CLASS 9 • BIOLOGY • MCQ PRACTICE BANK

Chapter 8

Plant Physiology

A complete, solved multiple-choice question bank covering Transport in Plants, Root Structure, Transpiration & Stomata, Transport of Water, Translocation of Food (Pressure Flow Mechanism), and Osmotic Adjustments in Plants.

60	4	100%
Solved MCQs	Options Each	With Explanations

Answer key highlighted & ticked ✓

Reference: **scholareye.xyz**

🌱 Solved MCQs — Chapter 8: Plant Physiology

Correct answers highlighted in green

Q1

CHAPTER 8 • PLANT PHYSIOLOGY

What is the movement of substances such as water, nutrients, hormones and waste products within an organism called?

A Transpiration

B **Transport** ✓

C Translocation

D Osmosis

Correct Answer: B

💡**Explanation:** Transport means the movement of substances within an organism. It is essential for cellular functions, growth, and responses to environmental changes.

Q2

CHAPTER 8 • PLANT PHYSIOLOGY

In all land plants (except mosses and liverworts), transport of water, salts and food is carried out by which two tissues?

A Epidermis and cortex

B **Xylem and phloem** ✓

C Cortex and pericycle

D Endodermis and pericycle

Correct Answer: B

💡**Explanation:** Xylem is responsible for the transport of water and salts, while phloem is responsible for the transport of food.

Q3

CHAPTER 8 • PLANT PHYSIOLOGY

Which tissue is responsible for the transport of water and salts in plants?

A Phloem

B Cortex

C Xylem ✓

D Epidermis

Correct Answer: C

Explanation: Xylem forms a continuous pipe-like system that carries water and dissolved salts from roots to the rest of the plant.

Q4

CHAPTER 8 • PLANT PHYSIOLOGY

Which tissue is responsible for the transport of food in plants?

A Xylem

B Phloem ✓

C Epidermis

D Pericycle

Correct Answer: B

Explanation: Phloem transports the food (mainly sucrose) prepared by leaves to all other parts of the plant body.

Q5

CHAPTER 8 • PLANT PHYSIOLOGY

The movement of ions or molecules across a cell membrane from a region of higher concentration to a region of lower concentration, without requiring energy, is called:

A Active transport

B **Passive transport** ✓

C Translocation

D Transpiration

Correct Answer: B

Explanation: Passive transport moves particles down their concentration gradient and does not require energy. Diffusion and osmosis are examples of passive transport.

Q6

CHAPTER 8 • PLANT PHYSIOLOGY

Osmosis is best defined as the movement of:

A Solute molecules through any membrane

B **Water molecules through a semi-permeable membrane from a region of lower solute concentration to higher solute concentration** ✓

C Ions using energy against a gradient

D Food molecules from source to sink

Correct Answer: B

Explanation: Osmosis is the movement of water molecules through a semi-permeable membrane from a region of lower solute concentration to a region of higher solute concentration. This movement does not require energy.

Q7

CHAPTER 8 • PLANT PHYSIOLOGY

The outermost covering of the root, made up of a single layer of cells, is called the:

A Cortex

B **Epidermis** ✓

C Endodermis

D Pericycle

Correct Answer: B

Explanation: Epidermis is the outermost single layer of cells covering the root. Many of its cells form root hairs.

Q8

CHAPTER 8 • PLANT PHYSIOLOGY

Root hairs are hair-like extensions of which root layer?

A Cortex

B **Epidermis** ✓

C Pericycle

D Endodermis

Correct Answer: B

Explanation: Many cells of the epidermis have tiny hair-like extensions into the spaces among soil particles — these are the root hairs.

Q9

CHAPTER 8 • PLANT PHYSIOLOGY

Root hairs greatly improve water and salt absorption mainly because they:

A Contain chloroplasts

B **Have a large surface area in direct contact with soil water** ✓

C Produce their own food

D Store starch grains

Correct Answer: B

Explanation: Root hairs have a large surface area and are in direct contact with soil water, which makes absorption of water and salts highly efficient.

