carbohydrates, and water is **produced by splitting**, not formed from hydrogen and oxygen.

Source: Life Processes, Section 5.2.1

Explanation

The textbook explicitly lists the three events of photosynthesis: absorption of light by chlorophyll, conversion of light energy to chemical energy + splitting of water, and **reduction** of CO₂ to carbohydrates. Statement (i) is wrong because CO₂ is reduced, not oxidised. Statement (iv) is wrong because water is split *into* hydrogen and oxygen, not formed *from* them. Examiners expect students to know these distinctions precisely.

Q12. § 5.2.1 Autotrophic Nutrition

[1]

The carbohydrates, which are not used immediately in plants, are stored in the form of 'a', which serves as an internal energy reserve. What does 'a' stand for ?

- (A) Starch
- (B) Sugar
- (C) Fat
- (D) Protein

Previously asked in: 2026 31/2/1 Q4

♦ Life Processes

Storage of carbohydrates as starch in plants

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Model Answer**(A) Starch**

Carbohydrates not used immediately by plants are stored in the form of **starch**, which serves as the internal energy reserve.

Source: Life Processes, Section 5.2.1 Autotrophic Nutrition

Explanation

The passage directly states: *"The carbohydrates which are not used immediately are stored in the form of starch, which serves as the internal energy reserve."* This is a direct recall question — just identify 'starch' as the correct option. Glycogen (not starch) is the storage form in animals, so don't confuse the two.

Q13. § 5.2.1 Autotrophic Nutrition § 5.2.3 How do Organisms obtain their Nutrition?

[1]

Which structure in a leaf is mainly responsible for gaseous exchange ?

- A Xylem
- B Stomata
- C Phloem
- D Cuticle

Previously asked in: 2026 31/1/1 Q1

♦ Life Processes

Gaseous exchange in plants (stomata)

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Model Answer**B. Stomata**

Stomata are tiny pores present on the surface of leaves through which massive amounts of gaseous exchange takes place.

Explanation

The source passage (Chapter 5, Section 5.2.1) explicitly states that "Massive amounts of gaseous exchange takes place in the leaves through these pores (stomata)." Xylem transports water, phloem transports food, and the cuticle prevents water loss — none are responsible for gaseous exchange.

Q14. § 5.3 RESPIRATION

[1]

Observe the figure given below and identify the incorrect step for the activity set-up :

- (A) Both plants are kept in the dark room for three days before placing them in separate glass jars.
- (B) Both plants are covered with separate wooden bell-jars.
- (C) Use vaseline to seal the bottom of the jars with the glass plates.
- (D) Both potted plants were kept in sunlight for a few hours before the iodine test for the presence of starch.

Previously asked in: 2026 31/3/1 Q2

♦ Life Processes

Experimental verification that sunlight is essential for photosynthesis

Photosynthesis – correct sequence of events

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Model Answer**(B) Both plants are covered with separate wooden bell-jars.**

The incorrect step is option (B). The setup uses **glass** bell-jars, not wooden ones. Wooden bell-jars would block sunlight, preventing photosynthesis, making the experiment invalid.

Explanation

This question is from the photosynthesis experiment (testing for starch). The bell-jars must be **transparent (glass)** so that sunlight can reach the plants. One jar contains KOH to absorb CO₂ (plant I – no photosynthesis), while plant II serves as control. All other options (A, C, D) describe correct steps. Examiners expect students to identify "wooden" as the error, since wood is opaque.

Q15. § 5.2.2 Heterotrophic Nutrition

[1]

Observe the given figure and select the statement that correctly states how these fungi obtain nutrition.

- (A) By eating the bread on which it is growing.
- (B) By using nutrients from the bread to prepare their own food.
- (C) By breaking down the nutrients of bread outside the body and then absorbing them.
- (D) By allowing other organisms to grow on the bread and then consuming them.

Previously asked in: 2026 31/4/1 Q1

♦ Life Processes

Nutrition in Heterotrophs (Saprophytic Nutrition)

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Model Answer**(C) By breaking down the nutrients of bread outside the body and then absorbing them.****Explanation**

The textbook (Chapter 5, Section 5.2.2) explicitly states: *"Some organisms break down the food material outside the body and then absorb it. Examples are fungi like bread moulds, yeast and mushrooms."* This is the key fact examiners expect. Options A, B, and D are incorrect — fungi are not autotrophs, do not eat, and do not consume other organisms.

Source: Chapter 5, Section 5.2.2 — Heterotrophic Nutrition

Q16. § 5.2.3 How do Organisms obtain their Nutrition?**[1]**

Assertion (A) : Amoeba takes in food using finger like extensions of the cell surface.

Reason (R) : In all unicellular organisms, the food is taken in by the entire cell surface.

- (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of (A).
- (b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of (A).
- (c) Assertion (A) is true, but Reason (R) is false.
- (d) Assertion (A) is false, but Reason (R) is true.

Previously asked in: 2023 31/6/1 Q19

♦ Life Processes

Nutrition in Amoeba – Pseudopodia and Food Ingestion

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Model Answer

(c) Assertion (A) is true, but Reason (R) is false.

Amoeba does use finger-like extensions (pseudopodia) to take in food, but not all unicellular organisms take in food by the entire surface — Paramecium, for example, takes in food at a specific spot.

Explanation

- **A is true:** The passage explicitly states "Amoeba takes in food using temporary finger-like extensions of the cell surface."
- **R is false:** The passage says food *may* be taken in by the entire surface in single-celled organisms, but Paramecium (also unicellular) takes food in at a specific spot — disproving the absolute claim in R.
- Examiners expect you to spot the word "all" in the Reason as the flaw; generalisations like "all unicellular organisms" are often incorrect in assertion-reason questions.

Q17.**[1]**

In the given diagram of a closed stomata : (1), (2), (3) and (4) respectively are

- (a) nucleus, chloroplast, guard cell, vacuole
- (b) nucleus, chloroplast, vacuole, guard cell
- (c) chloroplast, nucleus, vacuole, guard cell
- (d) vacuole, guard cell, nucleus, chloroplast

Previously asked in: 2023 31/6/1 Q5

♦ Life Processes

Structure of Stomata (Guard Cells, Stoma, Epidermal Cells)

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Model Answer

(b) nucleus, chloroplast, vacuole, guard cell

In a closed stoma, (1) nucleus, (2) chloroplast, (3) vacuole, and (4) guard cell are the correct labels respectively.

Explanation

In a standard diagram of stomata, the guard cells are the outermost bean-shaped structures (label 4), with the nucleus, chloroplast, and vacuole visible inside them. When the stoma is **closed**, the vacuoles are small (less turgid). Memorise the internal-to-external order: nucleus → chloroplast → vacuole → guard cell. Option (b) follows this standard labelling pattern used in NCERT Life Processes diagrams.

Q18. § 5.2.3 How do Organisms obtain their Nutrition? § 5.2.4 Nutrition in Human Beings

[1]

Consider the following statements about small intestine and select the one which is NOT correct :

- (a) The length of the small intestine in animals differs as it depends on the type of food they eat.
- (b) The small intestine is the site of complete digestion of food.
- (c) The small intestine receives secretions from liver and pancreas.
- (d) The villi of the small intestine absorb water from the unabsorbed food before it gets removed from the body via the anus.

Previously asked in: 2023 31/1/1 Q9

♦ Life Processes

Small Intestine – Structure and Function

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Model Answer

(d) is NOT correct. Water is absorbed from unabsorbed food in the **large intestine**, not the villi of the small intestine.

Source: Life Processes, Section 5.2.4

Explanation

The passage clearly states: *"The unabsorbed food is sent into the large intestine where its wall absorb more water from this material."* The villi of the small intestine function in **absorption of digested food**, not water from unabsorbed waste. Examiners expect you to distinguish between the roles of the small intestine (digestion + absorption of nutrients) and the large intestine (water absorption from undigested matter).

Q19. § 5.2.1 Autotrophic Nutrition**[1]**

A stomata closes when :

- (i) it needs carbon dioxide for photosynthesis.
- (ii) it does not need carbon dioxide for photosynthesis.
- (iii) water flows out of the guard cells.
- (iv) water flows into the guard cells.

The correct reason(s) in this process is/are :

- (a) (i) only
- (b) (i) and (iii)
- (c) (ii) and (iii)
- (d) (ii) and (iv)

Previously asked in: 2024 31/1/1 Q11

♦ Life Processes

Stomata: Opening and Closing Mechanism (Guard Cells)

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Model Answer**(c) (ii) and (iii)**

A stoma closes when the plant **does not need CO₂ for photosynthesis**, and when **water flows out of the guard cells**, causing them to shrink.

Source: Life Processes, Section 5.2.1

Explanation

The textbook clearly states: "the plant closes these pores when it does not need carbon dioxide for photosynthesis" and "the pore closes if the guard cells shrink" (which happens when water flows **out**). Option (iv) is wrong — water flowing **in** causes the pore to **open**, not close.

Q20. § 5.2.3 How do Organisms obtain their Nutrition?**[1]**

Listed below are the steps of nutrition in Amoeba. Select the correct sequence of these steps :

- (i) Diffusion of simple nutrients into cytoplasm
- (ii) Food vacuole formation
- (iii) Formation of finger like temporary extensions of cell surface
- (iv) Complex substances broken to simpler ones
- (v) Undigested material thrown out of the cell surface

A (iv), (i), (ii), (iii), (v)

B (iii), (ii), (iv), (i), (v)

C (ii), (i), (iv), (v), (iii)

D (iii), (iv), (i), (ii), (v)

Previously asked in: 2025 31/5/1 Q8

♦ Life Processes

Nutrition in Amoeba – steps of holozoic nutrition (pseudopodia, food vacuole, digestion, absorption, egestion)

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Model Answer

Answer: B — (iii), (ii), (iv), (i), (v)

Correct sequence: finger-like extensions form → food vacuole forms → complex substances broken down → simple nutrients diffuse into cytoplasm → undigested material thrown out.

Explanation

The passage clearly states the order: temporary finger-like extensions fuse over food → food vacuole forms → complex substances broken to simpler ones inside the vacuole → diffuse into cytoplasm → undigested material thrown out. Option B matches this exactly. Students often confuse steps (iv) and (i) — digestion (iv) must happen *before* diffusion (i) can occur.

Q21. § 5.4 TRANSPORTATION

[1]

Assertion (A) : The walls of atria are thicker than those of the ventricles.

Reason (R) : Ventricles have to pump blood into various organs at high pressure.

- (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
- (b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
- (c) Assertion (A) is true, but Reason (R) is false.
- (d) Assertion (A) is false, but Reason (R) is true.

Previously asked in: 2023 31/5/1 Q19

♦ Life Processes

Structure of the Heart – Atria and Ventricles

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Model Answer

(d) Assertion (A) is false, but Reason (R) is true.

The Assertion is false — ventricles have **thicker** walls than atria. The Reason is true — ventricles pump blood to various organs at high pressure.

Source: Chapter 5, Section 5.4.1 (Transportation in Human Beings)

Explanation

The textbook clearly states: "*ventricles have to pump blood into various organs, they have thicker muscular walls than the atria do.*" So the Assertion incorrectly swaps the relationship — it's the ventricles that are thick-walled, not the atria. The Reason correctly explains *why* ventricles need thick walls. Hence option **(d)** is correct.

Q22. § 5.2.3 How do Organisms obtain their Nutrition? § 5.2.4 Nutrition in Human Beings

[1]

Assertion (A) : The inner walls of the small intestine have finger like projections called villi which are rich in blood.

Reason (R) : These villi have a large surface area to help the small intestine in completing the digestion of food.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A).
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A).
- (c) (A) is true but (R) is false.
- (d) (A) is false but (R) is true.

Previously asked in: 2023 31/4/1 Q19

♦ Life Processes

Villi in Small Intestine – Structure and Function in Absorption

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Model Answer

(c) (A) is true but (R) is false.

Assertion is correct — villi are finger-like projections richly supplied with blood vessels. However, the Reason is false — villi increase surface area for **absorption** of digested food, not for completing digestion.

Explanation

The textbook clearly states: "*The inner lining of the small intestine has numerous finger-like projections called villi which increase the surface area for **absorption**.*" Digestion is completed by intestinal enzymes in the intestinal juice — villi play no role in digestion itself. Examiners specifically test this distinction between absorption and digestion. Always check whether the Reason correctly explains the Assertion and is factually accurate.

Q23. § 5.2.1 Autotrophic Nutrition § 5.2.4 Nutrition in Human Beings**[1]**

The opening and closing of stomata is regulated by :

- (A) CO₂ concentration in stomata
- (B) Temperature in guard cells
- (C) O₂ concentration in stomata
- (D) Amount of water in guard cells

Previously asked in: 2025 31/2/1 Q6

♦ Life Processes Regulation of stomatal opening and closing by guard cells

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Model Answer

(D) Amount of water in guard cells

The guard cells swell when water flows into them, causing the stomatal pore to open, and close when guard cells shrink (lose water).

Source: Chapter 5, Section 5.2.1 Autotrophic Nutrition

Explanation

The passage explicitly states: "The guard cells swell when water flows into them, causing the stomatal pore to open. Similarly the pore closes if the guard cells shrink." Examiners expect you to recall that it is the **turgidity/flaccidity of guard cells** (due to water content) that regulates stomatal movement — not CO₂, O₂, or temperature directly.

Q24. § 5.2.3 How do Organisms obtain their Nutrition?**[2]**

Give a diagrammatic representation of nutrition in Amoeba.

Previously asked in: 2026 31/5/1 Q10

♦ Life Processes

Nutrition in Amoeba (Holozoic Nutrition / Phagocytosis)

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Model Answer**Nutrition in Amoeba (Fig. 5.5):**

...

Food particle

↓

Pseudopodia extend → surround food → Food-vacuole formed

↓

Digestion inside vacuole (complex → simple substances)

↓

Simple substances diffuse into cytoplasm

↓

Undigested material expelled out of cell

...

The temporary finger-like extensions (**pseudopodia**) engulf the food particle, forming a **food-vacuole** where digestion occurs.

Source: Chapter 5, Section 5.2.3

Explanation

- CBSE expects a **labelled diagram** (even a rough schematic) showing the steps: pseudopodia formation → food-vacuole → digestion → diffusion → egestion.
- Key terms to include: **pseudopodia**, **food-vacuole**, **cytoplasm**, **diffusion**.
- Since the actual textbook figure (Fig. 5.5) cannot be drawn in text, showing a sequential flow diagram with labels earns full marks.
- Do not confuse Amoeba's nutrition with Paramecium (which uses cilia at a fixed spot).

Q25.

[1]

Identify the part that controls the closing and opening of the stomatal pore in leaves of plants. Select the correct option.

- (A) Stomata
- (B) Epidermal cells
- (C) Guard cells
- (D) Chloroplasts

Previously asked in: 2026 31/5/1 Q1

♦ Life Processes

Stomata – Guard Cells and Opening/Closing of Stomatal Pore

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Model Answer

(C) Guard cells

Guard cells control the opening and closing of the stomatal pore by changing their water content, causing them to swell or shrink.

Explanation

Guard cells are specialised cells surrounding each stoma. They regulate stomatal movement by changing their turgidity. Epidermal cells form the outer covering; chloroplasts are organelles involved in photosynthesis. Stomata is the pore itself, not the controlling structure. Examiners expect students to distinguish between the pore (stomata) and the cells that regulate it (guard cells).

Q26.

§ 5.2.4 Nutrition in Human Beings

[2]

Give the name of the enzyme present in the fluid in our mouth cavity. State the gland which produces it. What would happen to the digestion process if this gland stops secreting this enzyme ?

Previously asked in: 2023 31/6/1 Q23

♦ Life Processes

Salivary amylase and role of salivary glands in digestion

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Model Answer

The enzyme present in saliva (the fluid in the mouth cavity) is **salivary amylase**. It is produced by the **salivary glands**.

