CHAPTER 11

TRANSPORT IN PLANTS

MULTIPLE CHOICE QUESTIONS

1. Which of the following statements does not apply to reverse osmosis?
   a. it is used for water purification.
   b. In this technique, pressure greater than osmotic pressure is applied to the system
   c. It is a passive process
   d. It is an active process

2. Which one of the following will not directly affect transpiration?
   a. temperature
   b. light
   c. wind speed
   d. chlorophyll content of leaves

3. The lower surface of leaf will have more number of stomata in a
   a. dorsiventral leaf
   b. isobilateral leaf
   c. both a and b
   d. none of the above

4. The form of sugar transported through phloem is
   a. glucose
   b. fructose
   c. sucrose
   d. ribose

5. The process of guttation takes place
   a. when the root pressure is high and the rate of transpiration is low.
   b. when the root pressure is low and the rate of transpiration is high
   c. when the root pressure equals the rate of transpiration
   d. when the root pressure as well as rate of transpiration are high.

6. Which of the following is an example of imbibition
   a. uptake of water by root hair
   b. exchange of gases in stomata
   c. swelling of seed when put in soil
   d. opening of stomata

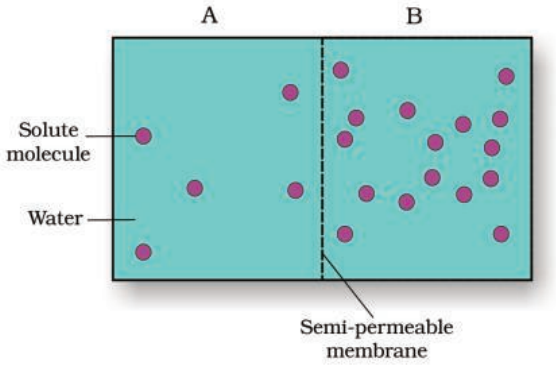
7. When a plant undergoes senescence, the nutrients may be
   a. accumulated
   b. withdrawn
   c. translocated
   d. None of the above

8. Water potential of pure water at standard temperature is equal to
   a. 10
   b. 20
   c. Zero
   d. None of the above

9. Mycorrhiza is a symbiotic association of fungus with root system which helps in
   A. Absorption of water
   B. Mineral nutrition
   C. Translocation
   D. Gaseous exchange

Options:
   a. Only A
   b. Only B
   c. both A and B
   d. both B and C

10. Based on the figure given below which of the following statements is not correct?



a. Movement of solvent molecules will take place from chamber A to B.
b. Movement of solute will take place from A to B.
c. Presence of a semipermeable is a pre-requisite for this process to occur.
d. The direction and rate of osmosis depends on both the pressure gradient and concentration gradient.

11. Match the followings and choose the correct option

	Column I		Column II
A.	Leaves	i.	Anti-transpirant
B.	Seed	ii.	Transpiration
C.	Roots	iii.	Negative osmotic potential
D.	Aspirin	iv.	Imbibition
E.	Plasmolyzed cell	v.	Absorbtion

Options:

a.	A-ii,	B-iv,	C-v,	D-i	E-iii
b.	A-iii,	B-ii,	C-iv,	D-i	E-v
c.	A-i,	B-ii,	C-iii,	D-iv	E-v
d.	A-v,	B-iv,	C-iii,	D-ii	E-i

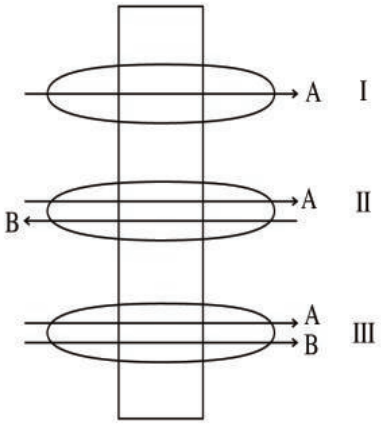
12. Mark the mismatched pair.