Q10

CHAPTER 8 • PLANT PHYSIOLOGY

Compared with root hairs, soil water has a _____ concentration of salts.

A Higher

B **Lower** ✓

C Exactly equal

D Zero

Correct Answer: B

Explanation: The soil water has a lower concentration of salts as compared to the root hair. This difference drives active uptake of salts into the root hair.

Q11

CHAPTER 8 • PLANT PHYSIOLOGY

Root hairs take up salts from the soil by which process?

A Osmosis

B Simple diffusion

C **Active transport** ✓

D Guttation

Correct Answer: C

Explanation: Because salt concentration is higher inside the root hair than in the soil, salts must be taken up against the gradient — this requires active transport.

Q12

CHAPTER 8 • PLANT PHYSIOLOGY

After salts are actively absorbed into the root hair, water moves into the root hair from the soil by:

A Active transport

B **Osmosis** ✓

C Guttation

D Facilitated diffusion of gases

Correct Answer: B

Explanation: Once solute concentration rises inside the root hair, water follows passively by osmosis, moving from the soil (lower solute) into the root hair (higher solute).

Q13

CHAPTER 8 • PLANT PHYSIOLOGY

The broad zone of cells just inside the epidermis of the root, through which water moves after entering the root hairs, is the:

A Endodermis

B Pericycle

C Cortex ✓

D Vascular bundle

Correct Answer: C

Explanation: Cortex is a broad zone of cells just inside the epidermis. Water moves from the epidermis to the cortex.

Q14

CHAPTER 8 • PLANT PHYSIOLOGY

Which root layer forms the innermost boundary of the cortex and receives water from it?

A Epidermis

B Endodermis ✓

C Pericycle

D Xylem

Correct Answer: B

Explanation: The endodermis is the innermost boundary of the cortex and receives water passed on from the cortex.

Q15

CHAPTER 8 • PLANT PHYSIOLOGY

The narrow layer of cells present just on the inner side of the endodermis is called the:

A Cortex

B **Pericycle** ✓

C Epidermis

D Phloem

Correct Answer: B

Explanation: Pericycle is a narrow layer of cells present on the inner side of the endodermis.

Q16

CHAPTER 8 • PLANT PHYSIOLOGY

Xylem and phloem, present in the innermost region of the root, are collectively known as the:

A Root hair system

B **Vascular bundle** ✓

C Pericycle

D Endodermal ring

Correct Answer: B

Explanation: Xylem and phloem together, in the centre of the root, are collectively called the vascular bundle.

Q17

CHAPTER 8 • PLANT PHYSIOLOGY

Inside the root, water and salts take two pathways to reach the centre. These are:

- **A** **Through the cells, and through cell walls / intercellular spaces** ✓
- **B** Through xylem only and phloem only
- **C** Through stomata and lenticels
- **D** Through the cortex only, in both directions

Correct Answer: A

Explanation: As shown in the root diagram, water and salts travel either through the cells themselves or through the cell walls and intercellular spaces to reach the vascular bundle.

Q18

CHAPTER 8 • PLANT PHYSIOLOGY

Water from the pericycle of the root moves into which structure to continue its journey to the stem?

- **A** Phloem of the root
- **B** **Xylem of the root** ✓
- **C** Cortex
- **D** Epidermis

Correct Answer: B

Explanation: Water from the pericycle moves into the xylem of the root, from where it is transported into the xylem of the stem through the similar connecting pipe.

Q19

CHAPTER 8 • PLANT PHYSIOLOGY

The loss of water in the form of vapours from the plant surface is called:

A Osmosis

B **Transpiration** ✓

C Guttation

D Active absorption

Correct Answer: B

Explanation: Transpiration is defined as the loss of water in the form of vapours from the plant surface.

Q20

CHAPTER 8 • PLANT PHYSIOLOGY

Most transpiration in plants occurs through the:

A Cuticle

B Lenticels

C **Stomata** ✓

D Root hairs

Correct Answer: C

Explanation: Most transpiration occurs through the stomata present in leaves, and this is called stomatal transpiration.