If the salivary glands stop secreting this enzyme, starch would not be broken down into simple sugars in the mouth. Digestion of carbohydrates would be delayed, beginning only from the small intestine.

Source: Life Processes, Section 5.2.4

Explanation

- The question has three parts — name the enzyme, name the gland, state the consequence — so address all three clearly.
- "Salivary amylase" and "salivary glands" are the exact terms from the textbook; use them.
- For the consequence, note that starch digestion would not begin in the mouth, but it is not completely stopped (pancreatic amylase in the small intestine can still act) — so say digestion is *delayed/incomplete at this stage*, not fully absent.

Q27. § 5.2.3 How do Organisms obtain their Nutrition? § 5.3 RESPIRATION § 5.4 TRANSPORTATION

[3]

Answer the following :

- (i) Name the movements that occur all along the gut in human digestive system. How do they help in digestion ?
- (ii) Where is bile juice stored in human body ? List two roles of bile juice.

Previously asked in: 2024 31/2/1 Q29(b)

♦ Life Processes

Bile juice – storage and functions

Peristaltic movements in the gut

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Model Answer

(i) The movements that occur all along the gut are called **peristaltic movements**. The muscular walls of the alimentary canal contract and relax alternately, pushing the food forward. This helps in thorough mixing of food with digestive juices and moves it along the digestive tract for complete digestion and absorption.

(ii) Bile juice is stored in a sac-like organ called the **gall bladder**.

Two roles of bile juice:

1. It makes the acidic food coming from the stomach **alkaline**, so that pancreatic enzymes can act on it.
2. It **emulsifies fats** — breaks large fat globules into smaller droplets, increasing the surface area for enzyme action.

Explanation

- "Peristalsis/peristaltic movements" is the exact term examiners expect for (i) — always name it, then explain the mechanism and its role.
- For (ii), both parts are needed: storage location (gall bladder) + two distinct roles. Emulsification of fats and making the medium alkaline are the two standard points from the NCERT Life Processes chapter. Writing "helps in digestion of fats" alone is too vague — specify *emulsification*.

Q28. § 5.2.4 Nutrition in Human Beings**[1]**

In human alimentary canal, the digestive juice secreted by the gastric glands are

- (A) Bile, Trypsin, Pepsin
- (B) Hydrochloric acid, Pepsin, Mucus
- (C) Lipase, Bile, Mucus
- (D) Salivary amylase, Pepsin, Bile

Previously asked in: 2025 31/6/1 Q12

♦ Life Processes

Gastric Glands and Digestive Juices in the Human Alimentary Canal

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Model Answer**(B) Hydrochloric acid, Pepsin, Mucus**

The gastric glands in the stomach wall release hydrochloric acid, a protein-digesting enzyme called pepsin, and mucus.

Source: Life Processes, Section 5.2.4

Explanation

The passage clearly states: *"These release hydrochloric acid, a protein digesting enzyme called pepsin, and mucus."* Bile is secreted by the liver (not gastric glands), trypsin and lipase come from the pancreas, and salivary amylase is from salivary glands — so options A, C, and D are wrong. Always associate gastric glands specifically with HCl + pepsin + mucus.

Q29. § 5.2.4 Nutrition in Human Beings § 5.3 RESPIRATION**[3]**

Answer the following :

- (a) With the help of an activity, explain the action of saliva on the food we eat.
- (b) Why is bile juice important in the process of digestion ?

Previously asked in: 2023 31/5/1 Q29

♦ Life Processes

Action of saliva on starch (salivary amylase activity)

Role of bile juice in digestion

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Model Answer

(a) Activity: Take a small piece of bread and chew it for 2-3 minutes without swallowing. Initially it has no taste, but after some time it starts to taste sweet.

This happens because saliva contains an enzyme called **salivary amylase (ptyalin)** which breaks down starch present in the bread into simple sugars (maltose). This shows that saliva acts on the starch in food and begins its chemical digestion in the mouth.

(b) Bile juice is secreted by the liver and stored in the gall bladder. It does not contain any digestive enzymes but is important because it makes the acidic food coming from the stomach **alkaline**, so that pancreatic enzymes can act on it. It also helps in the **emulsification of fats**, breaking large fat globules into smaller droplets, which increases the surface area for enzyme action.

Explanation

- For part (a), the examiner expects a named activity (chewing bread/starch) + naming salivary amylase + stating starch → sugar. This is a standard 2-mark activity-based answer.
- For part (b), two key points must be mentioned: (i) making medium alkaline and (ii) emulsification of fats. Missing either loses a mark.
- Do not confuse bile with pancreatic juice — bile has **no digestive enzymes**.

Q30.**[1]**

Opening and closing of stomata is due to :

- (a) High pressure of gases inside the cells.
- (b) Movement of water in and out of the guard cells.
- (c) Stimulus of light in the guard cells.
- (d) Diffusion of CO₂ in and out of the guard cells.

Previously asked in: 2023 31/4/1 Q9

♦ Life Processes

Opening and closing of stomata

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Model Answer

(b) Movement of water in and out of the guard cells.

Explanation

When guard cells absorb water, they become turgid and stomata open; when they lose water, they become flaccid and stomata close. This is the standard NCERT explanation for stomatal movement.

Q31. § 5.2.4 Nutrition in Human Beings

[1]

Sphincter muscles are present at the exit of :

- (a) Stomach and small intestine
- (b) Stomach and anus
- (c) Small intestine and large intestine
- (d) Oesophagus and stomach

Previously asked in: 2023 31/2/1 Q8

♦ Life Processes

Sphincter Muscles in the Digestive System

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Model Answer**(b) Stomach and anus**

The exit of food from the stomach is regulated by a **sphincter muscle**, and the exit of waste material from the body is regulated by the **anal sphincter**.

Explanation

The passage explicitly mentions two sphincter muscles: one at the exit of the stomach (regulating food entering the small intestine) and the anal sphincter (regulating removal of waste via the anus). No sphincter is mentioned at the oesophagus, small intestine, or large intestine junction in this context. Always look for exact terminology in the source text for MCQs.

Source: Life Processes, Section 5.2.4

Q32. § 5.2.4 Nutrition in Human Beings

[1]

The gastric glands present in the wall of the stomach release :

- (A) Mucus and Trypsin
- (B) Pepsin and Trypsin
- (C) Mucus and Pepsin
- (D) Pepsin and Salivary amylase

Previously asked in: 2025 31/3/1 Q10

♦ Life Processes

Gastric glands and secretions in the stomach

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Model Answer**(C) Mucus and Pepsin**

The gastric glands in the stomach wall release hydrochloric acid, **pepsin** (a protein-digesting enzyme), and **mucus**.

Source: Life Processes, section 5.2.4

Explanation

The passage clearly states: "*These release hydrochloric acid, a protein digesting enzyme called pepsin, and mucus.*" Trypsin is secreted by the **pancreas**, not the stomach. Salivary amylase is released by the salivary glands. Mucus protects the stomach lining, and pepsin digests proteins — both come from gastric glands, making **(C)** correct.

Q33. § 5.2.4 Nutrition in Human Beings

[1]

Secretion of less saliva in mouth will effect the conversion of :

- (A) proteins into amino acids
- (B) fats into fatty acids and glycerol
- (C) starch into simple sugars
- (D) sugars into alcohol

Previously asked in: 2025 31/1/1 Q8

♦ Life Processes Role of Saliva in Digestion – Conversion of Starch to Sugar

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Model Answer**(C) starch into simple sugars**

Saliva contains the enzyme **salivary amylase** which breaks down starch into simple sugars. Less saliva means less amylase, so starch digestion in the mouth is affected.

Source: Life Processes, Section 5.2.4

Explanation

The passage clearly states: *"The saliva contains an enzyme called salivary amylase that breaks down starch... to give simple sugar."* Proteins are digested by pepsin (stomach) and trypsin (small intestine); fats by lipase (small intestine). Option (D) is fermentation by yeast — not a digestive process. Examiners expect you to directly link saliva → salivary amylase → starch digestion.

Q34. § 5.2.3 How do Organisms obtain their Nutrition? § 5.2.4 Nutrition in Human Beings

[1]

Assertion (A) : The peristaltic movements occur all along the gut.

Reason (R) : The lining of the gut has muscles that contract rhythmically to push the food in regulated manner.

- (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
- (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
- (C) Assertion (A) is true, but Reason (R) is false.
- (D) Assertion (A) is false, but Reason (R) is true.

Previously asked in: 2026 31/5/1 Q9

♦ Life Processes Peristaltic movements and muscular lining of the gut

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Model Answer

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).

Explanation

The textbook states: *"The lining of canal has muscles that contract rhythmically in order to push the food forward. These peristaltic movements occur all along the gut."* — R directly explains why A is true, making option (A) correct.

Q35. § 5.2.1 Autotrophic Nutrition § 5.3 RESPIRATION

[5]

Option (A):

- (a) Draw a labelled diagram showing open and closed stomatal pore.
- (b) List the main events that occur during the process of photosynthesis.
- (c) Write a balanced chemical equation showing photo-synthesis in plants.

Previously asked in: 2026 31/4/1 Q16 (A)

♦ Life Processes

Photosynthesis (autotrophic nutrition)

Stomata and gaseous exchange

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Model Answer**(a) Labelled diagram of stomatal pore:**

` ` `

Guard cell Guard cell

\ /

===== [OPEN PORE] =====

(Chloroplasts present in guard cells)

===== [CLOSED PORE] =====

| |

Guard cell Guard cell

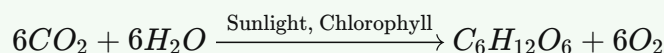
(flaccid) (flaccid)

` ` `

(Draw two kidney-shaped guard cells — one pair showing an open pore between them, another pair tightly pressed together showing a closed pore. Label: guard cells, stomatal pore, epidermal cells.)

(b) Main events during photosynthesis:

- Absorption of light energy** by chlorophyll present in chloroplasts.
- Splitting of water molecules** (photolysis) into hydrogen and oxygen using light energy; oxygen is released as a by-product.
- Conversion of CO₂ into glucose** (carbon fixation) using the absorbed light energy and hydrogen from water.

(c) Balanced chemical equation for photosynthesis:

Carbon dioxide + Water → Glucose + Oxygen

Explanation

- For **(a)**: Draw clearly; examiners award marks for correct labels — guard cells, stomatal pore, epidermal cells — and showing both open and closed states. Neat diagrams score full marks even without artistic perfection.
- For **(b)**: Three events (absorption of light, photolysis of water, carbon fixation/glucose formation) are the key points examiners look for. Mentioning chlorophyll and chloroplasts adds accuracy.

- For (c): The equation must be balanced (6CO_2 , $6\text{H}_2\text{O}$, $\text{C}_6\text{H}_{12}\text{O}_6$, 6O_2) and must show sunlight and chlorophyll as conditions above the arrow. Missing conditions or an unbalanced equation loses marks.

Q36. § 5.2.4 Nutrition in Human Beings § 5.3 RESPIRATION

[1]

The pH of the gastric juices released during digestion is :

- (A) Less than 7
- (B) More than 7
- (C) Equal to 7
- (D) Equal to 0

Previously asked in: 2026 31/2/1 Q21

♦ Life Processes

Gastric glands and secretions in the stomach

Role of Hydrochloric Acid in digestion

pH of gastric juice

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Model Answer

(A) Less than 7

Gastric glands release hydrochloric acid (HCl) during digestion, making the gastric juice acidic. Any acidic solution has a pH less than 7.

Explanation

The passage states that gastric glands release **hydrochloric acid**, which creates an acidic medium for pepsin to act. Acidic solutions always have $\text{pH} < 7$. Option (D) — $\text{pH} = 0$ — is incorrect as pure HCl is $\text{pH} 0$ but gastric juice is dilute acid, not pure acid. Examiners expect you to simply select (A) and may ask for a one-line justification.

Q37. § 5.3 RESPIRATION**[5]**

Answer the following parts:

- (i) In the experimental set-up shown above in diagram (I) atmospheric air is being passed into lime water with a syringe while in diagram (II) air is being exhaled into lime water. The time taken for the lime water to turn milky in both the test tubes is different. Give reason. [3]
- (ii) Draw the diagram of an open stomatal pore and label (I) Guard cells, and (II) Chloroplast on it. Mention two functions performed by stomata. [2]

Previously asked in: 2024 31/5/1 Q35 (b)

♦ Life Processes

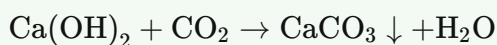
CO₂ concentration in atmospheric air vs exhaled air – lime water experiment

Stomata – structure, guard cells, chloroplast, and functions

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Model Answer

- (i) Exhaled air contains a much higher concentration of CO₂ (about 4%) compared to atmospheric air (about 0.04%). Lime water turns milky due to the reaction:



Since exhaled air has approximately 100 times more CO₂ than atmospheric air, the lime water in diagram (II) turns milky **much faster** than in diagram (I). The syringe in diagram (I) pushes in air with very little CO₂, so it takes considerably longer for the lime water to turn milky.

(ii)

Diagram of Open Stomatal Pore:

...

[Guard Cell] [Guard Cell]

(I) (I)

| • • • | | • • • |

| Chloroplast | | Chloroplast |

| ____ (II) ____ | PORE | ____ (II) ____ |

←— Stomatal opening —→

...

(Label: (I) Guard cells, (II) Chloroplast)

Two functions of stomata:

1. Exchange of gases (CO₂ and O₂) between the plant and the atmosphere.
2. Transpiration — loss of water vapour through stomatal pores.

Source: Life Processes, Chapter 5, Section 5.3

Explanation

- For part (i), the key idea is the **difference in CO₂ concentration** between atmospheric and exhaled air. Examiners expect you to state this clearly and may award marks for the chemical equation of lime water turning milky.

- For part (ii), draw a simple neat diagram showing two bean-shaped guard cells with dots representing chloroplasts inside them and a pore between them. Labels must be clear. The two functions (gas exchange and transpiration) are standard textbook points — both must be stated to get full marks.

Q38. § 5.4 TRANSPORTATION**[3]**

Explain the process of transport of oxygenated and deoxygenated blood in a human body.

Previously asked in: 2023 31/6/1 Q27

♦ Life Processes

Double Circulation in Humans

Transport of Oxygenated and Deoxygenated Blood in Humans

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Oxygenated blood from the lungs enters the **left atrium**. When the left atrium contracts, blood moves to the **left ventricle**, which then pumps it to the rest of the body through arteries.

Transport of Deoxygenated Blood:

Deoxygenated blood from the body enters the **right atrium**. It then passes to the **right ventricle**, which pumps it to the **lungs** for oxygenation.

This is called **double circulation** — blood passes through the heart twice in one complete cycle. The separation of oxygenated and deoxygenated blood ensures a highly efficient supply of oxygen to the body.

Source: *Life Processes, Section 5.4.1*

Explanation

- Examiners expect you to trace **both pathways** clearly: lungs → left side → body, and body → right side → lungs.
- Mention the **chambers** (atria and ventricles) by name — this fetches marks.
- The term **double circulation** is a key term that must appear for full marks.
- Avoid writing long paragraphs; two short labelled sections (oxygenated/deoxygenated) make the answer neat and easy to evaluate.

Q39. § 5.4 TRANSPORTATION**[2]**

Name the type of blood (oxygenated / deoxygenated) transported by each of the following mentioning the path (i.e. from one organ (which place) to another (which place)).

(i) Vena cava

(ii) Pulmonary artery

Previously asked in: 2023 31/1/1 Q23(a)

♦ Life Processes

Blood vessels and types of blood transported (Vena cava and Pulmonary artery)

Human circulatory system – double circulation

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Model Answer

(i) **Vena cava** — Transports **deoxygenated blood** from the body (various organs/tissues) to the right atrium of the heart.