a. Amyloplast : store protein granule
b. Elaioplast : store oils or fats
c. Chloroplasts : contain chlorophyll pigments
d. Chromoplasts : contain coloured pigments other than chlorophyll
e. Leucoplast : contains colourless pigments

VERY SHORT ANSWER TYPE QUESTIONS

1. Smaller, lipid soluble molecules diffuse faster through cell membrane, but the movement of hydrophilic substances are facilitated by certain transporters which are chemically _____.
2. In a passive transport across a membrane, when two different molecules move in opposite direction and independent of each other, it is called as _____.
3. Osmosis is a special kind of diffusion, in which water diffuses across the cell membrane. The rate and direction of osmosis depends upon both _____.

4. A flowering plant is planted in an earthen pot and irrigated. Urea is added to make the plant grow faster, but after some time the plant dies. This may be due to _____ .
5. Absorption of water from soil by dry seeds increases the _____, thus helping seedlings to come out of soil
6. Water moves up against gravity and even for a tree of 20m height, the tip receives water within two hours. The most important physiological phenomenon which is responsible for the upward movement of water is _____.
7. The plant cell cytoplasm is surrounded by both cell wall and cell membrane. The specificity of transport of substances are mostly across the cell membrane, because _____.
8. The C_4 plants are twice as efficient as C_3 plants in terms of fixing CO_2 but lose only _____ as much water as C_3 plants for the same amount of CO_2 fixed.
9. In a plant, tranalocation in xylem is unidirectional while in phloem it is bidirectional. Explain.
10. Identify the process occurring in I, II and III



11. Given below is a table. Fill in the gaps

	Property	Simple diffusion	Facilitated transport	Active Transport
i	Highly selective	_____	Yes	_____
ii	Uphill transport	_____	_____	Yes
iii	Requires ATP	_____	_____	_____

12. Define water potential and solute potential.

13. Why is solute potential always negative? Explain $y_w = y_s + y_p$

14. Tradescantia leaf epidermal peel was taken and
    a. Placed in salt solution for five minutes.
    b. After that it was placed in distilled water.
    When seen under the microscope what would be observed in a and b?

15. Differentiate between Apoplast and Symplast pathways of water movement. Which of these would need active transport?

16. How does water moves within the root?

17. Give the location of casparian strip and explain its role in the water movement.

18. Differentiate between guttation and transpiration.

19. Transpiration is a necessary evil in plants. Explain.

20. Describe briefly the three physical properties of water which helps in ascent of water in xylem.

21. A gardener forgot to water a potted plant for a day during summer, what will happen to the plant? Do you think it is reversible? If yes, how?

22. Identify a type of molecular movement which is highly selective and requires special membrane proteins, but does not require energy.

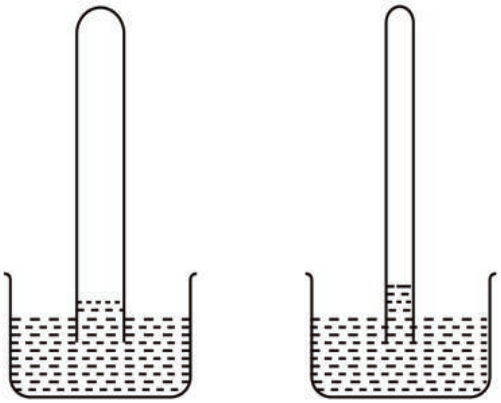
24. Correct the statements
    a. Cells shrink in hypotonic solutions and swell in hypertonic solutions.
    b. Imbibition is a special type of diffusion when water is absorbed by living cells.
    c. Most of the water flow in the roots occurs via the symplast.

SHORT ANSWER TYPE QUESTIONS

1. Minerals absorbed by the roots travel up the xylem. How do they reach the parts where they are needed most? Do all the parts of the plant get the same amount of the minerals?