Q21

CHAPTER 8 • PLANT PHYSIOLOGY

A small amount of water is also lost from leaves through a waxy covering called the:

- **A Cuticle** ✓
- B Cortex
- C Endodermis
- D Pericycle

Correct Answer: A

Explanation: Some transpiration occurs through the cuticle present on the leaf epidermis, in addition to stomatal transpiration.

Q22

CHAPTER 8 • PLANT PHYSIOLOGY

Special pore-like openings present in the stems of some plants, through which transpiration also occurs, are called:

- A Stomata
- **B Lenticels** ✓
- C Guard cells
- D Sieve pores

Correct Answer: B

Explanation: Lenticels are openings present in the stems of some plants through which transpiration can also take place.

Q23

CHAPTER 8 • PLANT PHYSIOLOGY

In leaves, water evaporates into the air spaces after moving from the xylem into the moist cell walls of the:

A Epidermal cells

B Guard cells

C Mesophyll cells ✓

D Pericycle cells

Correct Answer: C

Explanation: Water moves from the xylem into the cell walls of mesophyll cells; from these moist walls, water evaporates into the air spaces of the leaf and then passes out through the stomata.

Q24

CHAPTER 8 • PLANT PHYSIOLOGY

Which epidermal cells are unique in containing chloroplasts?

A Ordinary epidermal cells

B Guard cells ✓

C Cortex cells

D Pericycle cells

Correct Answer: B

Explanation: Guard cells are the only epidermal cells that contain chloroplasts, which allow them to photosynthesize and produce glucose.

Q25

CHAPTER 8 • PLANT PHYSIOLOGY

Stomata open and close mainly because of changes in the _____ of guard cells.

A Chlorophyll content

B Turgor pressure ✓

C Nuclear size

D Cell-wall colour

Correct Answer: B

Explanation: Stomata open and close because of changes in the turgor pressure of the sausage-shaped guard cells.

Q26

CHAPTER 8 • PLANT PHYSIOLOGY

The cell wall of a guard cell is:

A Thicker on the outside, thinner on the inside

B Thicker on the inside, thinner elsewhere ✓

C Uniformly thick all around

D Uniformly thin all around

Correct Answer: B

Explanation: The guard cell wall is thicker on the inside and thinner elsewhere. This uneven thickening makes the cell bow outward into a bean-shape when turgid, opening the stoma.

Q27

CHAPTER 8 • PLANT PHYSIOLOGY

When guard cells become turgid, they become:

A Flaccid and straight, closing the stoma

B Bean-shaped, opening the stoma between them ✓

C Shrunken, sealing the pore completely

D Rigid and immovable

Correct Answer: B

Explanation: When turgid, guard cells become bean-shaped and their inner walls move away from each other, opening the stoma.

Q28

CHAPTER 8 • PLANT PHYSIOLOGY

During daytime, guard cells take up which ions by active transport, raising their solute concentration?

A Sodium ions

B Calcium ions

C Potassium ions ✓

D Chloride ions alone

Correct Answer: C

Explanation: During the day, guard cells actively take in potassium ions from surrounding epidermal cells, which increases their solute concentration.

Q29

CHAPTER 8 • PLANT PHYSIOLOGY

As potassium ions build up in guard cells during the day, water enters them from epidermal cells by:

A Active transport

B **Osmosis** ✓

C Diffusion of gases

D Guttation

Correct Answer: B

Explanation: Because the solute concentration of guard cells rises above that of nearby epidermal cells, water moves into the guard cells by osmosis, making them turgid.

Q30

CHAPTER 8 • PLANT PHYSIOLOGY

Guard cells stay turgid during daytime partly because they:

A Store only starch

B **Photosynthesize and produce glucose, keeping solute concentration high** ✓

C Lack chloroplasts entirely

D Continuously lose potassium ions

Correct Answer: B

Explanation: Since guard cells contain chloroplasts, they photosynthesize and make glucose during the day, keeping their solute concentration — and hence turgor — high.