(ii) **Pulmonary artery** — Transports **deoxygenated blood** from the right ventricle of the heart to the lungs for oxygenation.

Source: Life Processes, Section 5.4.1

Explanation

- The key point examiners look for: **both vessels carry deoxygenated blood** — a common mistake is assuming arteries always carry oxygenated blood. The pulmonary artery is the exception.
- Always mention **source** → **destination** (path) for full marks; naming only the blood type gives half credit.
- "Vena cava is a vein → carries blood *to* the heart; pulmonary artery carries blood *away from* the heart to lungs" — this logic confirms direction.

Q40. § 5.4 TRANSPORTATION**[1]**

Assertion (A) : Blood clotting prevents excessive loss of blood.

Reason (R) : Blood clotting is due to blood plasma and white blood cells present in the blood.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A).
- (b) Both (A) and (R) are true, but (R) is not the correct explanation of (A).
- (c) (A) is true, but (R) is false.
- (d) (A) is false, but (R) is true.

Previously asked in: 2023 31/1/1 Q19

♦ Life Processes

Blood Clotting and Components of Blood

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Model Answer**(c) (A) is true, but (R) is false.**

Assertion is correct — blood clotting does prevent excessive blood loss. However, clotting is caused by **platelets** (thrombocytes), not by plasma and white blood cells (WBCs).

Source: Life Processes, Section 5.4.1 (Maintenance by platelets)

Explanation

The textbook clearly states: *"the blood has platelet cells which circulate around the body and plug these leaks by helping to clot the blood at these points of injury."* WBCs fight infection; they do not cause clotting. Plasma transports substances but is not the agent of clotting. Since the Reason incorrectly names WBCs and plasma instead of platelets, R is false, making option (c) correct.

Q41. § 5.4 TRANSPORTATION

[1]

Which of the following statement (s) is (are) true about human heart ? (a) Right atrium receives oxygenated blood from lungs through pulmonary artery. (b) Left atrium transfers oxygenated blood to left ventricle which sends it to various parts of the body. (c) Right atrium receives deoxygenated blood from different parts of the body through vena cava. (d) Left atrium transfers oxygenated blood to aorta which sends it to different parts of the body.

- A (b) only
- B (a) and (d)
- C (b) and (c)
- D (b) and (d)

Previously asked in: 2024 31/3/1 Q11

♦ Life Processes

Structure and functioning of the human heart

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Model Answer

Option C: (b) and (c)

Statement (b) is correct — left atrium transfers oxygenated blood to left ventricle, which pumps it to the body.
Statement (c) is correct — right atrium receives deoxygenated blood via vena cava.

Explanation

Statement (a) is wrong because pulmonary **veins** (not arteries) bring oxygenated blood to the left atrium.
Statement (d) is wrong because oxygenated blood goes from the left **ventricle** to the aorta, not directly from the left atrium. Examiners test whether students know which vessel carries oxygenated/deoxygenated blood and the correct sequence of chambers.

Q42. § 5.2.1 Autotrophic Nutrition

[2]

Photosynthesis takes place in the leaves and the food prepared by it reaches other parts of the plants. Name the process involved and explain it.

Previously asked in: 2024 31/2/1 Q22

♦ Life Processes

Translocation

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Model Answer

The process involved is **translocation**, carried out by **phloem** (vascular tissue).

Food (sucrose) prepared in leaves during photosynthesis is transported to all other parts of the plant — roots, stem, fruits, and seeds — through the phloem. This transport occurs in both upward and downward directions as per the plant's needs.

Source: *Life Processes, Chapter 5 (Transport in Plants)*

Explanation

- The question has two parts: **name** the process (translocation via phloem) and **explain** it. Award one mark each.
- Do not confuse phloem (food transport) with xylem (water/mineral transport) — a common error.
- Key points examiners look for: the word *phloem*, the word *translocation*, bidirectional movement, and that food reaches all parts of the plant.

Q43. § 5.4 TRANSPORTATION**[1]**

Which of the following statement(s) is (are) true about human heart ?

- (a) Right atrium receives oxygenated blood from lungs through pulmonary artery.
- (b) Left atrium transfers oxygenated blood to left ventricle which sends it to various parts of the body.
- (c) Right atrium receives deoxygenated blood through vena cava from upper and lower body.
- (d) Left atrium transfers oxygenated blood to aorta which sends it to different parts of the body.

- (A) (a)
- (B) (a) and (d)
- (C) (b) and (c)
- (D) (b) and (d)

Previously asked in: 2024 31/2/1 Q8

♦ Life Processes

Structure and Function of the Human Heart

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Model Answer**(C) (b) and (c)**

Statement (b) is correct — left atrium transfers oxygenated blood to left ventricle, which pumps it to the body.
Statement (c) is correct — right atrium receives deoxygenated blood via vena cava.

Explanation

From the passage: "Oxygen-rich blood from the lungs comes to... the left atrium... the left ventricle contracts... the blood is pumped out to the body. De-oxygenated blood comes from the body to... the right atrium."

Statement (a) is wrong because oxygenated blood comes via **pulmonary veins**, not pulmonary artery.

Statement (d) is wrong because the **left ventricle** (not left atrium) pumps blood into the aorta.

Q44. § 5.4 TRANSPORTATION

[3]

Name the blood vessel that brings (i) oxygenated blood (ii) deoxygenated blood, to the human heart. Also name that chamber of the heart which receives deoxygenated blood and state how deoxygenated blood from this chamber is sent to lungs for oxygenation.

Previously asked in: 2025 31/6/1 Q29

♦ Life Processes

Blood vessels carrying oxygenated and deoxygenated blood to the heart

Chambers of the heart and double circulation

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Model Answer

(i) Oxygenated blood is brought to the heart by the **pulmonary veins** (from the lungs).

(ii) Deoxygenated blood is brought to the heart by the **venae cavae** (from the body).

The **right atrium** receives deoxygenated blood. When the right atrium contracts, the blood passes into the **right ventricle**, which then pumps it to the **lungs** through the **pulmonary artery** for oxygenation.

Source: Life Processes, Section 5.4.1

Explanation

- Examiners expect all three parts: name both vessels, name the chamber, and explain the mechanism of sending blood to lungs.
- Common mistakes: calling pulmonary veins "arteries" (they carry oxygenated blood but are still veins), or forgetting to mention the right ventricle's role in pumping blood to the lungs.
- The path is: Right atrium → contracts → Right ventricle → pumps → Pulmonary artery → Lungs.
- 1 mark each for (i) & (ii), and 1 mark for the chamber + mechanism together.

Q45. § 5.4 TRANSPORTATION**[1]**

Select TRUE statements about lymph from the following :

- A. Lymph vessels carry lymph through the body and finally open into larger arteries.
- B. Lymph contains some amount of plasma, proteins and blood cells.
- C. Lymph contains some amount of plasma, proteins and red blood cells.
- D. Lymph vessels carry lymph through the body and finally open into larger veins.

The true statements are :

- (a) A and B
- (b) B and D
- (c) A and C
- (d) C and D

Previously asked in: 2025 31/4/1 Q6

♦ Life Processes Lymph – composition and transport

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Model Answer**(b) B and D**

Lymph contains plasma, proteins, and blood cells (not specifically RBCs), and lymph vessels finally open into larger **veins**, not arteries.

Source: Life Processes, Section 5.4.1

Explanation

The textbook states: "some amount of plasma, proteins and blood cells escape... to form lymph" (ruling out C, which incorrectly says only red blood cells) and "large lymph vessels... finally open into larger veins" (ruling out A, which says arteries). So B and D are both correct.

Q46. § 5.4 TRANSPORTATION

[3]

(B) (i) What is double circulation ?

(ii) Why is the separation of the right side and the left side of the heart useful ? How does it help birds and mammals ?

Previously asked in: 2023 31/4/1 Q29 (B)

♦ Life Processes

Double Circulation

Separation of Right and Left Sides of the Heart

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Model Answer**(i) Double Circulation:**

When blood passes through the heart **twice** during one complete cycle through the body, it is called double circulation. Blood goes once to the lungs (pulmonary circulation) and once to the rest of the body (systemic circulation).

(ii) Separation of right and left sides:

The separation prevents oxygenated and de-oxygenated blood from mixing, allowing a **highly efficient supply of oxygen** to the body.

Birds and mammals are warm-blooded — they constantly use energy to maintain body temperature. This requires a continuous, efficient oxygen supply. The complete separation of the two sides of the heart ensures oxygen-rich blood is always pumped to body tissues without dilution, meeting their high energy demands.

Source: Chapter 5, Section 5.4.1

Explanation

- Part (i) is worth ~1 mark: one crisp definition focusing on "twice through the heart" and naming both circuits.
- Part (ii) is worth ~2 marks: state the purpose (no mixing → efficient O₂ supply) and then specifically link to birds/mammals being warm-blooded with high energy needs. Examiners expect both the general benefit and the specific application to warm-blooded animals.

Q47. § 5.4 TRANSPORTATION

[2]

Answer the following:

- (a) Why is it important to prevent oxygenated and deoxygenated blood from mixing in birds and mammals ? [1]
- (b) Which animals can tolerate some mixing of the oxygenated and deoxygenated blood streams ? On what factor does the body temperature of these animals depend ? [1]

Previously asked in: 2023 31/2/1 Q22

♦ Life Processes

Cold-blooded animals and mixing of blood streams — body temperature dependence on environment

Separation of oxygenated and deoxygenated blood in birds and mammals (double circulation)

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Model Answer

(a) Birds and mammals are warm-blooded animals that maintain a constant high body temperature. This requires a lot of energy, so they need highly efficient oxygen supply. Mixing of oxygenated and deoxygenated blood would reduce the efficiency of oxygen delivery to tissues, making them unable to sustain the high metabolic rate needed.

(b) Amphibians and reptiles can tolerate some mixing of the two blood streams. Their body temperature depends on the temperature of the environment (they are cold-blooded/poikilothermic).

Explanation

- The key concept for (a) is the link between warm-bloodedness, high energy demand, and the need for pure oxygenated blood.
- For (b), examiners expect the names **amphibians and reptiles** and the term **environmental temperature** (or that they are cold-blooded/ectothermic). These points come from Chapter 7 (Control and Coordination / Life Processes context) of the NCERT textbook. Note: the source passages provided are from other chapters, but this is standard NCERT Biology content for Class 10, Chapter 6 (Life Processes).

Q48. § 5.4 TRANSPORTATION**[1]**

Assertion (A) : In the human heart ventricles have thicker muscular walls than atria.

Reason (R) : Ventricles have to pump the blood into various organs.

- A Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
B Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).
C Assertion (A) is true, but Reason (R) is false.
D Assertion (A) is false, but Reason (R) is true.

Previously asked in: 2024 31/4/1 Q18

♦ Life Processes

Structure and Function of the Human Heart – Ventricles vs Atria

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Model Answer

Option A — Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

Explanation

The textbook directly states: *"Since ventricles have to pump blood into various organs, they have thicker muscular walls than the atria do."* This confirms both the assertion and the reason, and the reason directly explains why ventricles have thicker walls. So option A is correct.

Q49. § 5.4 TRANSPORTATION**[2]**

State the main function of veins in human circulatory system. Why do they not need thick walls ?

Previously asked in: 2025 31/3/1 Q23

♦ Life Processes

Veins – Function and Structure in Human Circulatory System

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Model Answer

Function of veins: Veins collect deoxygenated blood from different organs and bring it back to the heart.

Why no thick walls: The blood in veins is no longer under high pressure (unlike arteries), so thick elastic walls are not needed. Instead, veins have **valves** to ensure blood flows only in one direction toward the heart.

Source: Chapter 5, Section 5.4.1 – The tubes – blood vessels

Explanation

- Two points are expected: (1) function of veins and (2) reason for thin walls — each worth 1 mark.
- Key phrase examiners look for: "blood is no longer under pressure" + mention of **valves** (this distinguishes veins from arteries structurally).
- Don't confuse: arteries carry blood *away* from heart under high pressure → thick walls; veins carry blood *back* to heart under low pressure → thin walls + valves.

Q50. § 5.4 TRANSPORTATION**[1]**

One-cell thick blood vessels are known as :

- (A) Alveoli
- (B) Capillaries
- (C) Arteries
- (D) Veins

Previously asked in: 2025 31/2/1 Q7

♦ Life Processes

Capillaries – one-cell thick blood vessels

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The smallest blood vessels whose walls are one-cell thick are called **capillaries**.

Explanation

The passage directly states: "*The smallest vessels have walls which are one-cell thick and are called capillaries.*" Alveoli are air sacs in lungs (not blood vessels); arteries and veins have thick/multi-layered walls. Only capillaries are one-cell thick.

Source: Life Processes, Section 5.4.1 — The tubes: blood vessels

Q51. § 5.4 TRANSPORTATION**[2]**

Besides minimising the loss of blood, why is it essential to plug any leak in a blood vessel ? Name the component of blood which helps in this process and state how this component perform this function.

Previously asked in: 2025 31/1/1 Q23 (a)

♦ Life Processes

Blood composition and function of platelets in clotting

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It is essential to plug leaks because loss of pressure in the blood vessels would reduce the efficiency of the pumping system.

Component: Platelets (thrombocytes)

Function: Platelets circulate in the blood and help clot the blood at the site of injury, thereby plugging the leak and preventing further blood loss.

Source: Life Processes, Chapter 5, Section 5.4.1 – Maintenance by platelets

Explanation

The question has two parts — (1) reason beyond blood loss, and (2) name + function of the component. Examiners expect the pressure point specifically (not just "to stop bleeding") and both the name **platelets** and how they work (clotting). Mentioning "circulate around the body" adds accuracy but keep it concise for 2 marks.

Q52. § 5.4 TRANSPORTATION**[2]**

Separation of right side and left side of the heart is useful to keep oxygenated and deoxygenated blood from mixing. Various organisms have different types of heart.

(I) Fill in the blanks (i) to (iii) correctly according to the type of organisms and their evolution in terms of blood circulation : Organisms | Number of chambers in heart | Type of blood being circulated | Type of circulation Fish | (i) _____ | Mixed | Single (ii) _____ | 3-chambered | Mixed | Incomplete double circulation Birds and Mammals | 4-chambered | Separated circulation path of oxygenated and deoxygenated blood | (iii) _____

(II) Which type of circulation is most efficient ?

Previously asked in: 2026 31/3/1 Q12

♦ Life Processes

Single and double circulation – efficiency

Types of heart chambers across organisms (fish, amphibians/reptiles, birds, mammals)

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Model Answer**(I)**

| Organisms | Chambers | Type of blood | Type of circulation |

| ---|---|---|---|

| Fish | **(i) 2-chambered** | Deoxygenated (single pass) | Single || **(ii) Amphibians / Reptiles** | 3-chambered | Mixed | Incomplete double circulation || Birds and Mammals | 4-chambered | Separated | **(iii) Complete double circulation** |

(II) Complete double circulation (found in birds and mammals) is the most efficient, as oxygenated and deoxygenated blood are completely separated, ensuring a highly efficient supply of oxygen to meet the high energy needs of warm-blooded animals.

Source: Chapter 5, Section 5.4.1 — Transportation in Human Beings

Explanation

- **(i)** Fish have a **2-chambered** heart (1 atrium + 1 ventricle); blood passes through the heart only once per cycle — **single circulation**.
- **(ii)** The organism with a 3-chambered heart that tolerates mixing is **amphibians or many reptiles**.
- **(iii)** In birds and mammals, blood passes through the heart **twice** per cycle — this is called **double circulation**; since there is no mixing, it is **complete** double circulation.
- For Part II, the examiner wants you to name the type and briefly justify it using the textbook reasoning (high energy needs, body temperature maintenance, complete separation of blood).

