CBSE Class 11 Biology

Important Questions

Chapter 11

Transport in Plants

1 Marks Questions

1.Name two anti-transpirants?

Ans. Phenyl mercuric acetate, Absissic acid.

2.Define translocation?

Ans. Transport of food through phloem vascular system is known as translocation.

3.When does wilting occur?

Ans. Wilting occurs when the loss of water by evaporation exceeds the rate of uptake by roots.

4.Name two factors that affect water potential?

Ans. Amount of solute & external pressures

5.Define plasmodesmata?

Ans. Plasmodesmata are protoplasmic connections between adjacent cells.

6.Why is salt added in excess to pickles?

Ans. High concentration of salts prevents the growth of microorganisms & thus it prevents spoilage of pickles.

7.What determines the direction of flow of water from one cell to another cell?

Ans. Water potential of cell (Ψ).

8.Define guttation.

Ans. Water loss in liquid phase from plants is called guttation

9.What is the water potential of pure water?

Ans. Zero bars.

10.Which part of the root is related with the absorption of water?

Ans. Root hairs.

11.What makes the raisins to swell up when kept in water?

Ans. Endosmosis.

12.Casparian strip is made of a substance which is impervious to water, Name this substance.

Ans. Suberin

13.What will happen to water potential when a solute is added to water ?

Ans. Water potential will decrease.

14.A plant cell when kept in a solution cot plasmolysed. What was the nature of the satiation.

Ans. Hypertonic.

15.Mention two ways of absorption of water by root hair in plants.

Ans. Apoplast and symplast pathway.

16.Which form of sugar is transported through phloem?

Ans. Sucrose.

17.Give one example of imbibitions.

Ans. Swelling of seed when put in water/moist soil.

18. A flowering plant is planted in an earthen pot and irrigated. Urea is added to make the plant row faster, but after some time ho plant dies. Give its possible reason.

Ans. Due to exosmosis ie water comes out the plant.

19.Why is energy required to develop root pressures?

Ans. Every activity requires energy. Root pressure develops due to activity of living cell.

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2 Marks Questions

1.Why cell is called an osmotic system?

Ans. A cell is called as an osmotic system because:-

i)It has all the components of an efficient osmotic system i.e. a semi permeable Membrane & different concentration of sap on the two sides of membranes.

ii) Flow of water occurs from higher water potential to lower water potential.

2.Distinguish between active transport & passive transport.

Ans.

Active Transport	**Passive Transport**
i) This is a rapid process.	i) this is a slow process
ii) Energy is needed	ii) No need of energy
iii) It is a vital process.	iii) It is a physical process.
iv) Movement is one direction only	iv) Movement is in both directions
v) Requires carrier proteins	v) does not require carrier proteins
vi) Movement of metabolite against conc. gradient	vi) Movement of metabolite along the conc. gradient.

3.Give the main purposes of transpiration?

Ans. i) Supplies water for the process of photosynthesis.

ii) Transports minerals from soil to all parts of a plant.

iii) Cools leaf surface by some 10-15 c by evaporative cooling

iv) Maintains shape of plant & structure by keeping cells turgid.

4.State the significance of plasmolysis?

Ans. Significance of plasmolysis :-

i) It explains osmosis

ii) Essential to know the biotic nature of the cell.

iii) Essential in killing of weeds.

iv) To determine the osmotic pressure of the cell.

v)As a proof of cell wall permeability.

5.Why is c_4 photosynthetic system more beneficial than c_3 photosynthetic system?

Ans. Evolution of c_4 photosynthetic system is perhaps one of the strategies for maximizing availability of co_2 while minimizing water loss. C_4 plants are twice as efficient as C_3 varieties in terms of carbon fixation eg. C_4 plants will lose only 300g of water by evaporation for every gram of co_2 fixed whereas C_3 plants loses 600g of water for same grams of CO_2 fixed.

6.Distinguish between transpiration & evaporation?

Ans.

Transpiration	**Evaporation**
i) It is a physiological process where loss of water occurs through aerial parts of plants.	i) It is not physiological process but simply a physical process.
ii) It takes place during the daytime	ii) It takes place at all the times
iii) It is regulated by activity of guard cells	iii) It is not so.

around stomata	

7.Mention two conditions necessary for imbibitions to occur?