2. If one wants to find minerals and in the form they are mobilised in the plant, how will an analysis of the exudate help?

3. From your knowledge of physiology can you think of some method of increasing the life of cut plants in a vase?
4. Do different species of plants growing in the same area show the same rate of transpiration at a particular time? Justify your answer.
5. Water is indispensable for life. What properties of water make it useful for all biological processes on the earth?
6. How is the intracellular levels of ions maintained higher than extracellular levels in animal cells?
7. Cut pieces of beetroot do not leave colour in cold water but do so in hot water. Explain.
8. In a girdled plant, when water is supplied to the leaves above the girdle, leaves may remain green for sometime then wilt and ultimately die. What does it indicate?
9. Various types of transport mechanisms are needed to fulfil the mineral requirements of a plant. Why are they not fulfilled by diffusion alone?
10. How can plants be grown under limited water supply without compromising on metabolic activities?
11. Will the ascent of sap be possible without the cohesion and adhesion of the water molecules? Explain.
12. Keep some freshly cut flowers in a solution of food colour. Wait for sometime for the dye to rise in the flower, when the stem of the flower is held up in light, coloured strands can be seen inside. Can this experiment demonstrate which tissue is conducting water up the stem?
13. When a freshly collected *Spirogyra* filament is kept in a 10% potassium nitrate solution, it is observed that the protoplasm shrinks in size:
    a. What is this phenomenon called?
    b. What will happen if the filament is replaced in distilled water?
14. Sugar crystals do not dissolve easily in ice cold water. Explain.
15. Salt is applied to tennis lawns to kill weeds. How does salting tennis lawns help in killing of weeds without affecting the grass?
16. What is the chemical composition of xylem and phloem sap?
17. Observe the figure and answer the question provided below the figure.



Why does tube B show higher water rise than A?

18. What are 'aquaporins'? How does presence of aquaporins affect osmosis?

19. ABA (Abscisic acid) is called a stress hormone.
    a. How does this hormone overcome stress conditions?
    b. From where does this hormone get released in leaves?

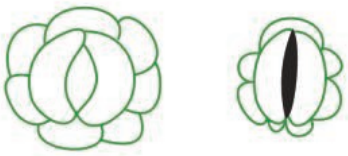
20. We know that plants are harmed by excess water. But plants survive under flooded condition. How are they able to manage excess water?

21. Differentiate between diffusion and translocation in plants.

22. How is facilitated diffusion different from diffusion?

23. Explain the mass flow hypothesis of transport in phloem.

24. Observe the diagram and answer the following:



a. Are these types of guard cells found in monocots or dicots?
b. Which of these shows a higher water content (i) or (ii)?
c. Which element plays an important role in the opening and closing of stomata?

25. Define Uniport, Symport and Antiport. Do they require energy?

LONG ANSWER TYPE QUESTIONS

1. Minerals are present in the soil in sufficient amounts. Do plants need to adjust the types of solutes that reach the xylem? Which molecules help to adjust this? How do plants regulate the type and quantity of solutes that reach xylem?
2. Plants show temporary and permanent wilting. Differentiate between the two. Do any of them indicate the water status of the soil?
3. Why are natural membranes selectively permeable. Give examples.
4. Halophytes may show cell pressure very much higher than atmospheric pressure. Explain how this can happen?
5. The radio labelled carbon in carbon dioxide supplied to potato plants in an experiment was seen in the tuber eventually. Trace the movement of the labelled carbon dioxide.
6. Water molecule is very polar. Polar end of molecule attracts opposite charges on another water molecule (acts like magnet). How will you explain this property of water with reference to upward movement of water? Comment on the upward movement of water given the intermolecular hydrogen bonding in water.

7. Comment on the experimental setup

   a. What does the setup demonstrate?
   b. What will happen to the level of water if a blower is placed close to setup.
   c. Will the mercury level fluctuate (go up/down) if phenyl mercuric acetate is sprayed on leaves?