Q53. § 5.4 TRANSPORTATION**[1]**

Assertion (A) : Blood plasma transports carbon dioxide in dissolved form, while oxygen is transported by respiratory pigments.

Reason (R) : Carbon dioxide is more soluble in water than in oxygen.

- (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
- (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).
- (C) Assertion (A) is true, but Reason (R) is false.
- (D) Assertion (A) is false, but Reason (R) is true.

Previously asked in: 2026 31/2/1 Q8

♦ Life Processes

Transport of gases in blood – CO₂ and O₂

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Model Answer

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

Plasma transports CO₂ in dissolved form because CO₂ is more soluble in water than O₂, so O₂ must be carried by haemoglobin in RBCs.

Explanation

The textbook states: "*Plasma transports food, carbon dioxide and nitrogenous wastes in dissolved form. Oxygen is carried by the red blood corpuscles.*" The reason CO₂ can dissolve in plasma (water-based) while O₂ cannot is directly explained by the greater solubility of CO₂ in water — making R the correct explanation of A. Choose option **(A)**.

Q54. § 5.4 TRANSPORTATION § 5.5 EXCRETION

[2]

Briefly mention the steps in double-circulation through human heart.

Previously asked in: 2026 31/5/1 Q12

♦ Life Processes

Double Circulation in the Human Heart

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Model Answer

Double circulation means blood passes through the heart **twice** in one complete cycle.

1. **Pulmonary circulation:** De-oxygenated blood from the body → right atrium → right ventricle → lungs (for oxygenation).
2. **Systemic circulation:** Oxygenated blood from lungs → left atrium → left ventricle → pumped to the rest of the body.

This separation prevents mixing of oxygenated and de-oxygenated blood, ensuring efficient oxygen supply.

Source: Chapter 5, Section 5.4.1

Explanation

- Examiners expect **both circuits named** (pulmonary + systemic) and the **correct sequence** of chambers involved in each.
- The key phrase "**blood passes through the heart twice**" defines double circulation and should appear.
- Mentioning that this **prevents mixing** of oxygenated/de-oxygenated blood shows conceptual understanding — worth the extra half-mark.
- Do not confuse left and right sides: oxygenated blood returns to the **left** side; de-oxygenated blood enters the **right** side.

Q55. § 5.4 TRANSPORTATION**[1]**

Assertion (A) : In human beings, the respiratory pigment is haemoglobin present in red blood cells.

Reason (R) : Haemoglobin has a very high affinity for carbon dioxide.

- A Both, Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
B Both, Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
C Assertion (A) is true, but Reason (R) is false.
D Assertion (A) is false, but Reason (R) is true.

Previously asked in: 2026 31/1/1 Q9

♦ Life Processes

Transport in humans – respiratory pigment haemoglobin

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Model Answer**Option C — Assertion (A) is true, but Reason (R) is false.**

Haemoglobin in RBCs is indeed the respiratory pigment in humans. However, haemoglobin has a high affinity for **oxygen**, not carbon dioxide. CO₂ is transported mainly in dissolved form in plasma.

Explanation

The Assertion is correctly stated — haemoglobin is the respiratory pigment present in red blood cells (RBCs). The Reason is factually wrong: haemoglobin binds strongly to **oxygen** (and carries it to body cells); carbon dioxide is transported primarily dissolved in plasma, not bound to haemoglobin. Since R is false, option C is correct. Remember this distinction — a common exam trap.

Q56. § 5.4 TRANSPORTATION**[1]**

In human beings the oxygen rich blood is pumped out to the body by :

- (A) contraction of right atrium
(B) relaxation of left ventricle
(C) contraction of right ventricle
(D) contraction of left ventricle

Previously asked in: 2026 31/4/1 Q7

♦ Life Processes

Transportation in Humans (Human Heart and Circulation)

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Model Answer**(D) contraction of left ventricle**

When the muscular left ventricle contracts, the oxygen-rich blood received from the left atrium is pumped out to the rest of the body.

Source: Life Processes, Section 5.4.1

Explanation

The key sequence to remember: lungs → left atrium → left ventricle → body. The **left ventricle contracts** to push oxygenated blood into the aorta and out to the body. The right side handles deoxygenated blood going to the lungs — a common distractor. Examiners expect you to identify the correct chamber (ventricle, not atrium) and the correct side (left, not right).

Q57. § 5.5 EXCRETION

[2]

Name the part of the human excretory system where nephrons are found. Write the structure and function of nephrons.

Previously asked in: 2023 31/1/1 Q24

♦ Life Processes

Human Excretory System

Structure and Function of Nephron

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Model Answer

Nephrons are found in the **kidneys**.

Structure: Each nephron consists of a cup-shaped **Bowman's capsule** that encloses a cluster of thin-walled blood capillaries (glomerulus). The capsule leads into a long coiled tubule.

Function: Blood is filtered in the glomerulus. The filtrate enters the tubule, where useful substances like glucose, amino acids, salts and water are selectively reabsorbed. The remaining waste (urine) passes into the ureter.

Source: Chapter 5, Section 5.5.1

Explanation

Although the question says 2 marks, it asks three things (location, structure, function), so keep each part brief — one–two lines each. Examiners look for: **kidneys** as the location, **Bowman's capsule + capillary cluster** for structure, and **filtration + selective reabsorption** for function. Do not skip any of the three parts or you lose marks.

Q58. § 5.2.3 How do Organisms obtain their Nutrition? § 5.2.4 Nutrition in Human Beings

[4]

Human digestive system is a tube running from mouth to anus. Its main function is to breakdown complex molecules present in the food which cannot be absorbed as such into smaller molecules. These molecules are absorbed across the walls of the tube and the absorbed food reaches each and every cell of the body where it is utilised for obtaining energy.

Read the source and answer the sub-parts that follow.

- (a) Name the glands present in the buccal cavity and write the components of food on which the secretion of these glands act upon. [1]
- (b) Two organs have a sphincter muscle at their exit. Name them. [1]
- (c) What will happen if : (i) mucus is not secreted by the gastric glands. (ii) Villi are absent in the small intestine. [2]

Previously asked in: 2024 31/3/1 Q38

♦ Life Processes

Buccal cavity – salivary glands and action of salivary amylase on starch

Role of mucus secreted by gastric glands

Role of villi in absorption in the small intestine

Sphincter muscles at the exit of stomach and urinary bladder / intestine

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Model Answer

(a) The glands present in the buccal cavity are **salivary glands**. Their secretion (saliva) contains **salivary amylase (ptyalin)** which acts on **starch (carbohydrates)** and breaks it down into simpler sugars.

(b) The two organs with a sphincter muscle at their exit are:

1. **Stomach** (pyloric sphincter)
2. **Anus** (anal sphincter)

(c)

(i) If mucus is not secreted by gastric glands, the inner lining of the stomach will not be protected from the **hydrochloric acid** and digestive enzymes. This can cause **ulcers** in the stomach wall.

(ii) If villi are absent in the small intestine, the **surface area for absorption** of digested food will decrease greatly, leading to **poor absorption** of nutrients into the blood.

Explanation

- (a) Salivary glands and salivary amylase acting on starch is standard textbook content — both parts (gland name + substrate) are needed for full credit.
- (b) Pyloric sphincter (stomach exit) and anal sphincter (anus) are the two key sphincters; examiners look for both organ names.
- (c)(i) Mucus protects stomach lining — ulcers is the key consequence. (c)(ii) Villi increase surface area — their absence means reduced absorption. Each point carries 1 mark.

Q59. § 5.5 EXCRETION

[1]

The basic filtration unit of the excretory system in human beings is :

- (A) Nephron
- (B) Urethra
- (C) Neuron
- (D) Urinary bladder

Previously asked in: 2025 31/6/1 Q11

♦ Life Processes

Nephron as the basic filtration unit of the excretory system

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Model Answer

(A) Nephron

The nephron is the basic filtration unit of the kidney. Each kidney contains large numbers of nephrons packed together that filter nitrogenous wastes from the blood.

Explanation

The passage clearly states: "Each kidney has large numbers of these filtration units called nephrons packed close together." Urethra carries urine out of the body; urinary bladder stores urine; neuron is a nerve cell — all distractors unrelated to filtration.

Q60. § 5.5 EXCRETION

[2]

Answer the following based on the figure of human nephron.

- (a) Identify 'X' in the figure of human nephron shown below. What role does it play in the process of urine formation?
- (b) Why some substances are selectively reabsorbed from the initial filtrate of urine, as it flows along the tubular part of nephron?

Previously asked in: 2025 31/5/1 Q23 (B)

♦ Life Processes

Human Nephron and Urine Formation

Selective Reabsorption in Renal Tubule

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Model Answer

(a) X is the **Bowman's capsule** (cup-shaped end of the nephron). It collects the filtrate from the glomerular capillaries. Blood is filtered here under pressure — the first step of urine formation called **filtration**.

(b) Useful substances such as glucose, amino acids, salts and water are selectively reabsorbed so that they are **not lost from the body**. Only waste products (e.g., urea) are retained in the filtrate to be excreted as urine.

Source: Chapter 5, Section 5.5.1 – Excretion in Human Beings

Explanation

- (a) The diagram's arrow points to the cup-shaped structure around the glomerulus — that is Bowman's capsule. Always name it and state its role: **collecting filtrate / ultrafiltration**.
- (b) The key idea is that the body must conserve useful substances. Simply write *which* substances are reabsorbed and *why* (to prevent loss of valuable materials). One sentence each is enough for 1 mark.
- Examiners look for correct terminology: "Bowman's capsule," "filtrate," "selective reabsorption."

Q61. § 5.5 EXCRETION

[2]

How is lymph formed? State its important function.

Previously asked in: 2025 31/5/1 Q23 (A)

♦ Life Processes

Formation and Functions of Lymph

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Model Answer

Formation of Lymph: When blood flows through capillaries, some plasma along with proteins leaks out into the spaces between cells, forming tissue fluid. This tissue fluid enters lymph capillaries and becomes **lymph**.

Function: Lymph carries digested and absorbed fat from the small intestine to the blood. It also drains excess tissue fluid back into the bloodstream.

Explanation

The source passages provided do not cover this topic (they relate to reproduction), but this question is from the **Life Processes** chapter (Chapter 6 – Circulatory System). Examiners expect:

- One clear sentence on how lymph is formed (plasma leaking out of capillaries → tissue fluid → lymph).
- One clear sentence on its function (transport of fats/digested food; return of excess fluid to blood).
- For 2 marks, one mark is typically awarded for formation and one for function. Keep it concise.

Q62. § 5.5 EXCRETION

Write one specific function each of the following organs in relation with excretion in human beings :

- (i) Renal Artery
- (ii) Urethra
- (iii) Glomerulus
- (iv) Tubular part of nephron

Previously asked in: 2023 31/4/1 Q23 (iv)

♦ Life Processes

Excretion in Human Beings – Functions of Renal Artery, Urethra, Glomerulus, and Tubular Part of Nephron

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Model Answer

- (i) Renal Artery:** It supplies oxygenated blood (containing nitrogenous wastes) to the kidneys for filtration.
- (ii) Urethra:** It carries urine from the urinary bladder to the outside of the body for elimination.
- (iii) Glomerulus:** It is a cluster of thin-walled capillaries where filtration of blood takes place — waste products and other substances are filtered out of the blood into the Bowman's capsule.
- (iv) Tubular part of nephron:** It selectively reabsorbs useful substances such as glucose, amino acids, salts and a major amount of water from the filtrate back into the blood.

Source: *Life Processes, Chapter 5, Section 5.5.1*

Explanation

- These are standard 1-mark-each parts; one clear function per organ is enough — no elaboration needed.
- Examiners look for key terms: *filtration* (glomerulus), *reabsorption* (tubule), *elimination/passage of urine* (urethra), *supply of blood for filtration* (renal artery).
- Do not confuse **ureter** (carries urine from kidney to bladder) with **urethra** (bladder to outside).
- The tubular reabsorption point is directly stated in the textbook: "glucose, amino acids, salts and a major amount of water are selectively re-absorbed."

Q63. § 5.5 EXCRETION

Write one specific function each of the following organs in relation with excretion in human beings :

- (i) Renal Artery
- (ii) Urethra
- (iii) Glomerulus
- (iv) Tubular part of nephron

Previously asked in: 2023 31/4/1 Q23 (iii)

♦ Life Processes

Excretion in Human Beings

Glomerulus

Renal Artery

Structure and Function of Nephron

Tubular part of nephron

Urethra

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Model Answer

(i) Renal Artery: It carries oxygenated blood (with nitrogenous wastes) from the aorta to the kidneys for filtration.

(ii) Urethra: It carries urine from the urinary bladder to the outside of the body for its elimination.

(iii) Glomerulus: It is a cluster of thin-walled blood capillaries where filtration of blood takes place under pressure; the filtrate (containing urea, glucose, salts, water) is collected into the Bowman's capsule.

(iv) Tubular part of nephron: It selectively re-absorbs useful substances such as glucose, amino acids, salts and a major amount of water from the filtrate back into the blood, so that only waste-concentrated urine passes forward.

Source: Chapter 5, Section 5.5.1 – Excretion in Human Beings

Explanation

- Examiners expect **one specific function** per organ — one crisp sentence each is enough for 1 mark per part.
- The renal artery is part of the blood supply bringing waste-laden blood *to* the kidney; do not confuse it with the renal vein (which carries filtered blood away).
- "Glomerulus" and "Bowman's capsule" together form the filtration unit; the question focuses on the glomerulus specifically — filtration is the key word.
- For the tubular part, the key term is **selective reabsorption** — examiners look for this phrase.

Q64. § 5.5 EXCRETION

Write one specific function each of the following organs in relation with excretion in human beings :

- (i) Renal Artery
- (ii) Urethra
- (iii) Glomerulus
- (iv) Tubular part of nephron Urethra

Previously asked in: 2023 31/4/1 Q23 (ii)

♦ Life Processes

Excretion in Human Beings

Glomerulus – Function in Excretion

Renal Artery – Function in Excretion

Tubular Part of Nephron – Function in Excretion

Urethra – Function in Excretion

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Model Answer

(i) Renal Artery: It supplies oxygenated blood (containing nitrogenous wastes) to the kidneys for filtration.

(ii) Urethra: It carries urine from the urinary bladder to the outside of the body for expulsion.

(iii) Glomerulus: It is a cluster of capillaries where filtration of blood takes place — waste products, water, glucose, salts are filtered out of the blood into the Bowman's capsule.

(iv) Tubular part of nephron: It selectively re-absorbs useful substances such as glucose, amino acids, salts and a major amount of water from the filtrate back into the blood.

Source: Chapter 5, Section 5.5.1 – Excretion in Human Beings

Explanation

- Examiners expect one **specific function** per organ — do not describe structure.
- Key terms to use: *filtration* (glomerulus), *reabsorption* (tubule), *expulsion/release* (urethra), *blood supply with wastes* (renal artery).
- The tubule's role in **selective reabsorption** is a frequently tested point — mention at least two substances reabsorbed.
- Keep each point to one sentence; these are likely 1-mark each.

Q65. § 5.5 EXCRETION

Write one specific function each of the following organs in relation with excretion in human beings :

- (i) Renal Artery
- (ii) Urethra
- (iii) Glomerulus
- (iv) Tubular part of nephron Renal Artery

Previously asked in: 2023 31/4/1 Q23 (i)

♦ Life Processes

Excretion in Human Beings – Organs and their Functions

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Model Answer

(i) Renal Artery: It supplies oxygenated blood (containing nitrogenous wastes like urea) to the kidneys for filtration.

(ii) Urethra: It carries urine from the urinary bladder to the outside of the body for elimination.

(iii) Glomerulus: It is a cluster of thin-walled capillaries where filtration of blood takes place — water, urea, glucose, salts pass into the Bowman's capsule.