Ans. i) Water potential gradient between the surface of absorbent & the liquid imbibed

ii) The affinity between the absorbent & the imbibed liquid.

8.What are the factors affecting the rate of diffusion.

Ans. The rate of diffusion is affected by the following:-

i) Gradient of concentration

ii) Permeability of cell membrane separating them.

iii) Temperature

iv) Pressure

9.What is the role of osmotic potential in regulating water potential of plant cells.

Ans. Osmotic potential refers to the pressure which is needed to stop the movement of water from outside into the solution. An isolated solution which is not bounded by any membrane has no osmotic pressure. It has only the potential to result into a pressure when placed in an osmometer

10. A well watered potted herbaceous plant shows wilting in the afternoon of a dry sunny day. Give reason.

Ans. During noon, the rate of transpiration becomes higher than the rate of water absorption by plant. If causes loss of turgidity and leads to wilting.

11.Do different species of plants slowing in the same soil show ho same the of transpiration of a particular time? Justify your answer.

Ans. Rate of transpiration is not same because transpiration is affected by num- bers and

distribution of stomata, and their opening.

12. How is transpiration different from guttation 7 Give two points.

Ans.

Transpiration	**Cuttation**
(i) Loss of water by a plant in form of vapours. **(ii) Occurs through the general surface of leaves (stomata) and the young stems.**	(i) The loss of liquid droplets from the plant. (ii) Occurs at the margins and the tips of the leaves.

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3 Marks Questions

1.Explain pressure flow hypothesis for translocation of sugars in plants?

Ans. most accepted mechanism for translocation of sugars source to sink is known as pressure flow hypothesis. The glucose is prepared at the source, it is converted into sucrose. The sugars is then moved in the form of sucrose into the companion cell, then into the living sieve tube cells by active transport loading at the source creates a hypertonic condition in vascular tissue- the phloem.

2. Explain why pure water has maximum water potential?

Ans. Pure water has maximum water potential because:-

i)Water molecules have kinetic energy, in liquid as well as the gaseous state they are in constant motion.
ii)The greater the concentration of water in a system, the greater its kinetic energy of its water potential.
iii)The pure water will have the greatest water potential.
iv)It two systems having water are in contact eg. soil & air or cell & solution, random movement of water molecules will occur from the system with higher energy to one with lower energy. At equilibrium, the water will move from the system containing water at higher water potential to one having low water potential.
v)Water potential is represented by Psi or Ψ . It is expressed in pressure units such as Pascal. Water potential of pure water at defined temperature & pressure is taken to be zero.
vi)If on pure water a solute is dissolved, its concentration decreases thereby reducing its water potentials so, all solutions have lower water potential than pure water.

3.Explain facilitated diffusion?

Ans. Facilitated diffusion is also called carrier mediated diffusion or transport by carrier proteins. It occurs along the concentration gradient assisted by carrier proteins eg. diffusion of glucose in RBC's. The membrane provides sites at which some molecules cross the membrane. They do not set up a concentration gradient. A concentration gradient is present for molecules to diffuse even if facilitated by proteins membrane without expenditure of ATP energy. It cannot cause net transport of molecules from a low to high concentration as it requires input of energy. Transport rate reaches maximum when all of the protein transporters are being used. It is very specific & permits a cell to select with protein side chains. Facilitated diffusion is stereo specific the carrier proteins are permeases.

4.Describe water potential? What are the factors influencing it?

Ans. Water potential is represented by $\Psi = \Psi m + \Psi s + \Psi p$. The water mover from the point where water potential is greater to the other where it is less. It is denoted by psi or Ψ .Water potential is the chemical energy of water. It is measured in terms of pressure & is also influenced by concentration gravity as well as pressure. The chemical potential of water is called water potential. It indicates free energy rotated to water. Water potential of pure water is zero.

Water moves into the cell from outside & hydrostatic pressure is increased. It increases water potential of a solute (Ψs) but the difference between inside & outside is reduced. Water moves from outside into the cell due to water potential gradient.

Three factors affect water potential. They are matric potential (Ψm), solute potential (Ψs) & pressure potential (Ψp). Solute potential is always negative. Pressure potential is usually positive & is denoted by Ψp. Thus, water potential is affected by both solute & pressure potential. The relationship between them is $\Psi = \Psi s + \Psi p$.