Q31

CHAPTER 8 • PLANT PHYSIOLOGY

At evening, what happens to the potassium ion concentration inside guard cells?

A It keeps increasing

B It falls, as ions move back into epidermal cells ✓

C It stays exactly the same

D It converts completely into starch instantly

Correct Answer: B

Explanation: At evening, glucose concentration falls and potassium ions move back to the epidermal cells, lowering the solute concentration of the guard cells.

Q32

CHAPTER 8 • PLANT PHYSIOLOGY

In the evening, as solute concentration in guard cells falls, water moves _____ the guard cells and the stomata _____.

A into; open

B out of; close ✓

C into; close

D out of; remain open

Correct Answer: B

Explanation: Water moves out of the guard cells by osmosis, the cells lose turgor, their inner walls touch each other, and the stoma closes.

Q33

CHAPTER 8 • PLANT PHYSIOLOGY

Since roots cannot push water up to the leaves, the pulling force created by transpiration is called:

A Root pressure

B **Transpirational pull** ✓

C Guttation pressure

D Guard-cell tension

Correct Answer: B

Explanation: The leaves apply a pulling force on the water in the roots, created by transpiration from their surfaces — this is called the transpirational pull.

Q34

CHAPTER 8 • PLANT PHYSIOLOGY

Transpirational pull is generated mainly by:

A Active transport occurring in the roots

B **Transpiration (evaporation of water) from the leaf surfaces** ✓

C Photosynthesis occurring in mesophyll cells

D Osmosis occurring only in guard cells

Correct Answer: B

Explanation: As mesophyll cells lose water by transpiration, they draw more water from the xylem, creating a pull that is transmitted down the entire water column.

Q35

CHAPTER 8 • PLANT PHYSIOLOGY

Which of the following is NOT one of the three reasons the water column inside xylem vessels stays continuous?

A Forces of attraction among water molecules

B The narrow diameter of xylem vessels

C Adhesion of water molecules to xylem vessel walls

D Active pumping of water by companion cells ✓

Correct Answer: D

Explanation: The continuous water column is maintained by cohesion between water molecules, the narrow diameter of xylem vessels, and adhesion of water to the vessel walls — not by any active pumping.

Q36

CHAPTER 8 • PLANT PHYSIOLOGY

When a water molecule moves up through the xylem of a leaf, it produces a _____ on the entire water column, pulling it upward.

A Pressure

B Tension ✓

C Turgor force

D Osmotic push

Correct Answer: B

Explanation: The movement of a water molecule up the leaf xylem produces a tension on the whole water column in the xylem of leaves, stem, and root, pulling it upward.

Q37

CHAPTER 8 • PLANT PHYSIOLOGY

Which statement correctly compares xylem and phloem as transport passages?

A Xylem is a two-way passage for water; phloem is a one-way passage for food

B Xylem is a one-way passage for water and salts (roots to leaves); phloem is a two-way passage for food ✓

C Both xylem and phloem are strictly one-way passages

D Both xylem and phloem are strictly two-way passages

Correct Answer: B

Explanation: Xylem carries water and salts only one way, from roots to leaves. Phloem is a two-way passage — the direction of food movement is decided by supply and demand at the sources and sinks.

Q38

CHAPTER 8 • PLANT PHYSIOLOGY

The direction of food movement inside the phloem is decided mainly by:

A Gravity alone

B Supply and demand at the sources and sinks ✓

C Root pressure alone

D Atmospheric humidity

Correct Answer: B

Explanation: Because phloem is a two-way passage, the direction food moves in depends on where it is being supplied from (source) and where it is demanded (sink).

Q39

CHAPTER 8 • PLANT PHYSIOLOGY

The mechanism by which food is transported through phloem is called the:

A Cohesion-tension mechanism

B **Pressure flow mechanism** ✓

C Active absorption mechanism

D Guttation mechanism

Correct Answer: B

Explanation: Translocation of food in phloem occurs by the pressure flow mechanism.

Q40

CHAPTER 8 • PLANT PHYSIOLOGY

In most plants, glucose is converted into _____ before being transported in the phloem.