(iv) Tubular part of nephron: It performs selective reabsorption — useful substances like glucose, amino acids, salts and water are reabsorbed back into the blood from the filtrate.

Source: Chapter 5, Section 5.5.1 – Excretion in Human Beings

Explanation

- Each part carries **1 mark**, so one clear, specific function per part is enough — no elaboration needed.
- Examiners look for the **key function word**: filtration (glomerulus), reabsorption (tubule), elimination/passage of urine (urethra), supply of blood with wastes (renal artery).
- Don't confuse **ureter** (carries urine from kidney to bladder) with **urethra** (bladder to outside).
- "Selective reabsorption" is the expected term for the tubular part — use it.

Q66. § 5.4 TRANSPORTATION § 5.5 EXCRETION

[1]

Assertion (A) : The basic filtration unit in the kidneys, like in the lungs, is a cluster of very thin-walled blood capillaries.

Reason (R) : Each capillary cluster in the kidney is associated with the cup-shaped end of a coiled tube called Bowman's capsule.

- (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
- (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).
- (C) Assertion (A) is true, but Reason (R) is false.
- (D) Assertion (A) is false, but Reason (R) is true.

Previously asked in: 2026 31/3/1 Q9

♦ Life Processes

Excretion – Structure of Nephron (Glomerulus and Bowman's Capsule)

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Model Answer

(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).

Both statements are factually correct, but R describes what Bowman's capsule is — it does not explain *why* the filtration unit is a capillary cluster.

Explanation

The Assertion is directly from the textbook: "the basic filtration unit in the kidneys, like in the lungs, is a cluster of very thin-walled blood capillaries." The Reason is also correct: "Each capillary cluster in the kidney is associated with the cup-shaped end of a coiled tube called Bowman's capsule." However, R merely names/describes the structure associated with the capillary cluster; it does not explain the assertion about capillaries being the filtration unit. Hence option (B) is correct.

Q67. § 5.5 EXCRETION

[4]

Kidneys help to regulate the volume of fluid and various metabolites waste products in the body. Normally, kidney filter about 180 L of fluid daily but the volume actually excreted out is only a litre or two a day. Patients with kidney failures can be saved by dialysis and kidney transplant.

Answer the following questions based on the passage:

- (a) Write the structure and function of Bowman's capsule. [1]
- (b) Although kidneys filter a large amount (about 180 L daily) of fluids, still the excretion from the body is only about a litre or two. Why ? [1]
- (c) What is excretion ? Why is it necessary for any living organism ? [2]

Previously asked in: 2026 31/5/1 Q15

♦ Life Processes

Excretion – Definition and Necessity in Living Organisms

Reabsorption in Kidneys / Selective Reabsorption of Filtrate

Structure and Function of Bowman's Capsule

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Model Answer

(a) Bowman's capsule is a cup-shaped structure surrounding the glomerulus in the nephron. It collects the filtrate (water, salts, glucose, urea) filtered from the blood under pressure.

(b) Because the remaining filtrate undergoes **selective reabsorption** in the tubular part of the nephron — useful substances like glucose, amino acids, salts, and most water are reabsorbed back into the blood. Only waste-laden fluid is excreted.

(c) Excretion is the process of removal of metabolic waste products from the body.

It is necessary because accumulated waste products like urea, CO₂, and excess salts are toxic and can disrupt normal cellular functions. Their removal keeps the internal environment (homeostasis) stable and ensures proper functioning of cells and organs.

Source: Life Processes, Excretion

Explanation

- (a) Describe both structure (cup-shaped, surrounds glomerulus) and function (collects filtrate) — each earns half mark.
- (b) Key term is **selective reabsorption**; mention what is reabsorbed (glucose, water, salts) to make the answer complete.
- (c) Give the definition first, then explain *why* it is necessary — the 2 marks are split between definition and necessity. Use terms like "toxic waste", "homeostasis" or "proper functioning" to score full marks.

Q68. § 5.2.3 How do Organisms obtain their Nutrition? § 5.4 TRANSPORTATION**[1]**

Give differences between the following : Nephron and neuron

Previously asked in: 2026 31/1/1 Q14 (a)

♦ Life Processes Nephron - structural and functional unit of kidney (excretion)

Neuron vs nephron - comparing nervous unit with excretory unit

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Model Answer

Nephron is the structural and functional unit of the kidney (excretory system) that filters blood. **Neuron** is the structural and functional unit of the nervous system that transmits electrical impulses.

Explanation

This is a 1-mark difference question, so one clear contrasting point is sufficient. The examiner expects you to identify what each unit belongs to (kidney vs. nervous system) and its basic function (filtration/excretion vs. impulse transmission). Avoid writing lengthy descriptions.

Q69. § 5.2.1 Autotrophic Nutrition § 5.3 RESPIRATION**[3]**

Answer the following:

- (i) State the role of ATP in cellular respiration.
- (ii) What ensures sufficient exchange of gases in plants ?
- (iii) State the conditions on which the direction of diffusion of gases in plant depend upon.

Previously asked in: 2023 31/1/1 Q29(a)

♦ Life Processes Diffusion of gases in plants – factors affecting direction Gas exchange in plants Role of ATP in cellular respiration

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Model Answer

(i) ATP acts as the energy currency of the cell. The energy released during cellular respiration is used to synthesise ATP from ADP and inorganic phosphate. This ATP is then broken down to release energy (30.5 kJ/mol) to drive all endothermic reactions and life processes in the cell.

(ii) In plants, large intercellular spaces ensure that all cells remain in contact with air. Gases are exchanged through stomata. This ensures sufficient exchange of gases throughout the plant body.

(iii) The direction of diffusion of gases in plants depends upon:

- The **environmental conditions**, and
- The **requirements of the plant** (e.g., at night, CO₂ is released; during the day, O₂ is released as CO₂ is used in photosynthesis).

Source: Chapter 5, Section 5.3 Respiration

Explanation

- For (i), the key phrase examiners look for is "energy currency" and the idea that ATP stores and releases energy for cellular activities.
- For (ii), mention **stomata** and **intercellular spaces** — both are expected.
- For (iii), state both factors clearly: environmental conditions and plant's requirements. Giving the day/night example strengthens the answer and is directly from the textbook.

Q70. § 5.2.1 Autotrophic Nutrition § 5.3 RESPIRATION § 5.5 EXCRETION

[2]

With the help of a schematic flow chart, show the breakdown of glucose in a cell to provide energy –

(i) in the presence of oxygen

(ii) in lack of oxygen

Previously asked in: 2023 31/1/1 Q23(b)

♦ Life Processes

Breakdown of glucose – aerobic and anaerobic respiration (flow chart)

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Model Answer

Breakdown of glucose in a cell:

Glucose (6-carbon)

↓ (*Glycolysis – in cytoplasm*)

Pyruvate (3-carbon)

(i) In the presence of oxygen (Aerobic respiration):

Pyruvate → (mitochondria, using O₂) → CO₂ + H₂O + **Energy (ATP)** (large amount)

(ii) In lack of oxygen (Anaerobic respiration):

- In **yeast**: Pyruvate → Ethanol + CO₂ + **Energy (ATP)**
- In **muscle cells**: Pyruvate → Lactic acid + **Energy (ATP)**

Source: Chapter 5, Section 5.3 – Respiration

Explanation

- The examiner expects a **flow chart / schematic**, not a paragraph. Use arrows to show the pathway.
- The **common first step** – glucose → pyruvate (glycolysis, in cytoplasm) – must be shown for full marks.
- **Two anaerobic pathways** are expected: yeast (ethanol + CO₂) and muscle cells (lactic acid). Mentioning both strengthens the answer.
- Key location details (cytoplasm for glycolysis, mitochondria for aerobic) add precision but are secondary to the pathway itself.
- Keep the flow chart neat and labelled; this is what earns marks in board exams.

Q71. § 5.2.1 Autotrophic Nutrition § 5.3 RESPIRATION § 5.5 EXCRETION

[3]

We water the soil but it reaches the topmost leaves of the plants. Explain in brief the process involved.

Previously asked in: 2024 31/3/1 Q29

♦ Life Processes

Transportation of Water in Plants (Ascent of Sap)

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Model Answer

The process involved is **transpiration** and **transportation through xylem (water transport)**.

1. Water absorbed by roots from the soil enters the root hair cells by **osmosis**.
2. This water is conducted upward through **xylem vessels** to all parts of the plant, including the topmost leaves.
3. In the leaves, water evaporates through **stomata** — this is called **transpiration**.
4. Transpiration creates a **suction pull** (transpiration pull), which draws water continuously upward from roots to leaves against gravity.

Thus, a continuous column of water moves from roots to the topmost leaves through the xylem due to transpiration pull.

Source: Chapter 5, Life Processes — Transportation in Plants

Explanation

- The examiner expects three key terms: **osmosis** (root absorption), **xylem** (conduction), and **transpiration pull** (driving force).
- Many students forget to mention the *mechanism* that drives water upward — always state "transpiration pull/suction pull created by transpiration."
- Keep the steps in logical order: soil → roots (osmosis) → xylem → leaves → stomata → transpiration pull.
- 3 marks = 3 distinct points; one mark each for absorption, xylem conduction, and transpiration pull.

Q72. § 5.2.1 Autotrophic Nutrition § 5.4 TRANSPORTATION § 5.5 EXCRETION

[3]

Give reasons for the following :

- (i) Alveoli in lungs are richly supplied with blood capillaries.
- (ii) Respiratory pigment in the blood takes up oxygen and not carbon dioxide.
- (iii) During anaerobic respiration, a 3-carbon molecule is formed as an end product instead of CO₂ in human beings.

Previously asked in: 2024 31/2/1 Q29(a)

♦ Life Processes

Alveoli structure and gas exchange in lungs

Anaerobic respiration in humans — lactic acid as end product

Role of haemoglobin (respiratory pigment) in oxygen transport

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Model Answer

(i) Alveoli are richly supplied with blood capillaries to provide a large surface area for rapid exchange of gases (oxygen and carbon dioxide) between air in the alveoli and the blood.

(ii) Haemoglobin (respiratory pigment) has a high affinity for oxygen, so it combines with oxygen to form oxyhaemoglobin and transports it to body cells. Carbon dioxide is mostly transported dissolved in plasma or as bicarbonate ions, not by haemoglobin.

(iii) During anaerobic respiration in humans, there is incomplete breakdown of glucose (pyruvate). Due to lack of oxygen, pyruvate is converted to lactic acid (3-carbon molecule) in the muscle cells instead of being fully oxidised to CO₂ and water.

Explanation

- For (i): Link alveolar structure to function — large surface + rich blood supply = efficient gas exchange.
- For (ii): Stress haemoglobin's **affinity for O₂**, not CO₂. Mention CO₂ transport via plasma/bicarbonate to show contrast.
- For (iii): Key point is **incomplete breakdown** and **no oxygen** → pyruvate → lactic acid (3C). Avoid confusing with yeast (which gives ethanol + CO₂). Examiners expect "lactic acid" and "muscle cells" explicitly.

Q73. § 5.4 TRANSPORTATION § 5.5 EXCRETION

[1]

In human respiratory system, when a person breathes in, the position of ribs and diaphragm will be :

- (A) lifted ribs and curve/dome shaped diaphragm.
- (B) lifted ribs and flattened diaphragm.
- (C) relaxed ribs and flattened diaphragm.
- (D) relaxed ribs and curve/dome shaped diaphragm.

Previously asked in: 2024 31/2/1 Q10

♦ Life Processes

Mechanism of Breathing – Movement of Ribs and Diaphragm during Inhalation

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Model Answer**(B) lifted ribs and flattened diaphragm.**

When a person breathes in (inhalation), the ribs are lifted upward and outward by intercostal muscles, and the diaphragm contracts and flattens, increasing chest cavity volume and allowing air to rush in.

Explanation

During inhalation, both the ribs moving up/out AND the diaphragm flattening work together to increase the volume of the thoracic cavity, reducing air pressure inside so air flows in. Option (A) is wrong because dome-shaped diaphragm occurs during exhalation. Options (C) and (D) describe exhalation. The key is: **inhalation = ribs lifted + diaphragm flattened.**

Q74. § 5.1 WHAT ARE LIFE PROCESSES? § 5.5 EXCRETION

[3]

Answer the following about respiration :

- (i) Why is respiratory pigment needed in multicellular organisms with large body size ? [1]
- (ii) Give reasons for the following : (a) Rings of cartilage are present in the throat. (b) Lungs always contain a residual volume of air. (c) The diaphragm flattens and ribs are lifted up when we breathe in. (d) Walls of alveoli contain an extensive network of blood vessels. [2]

Previously asked in: 2024 31/1/1 Q29

♦ Life Processes

Alveoli — structure and gaseous exchange

Mechanism of breathing — inhalation and exhalation

Need for respiratory pigments in large multicellular organisms

Structure and function of the human respiratory system

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Model Answer

(i) In large multicellular organisms, diffusion alone cannot supply oxygen to all cells. Respiratory pigments (e.g., haemoglobin) carry oxygen from the lungs to oxygen-deficient tissues and release it there.

(ii)

(a) Rings of cartilage are present in the throat to ensure that the air-passage does not collapse, keeping it open at all times for continuous airflow.

(b) Lungs always contain a residual volume of air so that there is sufficient time for oxygen to be absorbed and for carbon dioxide to be released, ensuring continuous gas exchange.

(c) When we breathe in, lifting the ribs and flattening the diaphragm increases the chest cavity volume, causing air to be sucked into the lungs to fill the expanded alveoli.

(d) The extensive network of blood vessels in alveolar walls facilitates efficient exchange of gases — oxygen is absorbed into the blood and carbon dioxide is released into the alveoli.

Source: Chapter 5 — Life Processes, Section 5.3 Respiration

Explanation

- (i) directly comes from the "More to Know" paragraph on respiratory pigments — mention diffusion being insufficient and haemoglobin's role.
- For (ii), all four reasons are explicitly stated in the textbook passage on the human respiratory system. Quote or closely paraphrase the text; examiners look for these exact points.
- Avoid adding extra detail; each sub-point needs only 1–2 lines since the whole (ii) part carries 2 marks total (½ mark each reason).

Q75. § Introduction § 5.3 RESPIRATION § 5.4 TRANSPORTATION

[1]

Assertion (A) : The rate of breathing in aquatic organisms is much faster than in terrestrial organisms.

Reason (R) : The amount of oxygen dissolved in water is very high as compared to the amount of oxygen in air.

- (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
- (b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
- (c) Assertion (A) is true, but Reason (R) is false.
- (d) Assertion (A) is false, but Reason (R) is true.

Previously asked in: 2024 31/1/1 Q19

♦ Life Processes

Respiration in Aquatic vs Terrestrial Organisms

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Model Answer

(c) Assertion (A) is true, but Reason (R) is false.

The amount of dissolved oxygen in water is far **less** than the oxygen present in air, so aquatic organisms must breathe faster to meet their oxygen needs.

Explanation

The Assertion is correct — aquatic organisms do breathe faster. However, the Reason is wrong because oxygen dissolved in water is actually much **lower** (not higher) than oxygen in air. This low availability of O₂ in water forces aquatic animals to increase their breathing rate. Since the Reason is factually incorrect, option (c) is the right choice.

Q76. § 5.1 WHAT ARE LIFE PROCESSES?

[3]

Answer the following about respiration and energy.

- (a) Write the name and one function of respiratory pigment found in human beings.
- (b) Why do lungs always contain a residual volume of air?
- (c) Why is ATP known as energy currency of the living beings?

