**SECTION – B (PAPER – A)**

Osmosis: Osmosis is a passive process that involves the movement of molecules from a region of higher concentration to lower concentration until the concentrations become equal on either side of the membrane1. It can occur in other liquids, supercritical liquids, and even gases2. There are two types of osmosis: endosmosis and exosmosis. Endosmosis occurs when a substance is placed in a hypotonic solution, causing the solvent molecules to move inside the cell and the cell becomes turgid or undergoes deplasmolysis. Exosmosis occurs when a substance is placed in a hypertonic solution, causing the solvent molecules to move outside the cell and the cell becomes flaccid or undergoes plasmolysis1.

Water potential: Water potential is the potential energy of water in a system compared to pure water when both temperature and pressure are kept the same. It can also be described as a measure of how freely water molecules can move in a particular environment or system3. Water potential is never positive but has a maximum value of zero, which is that of pure water at atmospheric pressure. When it comes to impure water, or water that has solutes in it, the more solute there is, the more negative Ψ becomes since the solute molecules will attract the water molecules and restrict their freedom to move.

Kranz anatomy: Kranz anatomy is a specialized structure found in C4 plants where the mesophyll cells are clustered around the bundle-sheath cells in a ring-like fashion. The number of chloroplasts in the bundle-sheath cells is more than that in the mesophyll cells. This structure is found in C4 grasses such as maize and a few dicots1. The Kranz anatomy is developed in three different steps: Initiation of procambium, Bundle sheath and mesophyll cell specification, Chloroplast development and integration of the C4 cycle1.

Photophosphorylation: Photophosphorylation is the process of utilizing light energy from photosynthesis to convert ADP to ATP. It is the process of synthesizing energy-rich ATP molecules by transferring the phosphate group into an ADP molecule in the presence of light2. There are two types of photophosphorylation: cyclic photophosphorylation and non-cyclic photophosphorylation. In cyclic photophosphorylation, electrons follow a circular path and only ATP (no NADPH) is produced. In non-cyclic photophosphorylation, electrons are removed from water and passed through PSII and PSI before ending up in NADPH. This process requires light to be absorbed twice, once in each photosystem, and it makes ATP.

EMP pathway is the other name of glycolysis.The EMP pathway, also known as the Embden-Meyerhof-Parnas pathway, is the process of glucose catabolism. It occurs in the cytoplasm of living cells. A molecule of glucose yields two pyruvates, two ATP and two NADH molecules at the end of this process1. The EMP pathway is the universal pathway of glucose degradation, whether energy is derived in aerobic respiration or fermentation. It is the first step of cellular respiration. It is required by all tissues to derive energy in the form of ATP. (more at - <https://byjus.com/neet/emp-pathway/#:~:text=EMP%20pathway%20is%20the%20other%20name%20of%20glycolysis.,all%20living%20cells%2C%20aerobic%20as%20well%20as%20anaerobic>.)

Enzymes and their Mechanism

An enzyme is a complex protein produced by living cells that acts as a catalyst in living organisms, regulating the rate at which chemical reactions proceed without itself being altered in the process1. Enzymes are responsible for catalyzing all aspects of cell metabolism, including the digestion of food, conservation and transformation of chemical energy, and the construction of cellular macromolecules from smaller precursors2.

The mechanism of enzyme action depends on two factors: the enzyme’s specificity and the transition state of the reactants or substrates. The enzyme’s specificity is due to its active site, which is a small aperture or opening that allows specific binding of an enzyme with the substrate due to residues like -NH2, -SH groups etc3. Enzymes participate in biochemical reactions by increasing the reaction rate or the conversion of reactants into products. They are never used up in the reaction and remain free after the release of products. Enzymes can catalyze the same chemical pathway several times until they get denatured and associate with inhibitors

alpha and beta oxidation of fats

Alpha oxidation and beta oxidation are two different pathways for the oxidation of fatty acids.

Alpha oxidation is a minor oxidation pathway that occurs in peroxisomes. It involves the removal of one carbon unit adjacent to the α-carbon from the carboxylic end of a fatty acid molecule. The carbon unit is removed in the form of CO2. Alpha oxidation occurs in those fatty acids that have a methyl group (-CH3) at the beta-carbon, which blocks beta oxidation1.

Beta oxidation, on the other hand, is a major mechanism of oxidation of fatty acids that occurs in mitochondria and peroxisomes. It involves breaking down long fatty acids that have been converted to acyl-CoA chains into progressively smaller fatty acyl-CoA chains. This reaction releases acetyl-CoA, FADH2 and NADH, which then enter another metabolic process called citric acid cycle or Krebs cycle, in which ATP is produced to be used as energy2.

Biological Nitrogen Fixation (<https://byjus.com/biology/nitrogen-fixation-nitrogen-metabolism>/)

Auxin-

Auxin is a plant hormone that regulates growth, particularly by stimulating cell elongation in stems. Auxins also play a role in cell division and differentiation, fruit development, the formation of roots from cuttings, the inhibition of lateral branching (apical dominance), and leaf fall (abscission)1.

The most important naturally occurring auxin is ß-indolylacetic acid (IAA), which is formed either from the amino acid tryptophan or from the breakdown of carbohydrates2. Auxins are mostly made in the tips of growing stems and roots, known as apical meristems, and can diffuse to other parts of the stems or roots1.

Bioassay is a technique used to determine the potency of a substance by measuring its effect on living cells or tissues. For auxin, bioassays can be performed using techniques such as Avena curvature test and agar block test1.

Auxin has several physiological effects on plants. It promotes cell division and elongation, stimulates the formation of roots from cuttings, and inhibits lateral branching. It also plays a role in fruit development and leaf fall