5.Distinguishes between imbibitions & diffusion?

Ans.

Imbibition	**Diffusion**

i) it occurs in living & dead both	i) it occurs in solids, liquids & gases.
ii) It refers "to the absorption of water by general surface"	ii) It refers "to the movement of molecules, ions of gases, solids, liquids from the region of higher concentration to lower concentration.
iii) An absorbent is involved but no membrane in it.	iii) No need of semi- permeable membrane
iv) It is a reversible process.	iv) It is not a reversible process.

6.Describe the plant cell as an osmotic system?

Ans. The plasma membrane in plant cell with the vacuolar membrane & cytoplasmic film or alone is more or less semi permeable in mature. This membrane allows the water molecules to get through it freely whereas it allows certain molecules to enter & prevent others. The cytoplasm is surrounded by the cell wall. It possesses very much higher concentration than the solutions entering the plant cells via osmosis. So the plant cell functions as an osmotic system if it fulfills the following two conditions:-

i) It has a semi-permeable membrane.
ii)It possesses a liquid substance having much higher concentration therefore, plant cell acts as osmotic system.

7.How is opening & closing of stomata controlled?

Ans. The factors affecting stomata opening & closing are:-

a) Light:- Light intensity needed for stomatal opening is low the stomata open in light but close in dark. In CAM plants, stomata open in dark & closed during daytime.

b) Temperature:- If temperature is increased, then the stomata open but when there is decrease in temperature the stomata close.

c) Availability of water:- The stomata are closed due to water stress or moisture deficit.

d) Concentration of CO_2 :- If there is an increase in CO_2 concentration inside the leaf the

stomatal openings are closed even in light. When CO_2 is used up by plant in photosynthesis the stomata open.

8. Differentiate between temporary and permanent writing. Do any of thorn indicate the water status of the soil ?

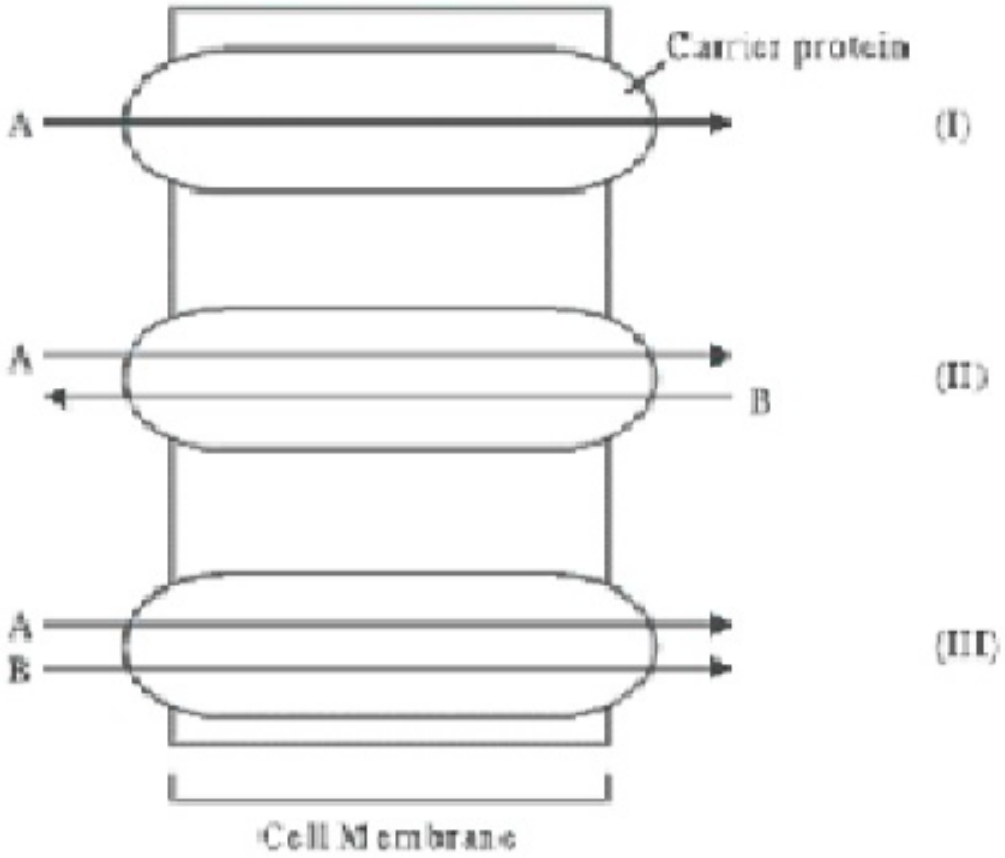
Ans.