Previously asked in: 2025 31/5/1 Q29

♦ Life Processes

ATP as energy currency of living beings

Residual volume of air in lungs

Respiratory pigment – Haemoglobin and its function

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Model Answer

- (a) The respiratory pigment in human beings is **haemoglobin**, found in red blood cells. Its function is to transport oxygen from the lungs to all body tissues.
- (b) Lungs always retain a residual volume of air so that there is sufficient time for oxygen to be absorbed into the blood and carbon dioxide to be released, ensuring a continuous exchange of gases even between breaths.
- (c) ATP (Adenosine Triphosphate) is called the energy currency of living beings because energy released during the breakdown of glucose is stored in ATP molecules. This stored energy is then used to power various cellular reactions whenever required — just like currency is used for different transactions.

Explanation

- For (a), name **haemoglobin** explicitly and state it carries O₂ — examiners expect both.
- For (b), the key idea is *continuity* of gas exchange; without residual air, the alveoli would collapse between breaths, stopping diffusion entirely.
- For (c), link ATP to both **storage** of energy (from respiration) and **utilisation** (for cellular reactions) — the "currency" analogy must be explained, not just stated.

Q77. § 5.2.4 Nutrition in Human Beings

[3]

The digestion of food in human alimentary canal is a complex process. State the enzyme/salt present in the following and mention their function in the process of digestion :

- (i) Saliva [1]
- (ii) Bile Juice [1]
- (iii) Pancreatic Juice [1]

Previously asked in: 2025 31/4/1 Q29

♦ Life Processes

Digestion in the Human Alimentary Canal

Role of Pancreatic Juice in Digestion

Role of Salivary Amylase in Digestion

Role of bile juice in digestion

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Model Answer

(i) Saliva:

Enzyme: Salivary amylase

Function: Breaks down starch (complex carbohydrate) into simple sugars.

(ii) Bile Juice:

Component: Bile salts (no enzyme)

Function: Makes the acidic food alkaline for pancreatic enzymes to act, and emulsifies large fat globules into smaller ones, increasing efficiency of enzyme action.

(iii) Pancreatic Juice:

Enzymes: Trypsin and Lipase

Function: Trypsin digests proteins; Lipase breaks down emulsified fats into fatty acids and glycerol.

Source: Chapter 5, Section 5.2.4 – Nutrition in Human Beings

Explanation

- **Bile juice has no enzyme** — a common mistake. It contains *bile salts* that emulsify fats. Examiners specifically look for this distinction.
- For **pancreatic juice**, name *both* enzymes (trypsin + lipase) and state *both* functions to score full marks.
- The keyword for bile's role is **emulsification** — breaking large fat globules into smaller ones.
- Keep the format neat: name the enzyme/salt first, then its function — this matches the question's demand and makes awarding marks easy for the examiner.

Q78. § 5.5 EXCRETION

[2]

"Plants use a variety of techniques to get rid of waste material." Justify this statement giving any four ways.

Previously asked in: 2025 31/4/1 Q23

♦ Life Processes

Excretion in Plants

Waste removal techniques in plants (stomata, shedding of leaves, stored in vacuoles, exuded into soil)

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Model Answer

Plants use various techniques to excrete waste:

1. **Transpiration** — excess water is removed as water vapour through stomata.
2. **Stored in vacuoles** — waste products are stored in cellular vacuoles.
3. **Stored in leaves** — wastes accumulate in leaves which then fall off.
4. **Resins and gums** — wastes are stored as resins and gums in old xylem.
5. **Excreted into soil** — some waste substances are released into the surrounding soil.

(Any four accepted)

Source: Chapter 5, Section 5.5.2 – Excretion in Plants

Explanation

The question is from **5.5.2 Excretion in Plants**. Examiners expect students to list distinct methods with a brief description of each. For 2 marks, four points are asked but only two are typically awarded (½ mark each) — write all four clearly to be safe. Avoid mixing up animal excretion details here. Key terms like *transpiration*, *vacuoles*, *resins and gums*, and *leaf fall* must appear.

Q79. § 5.4 TRANSPORTATION

[1]

Assertion (A) : In large animals, oxygen can reach different parts of the animal's body easily.

Reason (R) : Respiratory pigments take up oxygen from the air and carry it to body tissues.

- (a) Both, Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of Assertion (A).
- (b) Both, Assertion (A) and Reason (R) are true, and Reason (R) is not the correct explanation of Assertion (A).
- (c) Assertion (A) is true, but Reason (R) is false.
- (d) Assertion (A) is false, but Reason (R) is true.

Previously asked in: 2025 31/4/1 Q17

♦ Life Processes

Assertion-Reason: Limitations of Diffusion in Large Animals

Transport of Oxygen and Role of Respiratory Pigments

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Model Answer

(d) Assertion (A) is false, but Reason (R) is true.

In large animals, oxygen **cannot** easily reach all body parts by simple diffusion; a transport system with respiratory pigments (like haemoglobin) is needed. The Reason correctly states that respiratory pigments carry oxygen to body tissues.

Explanation

The Assertion is **false** because large/complex animals have a problem with oxygen delivery — diffusion alone is insufficient over large distances, which is *why* they evolved circulatory systems and respiratory pigments. The Reason is **true**: haemoglobin (a respiratory pigment in RBCs) picks up oxygen in the lungs and carries it to tissues. Since A is false and R is true, option **(d)** is correct.

Q80. § 5.2.1 Autotrophic Nutrition § 5.2.3 How do Organisms obtain their Nutrition? § 5.5 EXCRETION

[2]

Explain in brief two ways by which leaves of a plant help in excretion.

Previously asked in: 2023 31/5/1 Q23 (b)

♦ Life Processes

Excretion in Plants – Role of Leaves

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Model Answer

Leaves help in excretion in two ways:

1. **Storing waste in vacuoles:** Waste materials are stored in the cell vacuoles of leaves.
2. **Removal through falling leaves:** Waste products accumulated in leaves are removed when the plant sheds its leaves (leaf fall).

Source: Life Processes, Chapter 5

Explanation

The textbook specifically states that plants get rid of waste by storing it in cell-vacuoles or removing it in falling leaves. Examiners expect both points to be clearly linked to **leaves** (not gums/resins or soil excretion, which relate to other plant parts). Each point is worth 1 mark — name the method and briefly explain it.

Q81. § Introduction § 5.3 RESPIRATION § 5.5 EXCRETION

[1]

As compared to terrestrial organisms, the rate of breathing in aquatic organisms is :

- (a) faster because they need more oxygen for their survival.
- (b) faster because the amount of dissolved oxygen in water is fairly low.
- (c) slower because the amount of dissolved oxygen in water is fairly low.
- (d) slower because the capacity of water of dissolving atmospheric air is limited.

Previously asked in: 2023 31/5/1 Q9

♦ Life Processes

Rate of Breathing in Aquatic vs Terrestrial Organisms

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Model Answer

(b) faster because the amount of dissolved oxygen in water is fairly low.

Aquatic organisms must breathe faster to extract sufficient oxygen, as water contains much less dissolved oxygen than air.

Explanation

The key concept is that dissolved oxygen in water is present in very small amounts compared to oxygen in air. To meet their oxygen needs, aquatic organisms (e.g., fish) must process a larger volume of water rapidly, making their breathing rate faster than that of terrestrial organisms. Option (d) is a distractor — while technically related, the *reason given in the textbook* focuses on the **low amount of dissolved oxygen**, not the limited capacity of water to dissolve air. Option (a) is wrong because it implies aquatic animals need *more* oxygen, which is not the stated reason.

Q82. § 5.2.1 Autotrophic Nutrition § 5.3 RESPIRATION § 5.5 EXCRETION**[1]**

The process in which loss of water in the form of vapours from the aerial parts of plants takes place is X, which helps in Y. Here X and Y respectively are :

- (a) transpiration and photosynthesis.
- (b) transpiration and temperature regulation.
- (c) translocation and movement of soluble products of photosynthesis in phloem.
- (d) translocation and absorption of water and minerals from soil by roots.

Previously asked in: 2023 31/5/1 Q8

♦ Life Processes

Transpiration and its role in water/nutrient transport (absorption of water and minerals)

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Model Answer**(b) transpiration and temperature regulation.**

Loss of water vapour from aerial parts of plants is **transpiration**, which helps in **temperature regulation** of the plant.

Explanation

Transpiration is specifically the loss of water in vapour form from aerial parts (leaves, stems) through stomata. The textbook notes that plants lose large amounts of water through stomata; this evaporative loss cools the plant surface, regulating its temperature. Option (c) and (d) describe translocation, not transpiration. Option (a) is a distractor — photosynthesis requires water but transpiration does not directly "help" photosynthesis.

Q83. § 5.2.3 How do Organisms obtain their Nutrition?**[3]**

- (A) (i) How does Paramecium obtain its food ?
(ii) List the role of each of the following in our digestive system :
(a) Hydrochloric acid
(b) Trypsin
(c) Muscular walls of stomach
(d) Salivary amylase

Previously asked in: 2023 31/4/1 Q29 (A)

♦ Life Processes

Human Digestive System – Role of Digestive Juices and Enzymes

Nutrition in Unicellular Organisms – Paramecium

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Model Answer

(A)(i) In Paramecium, food is taken in at a specific spot on the cell. Cilia covering the entire surface of the cell move and direct food particles to this spot, where they are ingested.

(ii)

(a) Hydrochloric acid – Creates an acidic medium in the stomach that facilitates the action of the enzyme pepsin.

(b) Trypsin – A pancreatic enzyme that digests proteins in the small intestine.

(c) Muscular walls of stomach – Help in mixing food thoroughly with digestive juices.

(d) Salivary amylase – Breaks down starch (complex carbohydrate) into simple sugars in the mouth.

Source: Chapter 5, Section 5.2.3 and 5.2.4

Explanation

- For Paramecium, the key points are: **definite shape**, food taken at a **specific spot**, and role of **cilia** — all three should be mentioned.
- For part (ii), each sub-point is worth roughly 1/2 mark, so one crisp line per item is enough.
- Examiners look for the correct enzyme–substrate pair: amylase→starch, trypsin→proteins, pepsin (activated by HCl)→proteins.
- Avoid confusing pepsin (stomach) with trypsin (pancreas/small intestine).

Q84. § 5.1 WHAT ARE LIFE PROCESSES? § 5.2.1 Autotrophic Nutrition § 5.5 EXCRETION

[3]

Answer the following:

- (a)(i) What is the first step in the breakdown of glucose during aerobic and anaerobic respiration ? Where does it take place ?
- (a)(ii) ATP is called the energy currency of the cell. Why ?
- (a)(iii) What is meant by residual volume of air in a breathing cycle ?

Previously asked in: 2023 31/2/1 Q29 (a)

♦ Life Processes

ATP as energy currency of the cell

Glycolysis – first step in breakdown of glucose (cytoplasm)

Residual volume of air in a breathing cycle

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Model Answer

(a)(i) The first step in the breakdown of glucose — in both aerobic and anaerobic respiration — is the splitting of glucose (a six-carbon molecule) into **pyruvate** (a three-carbon molecule). This process is called **glycolysis** and it takes place in the **cytoplasm** of the cell.

(a)(ii) ATP is called the energy currency of the cell because energy released during respiration is stored in ATP molecules. Whenever the cell needs energy for activities like muscle contraction, protein synthesis, or nerve impulse conduction, ATP is broken down to release a fixed, usable amount of energy (~30.5 kJ/mol).

(a)(iii) Residual volume is the volume of air that **always remains in the lungs** even after breathing out. It ensures sufficient time for oxygen to be absorbed into the blood and for carbon dioxide to be released from the blood into the alveoli.

Source: Chapter 5, Section 5.3 — Respiration

Explanation

- (i) Examiners expect the term "pyruvate/pyruvic acid," mention that it is a 3-carbon molecule, and the location — **cytoplasm**. Many students forget to say it applies to BOTH aerobic and anaerobic respiration.
- (ii) The key idea is that ATP **stores and releases** energy in fixed amounts for diverse cellular activities. Quoting the analogy to a battery or mentioning ~30.5 kJ/mol adds precision.
- (iii) "Residual volume" must be linked to its **purpose** (time for gas exchange), not just defined as leftover air — that's what earns the mark.

Q85.

[1]

During vigorous exercise, the occurrence of cramps in the outer muscles of an athlete is due to the conversion of pyruvate to :

- (a) Glucose
- (b) Ethanol
- (c) Lactic acid
- (d) Lactose

Previously asked in: 2023 31/2/1 Q10

♦ Life Processes

Anaerobic Respiration – Conversion of Pyruvate to Lactic Acid

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Model Answer

(c) Lactic acid

During vigorous exercise, anaerobic respiration occurs in muscle cells, converting pyruvate to lactic acid. Its accumulation causes painful muscle cramps.

Explanation

The key concept is **anaerobic respiration in animals**: when oxygen is insufficient (vigorous exercise), pyruvate → lactic acid (not ethanol, which occurs in yeast/plants). Lactose is a sugar, not a respiration product. Glucose is the starting material, not a product of pyruvate breakdown.

Q86.

§ 5.2.1 Autotrophic Nutrition

§ 5.3 RESPIRATION

§ 5.5 EXCRETION

[2]

Answer the following:

- (a) We need to water the soil in plants on a regular basis. But it ultimately reaches the leaves of the plant. Explain how this takes place. [2]

Previously asked in: 2024 31/4/1 Q23

♦ Life Processes

Transport of Water in Plants (Xylem and Transpiration Pull)

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Model Answer

Water absorbed by roots is transported to leaves through **xylem vessels** — a network of tube-like structures running from roots through the stem to leaves. This upward movement occurs due to **transpiration pull**: water evaporates from leaves through stomata, creating a suction force that pulls water continuously upward through the xylem.

Explanation

The examiner expects two key points: (1) the tissue responsible — **xylem**, and (2) the driving force — **transpiration pull** (loss of water vapour through stomata creates suction). Both points are needed for full marks. Avoid vague terms like "absorbed by stem"; be specific about the mechanism.

Q87. § 5.1 WHAT ARE LIFE PROCESSES? § 5.2.3 How do Organisms obtain their Nutrition? § 5.5 EXCRETION [1]

On the basis of the characteristics of the processes given in the brackets in each case, differentiate between the following :
Respiration in terrestrial animals and fishes (organs involved)

Previously asked in: 2025 31/3/1 Q29 (c)

♦ Life Processes

Respiration: Organs of Respiration in Terrestrial Animals vs. Fishes (Lungs vs. Gills)

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Model Answer

Terrestrial animals breathe through **lungs**, while fishes breathe through **gills**.

Explanation

This is a straightforward 1-mark factual difference. Just name the organ for each — lungs for terrestrial animals, gills for fishes. No extra detail needed.

Q88. § 5.1 WHAT ARE LIFE PROCESSES? § 5.3 RESPIRATION [1]

On the basis of the characteristics of the processes given in the brackets in each case, differentiate between the following :
Products of breakdown of pyruvate in aerobic and anaerobic respiration in human beings (product(s) of the processes)

Previously asked in: 2025 31/3/1 Q29 (a)

♦ Life Processes

Products of aerobic vs anaerobic breakdown of pyruvate in human beings

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Model Answer

In aerobic respiration, pyruvate breaks down into **carbon dioxide and water**. In anaerobic respiration (in human muscle cells), pyruvate converts into **lactic acid**.

Explanation

The examiner wants only the products, not the full process. Remember: in humans, anaerobic breakdown gives lactic acid (not ethanol + CO₂, which is yeast). State one product per condition clearly.

Source: Chapter 5, Section 5.3 Respiration

Q89. § 5.2.1 Autotrophic Nutrition § 5.2.3 How do Organisms obtain their Nutrition? § 5.4 TRANSPORTATION

[2]

Answer the following :

- (i) The transport system in plants is relatively slower than in animals. Give reasons. [1]
- (ii) State the role of phloem in the transport of materials in plants. [1]

Previously asked in: 2025 31/1/1 Q23 (b)

♦ Life Processes Role of phloem in transport of materials in plants

Transport system in plants vs animals – reasons for slower transport in plants

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Model Answer

- (i) Plants do not have a pumping organ like the heart. Transport in plants occurs through diffusion and osmosis, which are passive and slow processes. Also, plants have low energy demands, so a slower transport system is sufficient.
- (ii) Phloem transports food (sucrose/glucose) prepared by leaves during photosynthesis to all other parts of the plant — roots, stems, fruits, and seeds. This process is called translocation and requires energy (ATP).

