**CELL PHYSIOLOGY - ANSWERS**

1. a) i) Diffusion

ii) Active transport

b) Diffusion-A concentration gradient between sodium ions in sap and those in the pond.

Active transport-energy in form of ATP must be available/Oxygen and food in the living tissue for respiration provide energy.

2. A film of water surrounds the soil particle. Root hairs of the plants penetrate between the soils particles/are close to the soil particles; cell sap of the root hair cells is more concentrated in solutes/has less water than the soil solution. Thus water moves into root hair cell by osmosis i.e across the cell a wall and the semi permeable membrane.

3. The leaves expose a smaller surface area to the sun. Thus reducing transpiration/excessive water loss.

4 a) Diffusion is defined as the net movement of a substance from a region where its concentration is high to a region where its concentration is low.

b) i) Diffusion gradient-the greater the diffusion gradient, the greater the rate of diffusion

ii) Surface area to volume ratio-the greater the S.A.V.R the higher the temperature the greater the rate of diffusion.

iii) Temperature –The higher the temperature the greater the rate of diffusion

c) i) Absorption of mineral salts from the soil by root hairs

ii) Re-absorption of glucose molecules in the kidney tubule.

iii) Absorption of digested food in the ileum e.g glucose, amino acids.

5. i) Uptake of water from the soil into root hairs of plant roots

ii) Movement of water from the veins of leaves through the leaf cells to the atmosphere during transpiration.

6. a) The visking tubing was fully filled with solution. Level of water in beaker decreased .

b) Sucrose solution in visking tubing created high concentration gradient.

-Water molecules moved from distilled water to the visking tubing by osmosis.

7. -Plant cells have cells membrane and cell wall. When the cell is placed or immersed in distilled water, the water is absorbed by osmosis. As cell becomes turgid, the cell created an inward force, wall pressure that prevents the cell from bursting.

8.

| **Diffusion** | **Osmosis** |
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| Involves movement of particles of molecules of liquid or gas.<br>It may be through a membrane or in air. | Involves movement of solvent<br>It takes place through a semi-permeable.<br>Rate affected by pH changes. |

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| Not affected by PH changes. | |

9. a) Isotonic solution- a solution which has the same concentration as the cell sap.

b) Hypotonic solution- a solution which is less concentrated than the cell sap.

c) Hypertonic solution- A solution which is more concentrated than the cell sap.

10. Plants normally grow in soils whose solute concentration is lower than that of the cell sap. This enables the plants to take up water by osmosis. Addition of large amounts of salt to the soil increases the solute concentration of soil water beyond that of the cell sap. The result is that the plants lose water to the soil by osmosis. Since water is very important for maintaining the structural and metabolic activities of plants, its deficiency leads to death of the plants.

11. a) The red blood cells take in water by osmosis. They swell and exert pressure on the fragile plasma membrane which then breaks. Plant cells take in water and swell but do not burst. This is because their tough cell wall can only stretch to a limited extent. Once fully stretched, the cell wall resists further expansion of the cell and no more water is taken up.

b) Fresh water protozoa take in water by osmosis. The excess water is then actively pumped into the contractile vacuole which discharges the water to the outside.