A Starch

B **Sucrose** ✓

C Fructose

D Cellulose

Correct Answer: B

Explanation: For transportation in most plants, glucose is converted into sucrose, which is then loaded into the sieve tubes.

Q41

CHAPTER 8 • PLANT PHYSIOLOGY

According to the pressure flow mechanism, dissolved food flows from a:

A Sink to a source

B Source to a sink ✓

C Leaf to root only, never the reverse

D Stem to leaf only

Correct Answer: B

Explanation: The pressure flow mechanism states that dissolved food flows from a source (where it is made or stored) to a sink (where it is used or stored).

Q42

CHAPTER 8 • PLANT PHYSIOLOGY

Along with the sites of food utilization (e.g., growing tips), which tissues also act as sinks in the pressure flow mechanism?

A Photosynthetic mesophyll tissues

B Storage tissues ✓

C Root hairs

D Guard cells

Correct Answer: B

Explanation: Sinks include the sites of food utilization, such as growing tips of roots and stems, and also the storage tissues.

Q43

CHAPTER 8 • PLANT PHYSIOLOGY

At the source site, sucrose enters the sieve tubes of phloem by:

A Passive diffusion

B Osmosis

C **Active transport** ✓

D Guttation

Correct Answer: C

Explanation: At the source, food (sucrose) enters the sieve tubes of phloem by active transport.

Q44

CHAPTER 8 • PLANT PHYSIOLOGY

Which cells of the phloem supply the energy needed for active transport of sucrose into the sieve tubes?

A Guard cells

B **Companion cells** ✓

C Cortex cells

D Pericycle cells

Correct Answer: B

Explanation: Companion cells of the phloem provide the energy required for the active transport of sucrose at the source.

Q45

CHAPTER 8 • PLANT PHYSIOLOGY

At the source, because sieve tubes have a higher solute concentration than nearby xylem, water enters the sieve tubes by:

A Active transport

B **Osmosis** ✓

C Diffusion of gases

D Guttation

Correct Answer: B

Explanation: Due to the higher solute concentration in sieve tubes compared to the nearby xylem tissue, water flows into the sieve tubes by osmosis.

Q46

CHAPTER 8 • PLANT PHYSIOLOGY

As water enters the sieve tubes at the source, the fluid pressure inside them:

A Decreases sharply

B **Increases, pushing the food solution toward the sink** ✓

C Stays exactly constant

D Becomes negative

Correct Answer: B

Explanation: The inflow of water increases the fluid pressure in the sieve tubes, and this pushes the food solution in bulk towards the sink.

Q47

CHAPTER 8 • PLANT PHYSIOLOGY

At the sink, sucrose is removed from the sieve tubes into the sink tissue by:

A Osmosis

B **Active transport** ✓

C Passive diffusion only

D Transpiration

Correct Answer: B

Explanation: At the sink, sucrose is actively unloaded from the sieve tubes into the sink tissues.

Q48

CHAPTER 8 • PLANT PHYSIOLOGY

After sucrose is unloaded at the sink, water also moves out of the sieve tubes into the:

A Cortex

B **Xylem** ✓

C Epidermis

D Pericycle

Correct Answer: B

Explanation: Water moves by osmosis from the sieve tubes into the xylem at the sink, following the sucrose that was unloaded.

Q49

CHAPTER 8 • PLANT PHYSIOLOGY

The loss of water from sieve tubes into the xylem at the sink causes the fluid pressure in the sieve tubes to:

A Increase further

B Reduce ✓

C Remain unchanged

D Become equal to atmospheric pressure

Correct Answer: B

Explanation: As water leaves the sieve tubes at the sink, it reduces the fluid pressure there.

Q50

CHAPTER 8 • PLANT PHYSIOLOGY

Food flows in bulk towards the sink because:

A Fluid pressure is higher at the sink than at the source

B Fluid pressure is higher at the source than at the sink ✓

C There is no pressure difference between source and sink

D Sink tissues actively pull the sieve tubes

Correct Answer: B

Explanation: Due to higher fluid pressure at the source than at the sink, food flows in bulk towards the sink — this is the essence of the pressure flow mechanism.