Explanation

- (i) Key point: no pump + passive transport = slow. Contrast with animals that have a heart and circulatory system for fast transport.
- (ii) Phloem = food transport (not water). Remember: **Xylem = water/minerals (upward); Phloem = food (all directions)**. Mentioning "translocation" and "energy" scores full marks.

Q90. § 5.2.1 Autotrophic Nutrition

[1]

The breakdown of glucose has taken the following pathway :

Glucose → (a) Pyruvate + Energy → (b) Lactic acid + Energy

The sites 'a' and 'b' respectively are :

- (A) Mitochondria and Oxygen deficient muscle cells
- (B) Cytoplasm and Oxygen rich muscle cells
- (C) Cytoplasm and Yeast cells
- (D) Cytoplasm and Oxygen deficient muscle cells

Previously asked in: 2025 31/1/1 Q12

♦ Life Processes

Anaerobic Respiration – Breakdown of Glucose (Glycolysis and Lactic Acid Fermentation)

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Model Answer**(D) Cytoplasm and Oxygen deficient muscle cells**

Step 'a' (Glucose → Pyruvate) occurs in the **cytoplasm** (glycolysis). Step 'b' (Pyruvate → Lactic acid) occurs in **oxygen-deficient muscle cells** during anaerobic respiration.

Explanation

- Glycolysis always occurs in the cytoplasm — this is a fixed fact examiners test repeatedly.
- Lactic acid fermentation is specific to oxygen-starved muscle cells (not yeast — yeast produces ethanol + CO₂).
- Options B and C are wrong because aerobic/yeast pathways don't produce lactic acid.
- Option A is wrong because glycolysis does NOT occur in mitochondria.

Q91. § 5.2.4 Nutrition in Human Beings

[3]

In xylem tissue, vessels and tracheids of the roots, stems and leaves are interconnected to form a continuous system of water-conducting channels reaching all parts of the plant. Explain how this is achieved.

Previously asked in: 2026 31/3/1 Q13

♦ Life Processes

Water transport through xylem – vessels and tracheids forming continuous conducting channels

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Model Answer

In xylem tissue, vessels and tracheids have pits and perforations in their walls, allowing water to pass from cell to cell. The vessels are long, tube-like structures formed by the joining of many cells end-to-end, with cross walls dissolved away, forming a continuous hollow channel. Tracheids are interconnected through pits. These elements in roots, stems, and leaves are joined to each other, forming a continuous, unbroken network. Water absorbed by root hair cells moves laterally into the xylem and then travels upward through this network, reaching all plant parts.

Source: *Life Processes, Transport in Plants section*

Explanation

- The question tests understanding of **xylem as a continuous conducting system**.
- Key points examiners expect: (1) structure of vessels (end-to-end cells, dissolved cross walls), (2) role of pits in tracheids, (3) continuity from roots → stems → leaves.
- Since no source passage directly covers this topic, use your textbook knowledge from Chapter 6 (Life Processes). The answer above reflects standard NCERT Class 10 content on this topic.
- Avoid writing vague lines like "they are connected to each other" — explain **how** (pits, perforations, hollow tubes).

Q92. § 5.1 WHAT ARE LIFE PROCESSES? § 5.2.1 Autotrophic Nutrition

[2]

What kind of respiration provides more energy and why ?

Previously asked in: 2026 31/3/1 Q11

♦ Life Processes

Aerobic vs Anaerobic Respiration – Energy Comparison

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Model Answer**Aerobic respiration** provides more energy.

In aerobic respiration, glucose is completely broken down in the presence of oxygen, releasing a large amount of energy in the form of ATP. Anaerobic respiration breaks down glucose only partially (in the absence of oxygen), releasing far less energy.

Source: *Life Processes, Chapter 5 (What you have learnt)*

Explanation

- The source passage directly states: "*Aerobic respiration makes more energy available to the organism.*"
- Examiners expect two things: (1) naming aerobic respiration as the correct type, and (2) giving the reason — complete breakdown of glucose using oxygen releases more ATP/energy compared to the incomplete breakdown in anaerobic respiration.
- Keep the answer concise; one sentence naming the type and one sentence giving the reason is sufficient for 2 marks.

Q93. § 5.1 WHAT ARE LIFE PROCESSES? § 5.2.1 Autotrophic Nutrition § 5.3 RESPIRATION

[1]

Pravin was given a list of characteristics associated with the process of anaerobic respiration in humans, in the table given below :

Characteristic (i) Muscle Cell (ii) Requires presence of Oxygen (O₂) and Carbon dioxide (CO₂) (iii) 3-Carbon molecules

Which of the above characteristics is/are related to the above process ?

- (A) (i) and (ii)
- (B) (i) and (iii)
- (C) (ii) and (iii)
- (D) (i) only

Previously asked in: 2026 31/3/1 Q1

♦ Life Processes

Anaerobic Respiration in Humans (Lactic Acid Fermentation in Muscle Cells)

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Model Answer**(B) (i) and (iii)**

Anaerobic respiration in human muscle cells occurs without oxygen, producing lactic acid — a 3-carbon molecule. Hence characteristics (i) and (iii) are correct.

Explanation

- Anaerobic respiration in muscles does **not** require oxygen (so characteristic ii is wrong).
- It occurs in **muscle cells** when oxygen is insufficient (characteristic i ✓).
- Pyruvate → lactic acid, which is a **3-carbon molecule** (characteristic iii ✓).
- Examiners expect you to recall that anaerobic respiration in humans produces lactic acid (3C), not ethanol.

Q94. § 5.2.1 Autotrophic Nutrition § 5.3 RESPIRATION

[3]

Complete the pathways given below, showing the breakdown of glucose. Identify 'A', 'B', 'C', 'D', 'E' and 'F'.

Previously asked in: 2026 31/2/1 Q13

♦ Life Processes

Breakdown of Glucose – Aerobic and Anaerobic Respiration Pathways

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Model Answer

A = Glucose (6-carbon molecule) breaks down in the cytoplasm into **B = Pyruvate** (3-carbon molecule).

Pyruvate then follows two pathways:

Anaerobic pathway:

- In yeast: Pyruvate → **C = Ethanol** + **D = Carbon dioxide** (fermentation)
- In muscles (lack of O₂): Pyruvate → **E = Lactic acid**

Aerobic pathway:

- In mitochondria (presence of O₂): Pyruvate → **F = Carbon dioxide + Water** + Energy (ATP)

Source: Chapter 5, Section 5.3 – Respiration

Explanation

The examiner expects students to recall Figure 5.8 (Break-down of glucose by various pathways) from the textbook. Key points to remember:

- **A and B** are always the same regardless of pathway — glucose → pyruvate in cytoplasm.
- **C & D** are the anaerobic products in **yeast** (ethanol + CO₂).
- **E** is the anaerobic product in **muscle cells** (lactic acid — causes cramps).
- **F** represents aerobic end-products in mitochondria (CO₂ + H₂O + energy).
- Mention location (cytoplasm/mitochondria/yeast) for full marks.

Q95. § 5.3 RESPIRATION

[1]

Choose the equation of reaction that correctly represents anaerobic respiration in muscles :

- (A) Glucose → (Absence of O₂) Pyruvate → Ethanol + CO₂ + Energy
- (B) Glucose → (O₂) Pyruvate → (O₂) Energy
- (C) Glucose → (O₂) Pyruvate → (Lack of oxygen) Ethanol + Energy
- (D) Glucose → Pyruvate → (Lack of oxygen) Lactic acid + Energy

Previously asked in: 2026 31/5/1 Q3

♦ Life Processes

Anaerobic Respiration in Muscles

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Model Answer**(D) Glucose → Pyruvate → (Lack of oxygen) Lactic acid + Energy**

In muscle cells, when oxygen is lacking, pyruvate is converted to lactic acid (not ethanol). Ethanol + CO₂ is produced in yeast, not muscles.

Source: Life Processes, Section 5.3 Respiration

Explanation

The key distinction: anaerobic respiration **in muscles** produces **lactic acid**, while anaerobic respiration **in yeast** produces **ethanol + CO₂**. Options A and C describe yeast fermentation. Option B describes aerobic respiration. Examiners frequently test this difference, so always specify the organism/tissue when writing about anaerobic respiration.

Q96. § 5.4 TRANSPORTATION § 5.5 EXCRETION

[2]

What is the function of diaphragm in human respiratory system ? Where is it present in human body ?

Previously asked in: 2026 31/1/1 Q10

♦ Life Processes

Respiration in humans – role of diaphragm in breathing

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Model Answer

The **diaphragm** is a dome-shaped muscular partition that separates the chest cavity from the abdominal cavity. It is present below the lungs in the thoracic region.

Function: When the diaphragm contracts, it flattens and moves downward, increasing the volume of the chest cavity. This causes air to rush into the lungs (inhalation). When it relaxes, it moves upward, decreasing chest volume, forcing air out (exhalation). Thus, it plays a key role in the breathing mechanism.

Explanation

The diaphragm is not explicitly detailed in the source passages provided, but it is a standard part of the CBSE Class 10 Chapter 5 (Life Processes) curriculum on human respiration. Examiners expect students to mention **two things**: (1) its **location** (below the lungs / between thoracic and abdominal cavity) and (2) its **function** in breathing (contraction → inhalation; relaxation → exhalation). Both points carry 1 mark each. Avoid writing only one aspect.

Q97. § 5.1 WHAT ARE LIFE PROCESSES? § 5.2.1 Autotrophic Nutrition

[2]

"Transpiration in plants is a necessary evil."

Comment on the statement giving two reasons.

Previously asked in: 2026 31/4/1 Q10

♦ Life Processes

Transportation in Plants (Transpiration)

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Model Answer

Transpiration is called a "necessary evil" because:

1. **Evil (harmful):** Plants lose large amounts of water through stomata during transpiration, which can cause wilting and water stress, especially in dry conditions.
1. **Necessary (useful):** It creates a suction pull that helps in the upward transport of water and minerals from roots to leaves through xylem. It also helps in cooling the plant.

Explanation

The phrase "necessary evil" means something harmful but unavoidable because it also brings benefits.

Examiners expect **one reason why it is harmful** and **one reason why it is beneficial**. The key benefit is the transpiration pull driving water transport through xylem. Note: this topic is from Chapter 6 (Life Processes — Transport in Plants), which is in your syllabus even though the provided passages don't explicitly cover transpiration; these are standard NCERT-expected points.

Q98. § 5.2.1 Autotrophic Nutrition § 5.5 EXCRETION

[1]

Observe the following diagram and identify the process and its significance from the following options :

- (a) Evaporation : maintains water contents in leaf cells.
- (b) Transpiration : creates a suction force which pulls water inside the plant.
- (c) Excretion : helps in excreting out waste water from the plant.
- (d) Translocation : helps in transporting materials from one cell to another.

Previously asked in: 2023 31/4/1 Q8

♦ Life Processes

Transpiration and its role in water/nutrient transport (absorption of water and minerals)

Transportation in Plants (Transpiration)

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Model Answer

(b) Transpiration : creates a suction force which pulls water inside the plant.

Explanation

The diagram shows water vapour escaping from leaves through stomata — this is **transpiration**. Its key significance is that it creates a suction (transpiration pull) that draws water upward from roots through xylem. Options (a), (c), and (d) are incorrect as evaporation is a physical process, excretion refers to waste removal, and translocation involves transport of food, not water vapour loss.

Q99. § 5.2.2 Heterotrophic Nutrition

[1]

An organism which breaks down the food material outside the body and then absorbs it is

- (a) a plant parasite, Cuscuta
- (b) an animal parasite, Tapeworm
- (c) a bacteria, Rhizobium
- (d) a fungi, Rhizopus

Previously asked in: 2023 31/1/1 Q8

♦ Life Processes

Extracellular Digestion / Saprophytic Nutrition

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Model Answer**(d) a fungi, Rhizopus**

Fungi like Rhizopus break down food material outside their body and then absorb it. This is saprotrophic nutrition.

Explanation

The passage in section 5.2.2 explicitly states: *"Some organisms break-down the food material outside the body and then absorb it. Examples are fungi like bread moulds, yeast and mushrooms."* Rhizopus is a bread mould (fungus), so option (d) is correct. Cuscuta and Tapeworm are parasites; Rhizobium is a symbiotic bacterium — none of these digest food externally before absorbing it.

Q100. § 5.2.4 Nutrition in Human Beings**[2]**

State one role of each of the following in human digestive system :

- (i) Hydrochloric acid
- (ii) Villi
- (iii) Anal Sphincter
- (iv) Lipase

Previously asked in: 2024 31/1/1 Q22

♦ Life Processes

Role of Anal Sphincter in egestion

Role of Hydrochloric Acid in digestion

Role of Lipase in digestion of fats

Role of Villi in absorption

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Model Answer

(i) Hydrochloric acid: Creates an acidic medium in the stomach which facilitates the action of the enzyme pepsin.

(ii) Villi: Finger-like projections on the inner lining of the small intestine that increase surface area for absorption of digested food.

(iii) Anal sphincter: Regulates the exit of undigested/unabsorbed waste material from the body through the anus.

(iv) Lipase: Secreted in pancreatic juice; breaks down emulsified fats into fatty acids and glycerol.

Source: Chapter 5, Section 5.2.4 – Nutrition in Human Beings

Explanation

- This 2-mark question has 4 parts, so award roughly 1/2 mark each — keep each answer to **one line only**.
- Examiners look for the **key function word**: "acidic medium/pepsin" for HCl; "increase surface area/absorption" for villi; "regulates exit of waste" for anal sphincter; "breaks down emulsified fats" for lipase.
- Avoid vague answers like "helps in digestion" — be specific about *what* is digested or *what* process is aided.

Q101. § 5.2.3 How do Organisms obtain their Nutrition? § 5.2.4 Nutrition in Human Beings

[1]

Assertion (A) : Xylem tissue moves water and minerals obtained from the soil by the roots.

Reason (R) : Xylem tissue is found only in the roots of a plant.

- (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
- (B) Both Assertion (A) and Reason (R) are true and Reason (R) is not the correct explanation of the Assertion (A).
- (C) Assertion (A) is true, but Reason (R) is false.
- (D) Assertion (A) is false, but Reason (R) is true.

Previously asked in: 2025 31/6/1 Q18

♦ Life Processes Xylem tissue and transport of water and minerals

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Model Answer

(C) Assertion (A) is true, but Reason (R) is false.

Xylem transports water and minerals from roots to all parts of the plant; it is present throughout the plant — roots, stem, and leaves — not only in roots.

Explanation

The Assertion is correct (xylem = water + mineral transport). The Reason is false because xylem forms a continuous vascular network through roots, stem, and leaves. Since A is true but R is false, option (C) is correct. Examiners expect you to evaluate both statements independently before choosing.

Q102. § 5.2.1 Autotrophic Nutrition § 5.5 EXCRETION

[1]

In aerobic respiration, the steps are : breakdown of glucose to pyruvate and its further conversion to carbon dioxide. Both processes respectively occur in –

- A Vacuole and Cytoplasm
- B Chloroplast and Mitochondria
- C Mitochondria and Cytoplasm
- D Cytoplasm and Mitochondria

Previously asked in: 2025 31/5/1 Q12

♦ Life Processes Aerobic Respiration – Sites of Glycolysis and Pyruvate Oxidation (Cytoplasm and Mitochondria)

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Model Answer

Option D: Cytoplasm and Mitochondria

Breakdown of glucose to pyruvate occurs in the **cytoplasm**, and further breakdown of pyruvate to carbon dioxide (aerobic respiration) occurs in the **mitochondria**.