Temporary wilting	**Permanent willing**
(i) Plant recovers from temporary wilting Mt sometime. **(ii) Much damage is not caused.** **(iii) It commonly occurs during mid-day only**	(i) Automatic recovery is no possible. It may re if water is provided soon. (ii) Much damage is caused. (iii) It occurs throughout day and night

9. Observe the given figure and give the answers of the following

(a) Identify the process occuring in (I), (and (ill)
(h) Differentiate between the process II and III.
(c) How many types of aquaporins form the water channels in the cell membrane.

Ans.



10. Give the scientific term for the following statements/processes:

(a) Movement of water in roots exclusively. Through the cell wall
(b) The positive hydrostatic pressure developed inside the cell or cell wall.
(c) A solution having relatively less conecutnUon
(d) Loss of water from the aerial parts of the plants in the form of water vapours.
(e) Movement of a molecule across a membrane independent of other
(f) Water loss in its liquid phase through the special openings of veins near the tip of leaves of many herbaceous plants.

Ans. (a) Apoplast pathway
(b) Turgor pressure
(c) Hypotonie
(d) Transpiration
(e) Uniport
(f) Guttation

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5 Marks Questions

1.Describe the cohesive force theory of ascent of sap in plants?

Ans. Cohesive force theory or transpirational pull theory was proposed by Dixon & jolly. Main aspects of this theory are:-

i) Strong cohesive force or tensile strength of water:- The water molecules attract each other by mutual force which is called the “cohesive force”. The attraction between the walls of xylem elements & the water molecules is called adhesion the cohesive force helps to maintain a long column of water under tension.

ii) Continuity of water column in plant:- air breaks do not hinders the total cohesive system & the tree are able to maintain a rapid flow of sap. The water or the sap can be pulled by the transpiration force.

iii)Transpiration pull or tension of unbroken column of water:- As a result of transpiration water is drawn in the intercellular spaces from the mesophyll cells which consequently draw water osmotically from nearby cells & thus a diffusion pressure deficit or suction force is developed. Due to suction force, the adjacent cells take water from xylem of these veins of the leaves. As the xylem of these veins is connected with xylem of roots through stem xylem a tension is set up in the water column of xylem & whole column is physically pulled up.

2.What forces are involved in absorption of water from soil by root hairs.

Ans. a)A negative tension is exerted down the roots due to transpiration on pull by the aerial parts of the plants this causes a decrease in water potential of roots which favours the uptake of water from the soil.

b) The decrease of water potential in the root cells than the soil favours the absorption of

water from the soil.

c) The cohesive forces among the water molecules & adhesive forces between the water & xylem vessels maintain an unbroken column of water in capillaries of xylem vessels. The gradient of water potential exists in the xylem vessel starting from leaf to roots which favour uptake of water from the soil.

d) The water from the soil enters into the root hairs & from there it reaches the xylem vessel with lower water potential. It results in formation of root pressure. This root pressure pushes water to aerial parts of plant body.

3.Define transpiration? Why is it useful? Mention any three environmental factors that affect the transpiration?

Ans. Transpiration is a phenomenon naturally occurring in plants through which water is lost from plants in the form of water vapours through their aerial parts. It is useful to plants because

(i) It helps in movement of xylem sap.

(ii) It causes cooling of leaf surface & thereby protects leaf from heat injury by intense sunlight

Transpiration is affected by 3 environmental factors:-

a)humidity:- water is lost slowly in the atmosphere, if the humidity is high or increased.

b)temperature:- the rate of transpiration is doubled with rise in temperature by 10·c

c)wind speed:- high wind speed or a dry breeze greatly increases the transpiration