Q51

CHAPTER 8 • PLANT PHYSIOLOGY

On the basis of habitat and osmotic adjustment, into how many types are plants classified?

A Two

B Three

C **Four** ✓

D Five

Correct Answer: C

Explanation: Plants are classified into four types based on habitat: mesophytes, hydrophytes, xerophytes, and halophytes.

Q52

CHAPTER 8 • PLANT PHYSIOLOGY

Terrestrial plants adapted to survive in moderate environments — neither too dry nor too wet — are called:

A Hydrophytes

B **Mesophytes** ✓

C Xerophytes

D Halophytes

Correct Answer: B

Explanation: Mesophytes are terrestrial plants adapted to moderate environments. They have a well-developed root system and a cuticle to minimize water loss.

Q53

CHAPTER 8 • PLANT PHYSIOLOGY

Which of the following is a classic example of a mesophyte?

A Water lily

B Cactus

C Maize (corn) ✓

D Mangrove

Correct Answer: C

Explanation: Examples of mesophytes given in the chapter include maize (corn), clover, and rose.

Q54

CHAPTER 8 • PLANT PHYSIOLOGY

Plants that live in freshwater (ponds, lakes) or in wet soil, absorbing water through their whole surface, are called:

A Xerophytes

B Hydrophytes ✓

C Mesophytes

D Halophytes

Correct Answer: B

Explanation: Hydrophytes live in freshwater or wet soil, and absorption of water occurs through their whole body surface.

Q55

CHAPTER 8 • PLANT PHYSIOLOGY

Which plant is given as the most common example of a hydrophyte with broad floating leaves and stomata mainly on the upper surface?

A Cactus

B **Water lily** ✓

C Maize

D Mangrove

Correct Answer: B

Explanation: Water lily is the most common example of a hydrophyte; its broad leaves float on water and have a large number of stomata on their upper surface.

Q56

CHAPTER 8 • PLANT PHYSIOLOGY

Plants that live in extremely dry environments such as deserts, with deep roots and very few stomata, are called:

A Hydrophytes

B Mesophytes

C **Xerophytes** ✓

D Halophytes

Correct Answer: C

Explanation: Xerophytes live in extremely dry environments. They have deep roots to absorb water from almost-dry soil and very few stomata to reduce water loss.

Q57

CHAPTER 8 • PLANT PHYSIOLOGY

In xerophytes such as Cactus, water is stored in soft, juicy specialized stems or roots called:

A Sieve tubes

B **Succulent organs** ✓

C Lenticels

D Guard tissues

Correct Answer: B

Explanation: Some xerophytes, like Cactus, store water in specialized soft and juicy stems or roots, which are called succulent organs.

Q58

CHAPTER 8 • PLANT PHYSIOLOGY

Plants that live in habitats with salty water, such as the sea or salty marshes, are called:

A Xerophytes

B Hydrophytes

C **Halophytes** ✓

D Mesophytes

Correct Answer: C

Explanation: Halophytes live in habitats with salty waters, such as sea or salty marshes, including many sea grasses.

Q59

CHAPTER 8 • PLANT PHYSIOLOGY

Halophytes prevent water from moving out of their cells mainly by:

A Losing salts continuously into the environment

B Absorbing salts from outside to make their bodies hypertonic ✓

C Closing all stomata permanently

D Storing only water and no salts

Correct Answer: B

Explanation: Halophytes absorb salts from outside, making their bodies hypertonic to the surrounding salty environment, so water does not move out of their cells by osmosis.

Q60

CHAPTER 8 • PLANT PHYSIOLOGY

In halophytes, excess absorbed salt can be stored in cells or excreted from the leaves through:

A Stomata

B Salt glands ✓

C Root hairs

D Lenticels

Correct Answer: B

Explanation: The excess salt absorbed by halophytes can be stored in their cells or excreted out through salt glands present on their leaves.