Explanation

The textbook (Section 5.3) clearly states: "The first step is the break-down of glucose into pyruvate — this takes place in the **cytoplasm**. Break-down of pyruvate using oxygen takes place in the **mitochondria**." This is a frequently asked fact; remember the sequence: Cytoplasm → Mitochondria for aerobic respiration.

Q103. § 5.2 NUTRITION § 5.2.1 Autotrophic Nutrition § 5.2.2 Heterotrophic Nutrition**[1]**

The essential element taken up from the soil by the plants to synthesize proteins is :

- (a) Phosphorus
- (b) Nitrogen
- (c) Iron
- (d) Magnesium

Previously asked in: 2025 31/4/1 Q5

♦ Life Processes

Nutrition in Plants – Mineral Absorption (Nitrogen for Protein Synthesis)

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Model Answer

(b) Nitrogen

Nitrogen is the essential element taken up from the soil by plants to synthesize proteins.

Explanation

Proteins contain nitrogen as a key element. Plants absorb nitrogen from the soil (as nitrates/nitrites) to build amino acids and proteins. The other options — phosphorus, iron, and magnesium — serve different functions and are not the primary element for protein synthesis. This is a straightforward factual question; just recall that proteins = nitrogen.

Q104. § 5.2.2 Heterotrophic Nutrition § 5.2.3 How do Organisms obtain their Nutrition? § 5.2.4 Nutrition in Human Beings**[2]**

In the process of digestion of food in human beings, two protein-digesting enzymes are secreted. Name the enzymes along with the glands that secrete them.

Previously asked in: 2023 31/5/1 Q24

♦ Life Processes

Protein-digesting enzymes in human digestion (Pepsin from gastric glands and Trypsin from pancreas)

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Model Answer

Two protein-digesting enzymes secreted during digestion:

1. **Pepsin** — secreted by the **gastric glands** present in the walls of the stomach.
2. **Trypsin** — secreted by the **pancreas** (in pancreatic juice) into the small intestine.

Source: Life Processes, Section 5.2.4

Explanation

The question specifically asks for **protein-digesting** enzymes, so do not include salivary amylase (digests starch) or lipase (digests fats). Examiners expect both the enzyme name **and** the secreting gland for full marks — one mark per enzyme-gland pair. Note that intestinal juice also converts proteins to amino acids, but the question asks for named enzymes with named glands; pepsin + gastric glands and trypsin + pancreas are the clearest, textbook-stated pairs.

Q105.

[2]

Answer either (a) or (b):

- (a) Sometimes while running, the athletes suffer from muscle cramps. Why ? How is the respiration in this case different from aerobic respiration ? [2]

Previously asked in: 2024 31/5/1 Q23

♦ Life Processes

Anaerobic Respiration and Muscle Cramps

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Model Answer

During intense running, oxygen supply to muscle cells becomes insufficient. The muscles then break down pyruvate into **lactic acid** (anaerobic respiration) instead of carbon dioxide and water. The build-up of lactic acid causes muscle cramps.

Difference from aerobic respiration:

- Anaerobic respiration occurs **without oxygen**; aerobic requires oxygen.
- Aerobic respiration completely breaks down glucose $\rightarrow \text{CO}_2 + \text{H}_2\text{O}$, releasing **more energy**. Anaerobic respiration produces lactic acid and releases **less energy**.

Source: Life Processes, Section 5.3 Respiration

Explanation

The examiner expects two points: (1) reason for cramps = lactic acid build-up due to lack of oxygen, and (2) difference = no oxygen used, product is lactic acid (not $\text{CO}_2 + \text{H}_2\text{O}$), and less energy released. Both points are needed for full 2 marks. Don't confuse anaerobic in muscles ($\rightarrow$ lactic acid) with anaerobic in yeast ($\rightarrow$ ethanol + CO_2).

Q106. § 5.4 TRANSPORTATION § 5.5 EXCRETION**[4]**

Kidneys are vital organs for survival. Several factors like infections, injury or restricted blood flow to kidneys reduce the activity of kidneys. This leads to accumulation of poisonous wastes in the body, which can even lead to death. In case of kidney failure, an artificial kidney can be used. An artificial kidney is a device to remove waste products from the blood through dialysis.

Answer the following questions :

- (a) (i) Name the artery that brings oxygenated blood to the kidney. (ii) Name the cluster of thin-walled blood capillaries present in the Bowman's capsule. [1]
- (b) In human excretory system name the organ which stores urine. Is this organ under hormonal control or nervous control ? [1]
- (c) Answer either (i) or (ii): [2]

Previously asked in: 2024 31/4/1 Q38

♦ Life Processes

Artificial Kidney (Dialysis)

Glomerulus and Bowman's Capsule

Human Excretory System – Kidney Structure and Function

Urinary Bladder – Storage and Control of Urine

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I notice sub-question (c) is incomplete — the two options (i) and (ii) are not provided. I'll answer (a) and (b) fully, and note the gap for (c).

Model Answer**(a)**

(i) **Renal artery** brings oxygenated blood to the kidney.

(ii) The cluster of thin-walled blood capillaries in the Bowman's capsule is called the **glomerulus**.

(b) The **urinary bladder** stores urine. It is under **nervous control** — the stretching of the bladder wall sends a signal to the brain, which initiates the urge to urinate.

(c) (Sub-question (c) options (i) and (ii) are missing from the question. Please provide the options so this part can be answered.)

Source: Life Processes, Excretion in Human Beings

Explanation

- **Renal artery / glomerulus** are standard one-word answers examiners expect; spelling must be correct.
- For (b), many students confuse hormonal and nervous control — urinary bladder is **nervous** (not hormonal). State the organ + type of control + a brief reason for full marks.
- For (c), once the options are provided, budget ~40–50 words (about 4 points) for a 2-mark answer.

Q107. § 5.2.1 Autotrophic Nutrition § 5.2.2 Heterotrophic Nutrition § 5.2.3 How do Organisms obtain their Nutrition?**[1]**

In human beings, when the process of digestion is completed, the (i) proteins, (ii) carbohydrates, and (iii) fats are respectively finally converted into :

- A (i) Amino acids, (ii) glucose and (iii) fatty acids
- B (i) Amino acids, (ii) glucose, (iii) fatty acids and glycerol
- C (i) Glucose, (ii) fatty acids and glycerol, (iii) amino acids
- D (i) Sugars, (ii) amino acids, (iii) fatty acids and glycerol

Previously asked in: 2024 31/4/1 Q6

♦ Life Processes End products of digestion of proteins, carbohydrates, and fats

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Model Answer

Option B: (i) Amino acids, (ii) glucose, (iii) fatty acids and glycerol.

Explanation

Proteins are digested into amino acids, carbohydrates into glucose, and fats into fatty acids **and** glycerol — both end-products of fat digestion must be mentioned. Option A is wrong as it omits glycerol.

Q108. § 5.2.4 Nutrition in Human Beings § 5.3 RESPIRATION**[5]**

Answer the following:

- (i) State the role of rings of cartilage present in the throat. [1]
- (ii) Discuss the role of the ribs and diaphragm when air is taken in during the breathing cycle. [2]
- (iii) Why do we get muscle cramps during heavy exercise ? Explain. [2]

Previously asked in: 2025 31/2/1 Q35 (b)

♦ Life Processes

Anaerobic respiration and muscle cramps during exercise

Role of cartilage rings in the trachea

Role of ribs and diaphragm in inhalation (breathing cycle)

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Model Answer

- (i) Rings of cartilage in the throat ensure that the air-passage (trachea) does not collapse, keeping it open for continuous airflow to the lungs.
- (ii) When air is taken in (inhalation), the ribs move upward and outward, and the diaphragm moves downward and becomes flattened. These movements increase the volume of the chest cavity. As a result, air pressure inside decreases and air is sucked into the lungs, filling the expanded alveoli.
- (iii) During heavy exercise, the muscle cells may not receive sufficient oxygen. In the absence of adequate oxygen, pyruvate (formed from glucose) is converted into **lactic acid** instead of being broken down aerobically. This lactic acid builds up in the muscle cells, causing muscle cramps. The cramps disappear once the oxygen supply is restored and lactic acid is broken down.

Source: Chapter 5, Section 5.3 — Respiration

Explanation

- (i) is a direct one-liner fact from the text — just state the function clearly.
- (ii) Name both structures (ribs AND diaphragm), state the direction of their movement, link it to increased chest volume → decreased pressure → air sucked in. Two marks = two clear steps.
- (iii) The key chain is: heavy exercise → lack of O₂ → anaerobic pathway in muscles → pyruvate → **lactic acid** → cramps. The word *lactic acid* is essential for full marks. Examiners also expect you to mention that it is a 3-carbon molecule (optional but good) and that it is the *build-up* that causes cramps.

Q109. § 5.2.2 Heterotrophic Nutrition § 5.2.3 How do Organisms obtain their Nutrition? § 5.2.4 Nutrition in Human Beings**[5]**

Answer the following:

- (i) "The length of the small intestine in various animals depends on the food they eat." Justify the statement. [2]
- (ii) Discuss the role of the pancreas and bile juice in the digestion of food in human beings. [2]
- (iii) How is the small intestine designed to absorb digested food ? [1]

Previously asked in: 2025 31/2/1 Q35 (a)

♦ Life Processes

Length of small intestine in relation to diet (herbivores vs carnivores)

Role of pancreas and bile juice in digestion

Structure and adaptations of small intestine for absorption of digested food

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Model Answer

(i) Herbivores like cows eat grass, which is rich in cellulose and difficult to digest, so they have a **longer small intestine** to allow complete digestion. Carnivores like tigers eat meat, which is easier to digest, so they have a **shorter small intestine**. Thus, the length of the small intestine is related to the type of food consumed.

(ii) The **pancreas** secretes pancreatic juice which contains enzymes that digest carbohydrates, proteins, and fats. **Bile juice**, produced by the liver and stored in the gall bladder, is released into the small intestine. It does not contain enzymes but helps in the **emulsification of fats** — breaking large fat globules into smaller ones — which makes it easier for enzymes to act on them. Bile also makes the medium alkaline, which is necessary for enzyme action.

(iii) The inner lining of the small intestine has finger-like projections called **villi**, which greatly increase the surface area for absorption. Villi have a rich network of blood vessels that absorb the digested food into the blood.

Explanation

- For (i), the key idea is herbivores vs. carnivores and the relative difficulty of digesting plant vs. animal material.
- For (ii), examiners expect two separate roles: pancreatic juice (enzyme-based digestion) and bile (emulsification + alkaline medium).
- For (iii), just name **villi**, state their function (increase surface area), and mention blood vessels — that covers 1 mark fully.

Q110. § 5.1 WHAT ARE LIFE PROCESSES? § 5.2 NUTRITION**[1]**

Assertion (A) : Animals will not get energy if they eat (consume) coal as food.

Reason (R) : Specific enzymes are needed for the breakdown of a particular food.

- (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
- (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).
- (C) Assertion (A) is true, but Reason (R) is false.
- (D) Assertion (A) is false, but Reason (R) is true.

Previously asked in: 2025 31/2/1 Q20

♦ Life Processes

Enzymes and digestion of food substances

Nutrition and energy release from food

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(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

Animals lack the specific enzymes needed to break down coal, so no energy can be released from it for use by the body.

Explanation

Both statements are correct and directly linked. The textbook states that heterotrophs use **enzymes (bio-catalysts)** to break down complex food substances. Coal is not a biological food material, so no enzyme exists to digest it, making energy extraction impossible. R correctly explains A — hence option (A) is the answer. Watch for traps: option (B) applies when both are true but unrelated; here the link is direct.

Q111. § 5.2.3 How do Organisms obtain their Nutrition? § 5.2.4 Nutrition in Human Beings § 5.3 RESPIRATION**[1]**

Pancreas secretes pancreatic juice which contain certain enzyme that helps in digestion of food. Choose the correct option from the following :

- A Trypsin digests emulsified fats and lipase digests proteins.
- B Trypsin digests proteins and lipase digests emulsified fats.
- C Trypsin and lipase both digests fats.
- D Trypsin digests proteins and lipase digests carbohydrates.

Previously asked in: 2026 31/1/1 Q5

♦ Life Processes

Digestion in humans - pancreatic enzymes

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Answer: (B) Trypsin digests proteins and lipase digests emulsified fats.

Explanation

The textbook (section 5.2.4) explicitly states: *"The pancreas secretes pancreatic juice which contains enzymes like trypsin for digesting proteins and lipase for breaking down emulsified fats."* Options A, C, and D incorrectly swap or combine these functions. Always remember: **trypsin** → **proteins**; **lipase** → **emulsified fats**.

Q112. § 5.4 TRANSPORTATION

[5]

Option (B):

- (a) Draw a well-labelled diagram of nephron and label atleast 4 of its parts.
- (b) Write the role of capillary cluster inside Bowman's capsule.
- (c) What is meant by selective reabsorption ?

Previously asked in: 2026 31/4/1 Q16 (B)

♦ Life Processes

Excretion in humans - structure of nephron

Glomerulus and filtration in Bowman's capsule

Selective reabsorption in nephron

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Model Answer

(a) Diagram of Nephron:

Bowman's Capsule

|

Glomerulus (capillary cluster)

|

Proximal Convolutud Tubule (PCT)

|

Loop of Henle

|

Distal Convolutud Tubule (DCT)

|

Collecting Duct

(A well-labelled diagram should show: Bowman's capsule, Glomerulus, PCT, Loop of Henle, DCT, and Collecting duct — at least 4 parts labelled.)

(b) Role of capillary cluster (Glomerulus) inside Bowman's capsule:

The capillary cluster inside the Bowman's capsule is called the **glomerulus**. Blood is filtered here under high pressure. Water, glucose, amino acids, urea, and salts pass from the blood into the Bowman's capsule as filtrate. This process is called **ultrafiltration**.

(c) Selective Reabsorption:

As the filtrate passes through the tubular part of the nephron, useful substances such as glucose, amino acids, salts, and water are reabsorbed back into the blood capillaries surrounding the tubule. This process of absorbing only useful substances (and not waste like urea) back into the blood is called **selective reabsorption**.

Explanation

- The diagram carries most marks in part (a); label at least 4 parts clearly with arrows.
- For (b), the key terms examiners look for are **glomerulus**, **filtration/ultrafiltration**, and the substances filtered (glucose, urea, salts, water).

- For (c), stress the word "selective" — not everything is reabsorbed; only useful substances are, while wastes remain in the filtrate. This distinction is what earns marks.

Q113.**[2]**

Varun is diabetic. His latest ultrasound reports showed a blockage in his pancreatic duct. How will this affect the dual functioning of the pancreas ?

Previously asked in: 2026 31/4/1 Q12 (A)

♦ Life Processes

Digestive Glands and Pancreas (Dual Endocrine-Exocrine Function)

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The pancreas acts as both an **exocrine** and an **endocrine** gland.

- **Exocrine function** (affected): A blockage in the pancreatic duct will prevent pancreatic juice (containing enzymes like trypsin and lipase) from reaching the small intestine, thus hampering digestion of proteins and fats.
- **Endocrine function** (unaffected): The secretion of **insulin** directly into the blood does not depend on the pancreatic duct, so blood sugar regulation continues. However, since Varun is diabetic, his insulin secretion is already impaired.

Source: Chapter 5, Section 5.2.4 – Nutrition in Human Beings

Explanation

- The key distinction here is **exocrine** (duct-dependent) vs **endocrine** (ductless, directly into blood).
- Examiners expect students to name the affected enzymes (trypsin, lipase) and state that digestion will be impaired.
- Mentioning insulin and that endocrine function is unaffected by the duct blockage earns the second mark.
- The diabetes reference in the question is a hint to link back to insulin/endocrine function — address it briefly.

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