

Question Bank- First Semester- Plant Physiology

Questions sec 1 &2

Put true (T) or false (F) at the end of the following sentences and correct the false ones:

- 1- Both C4 and CAM plants make their sugar without Calvin cycle.
- 2- In both C4 and CAM plants stomata close during day.
- 3- In both C4 and CAM plants, an enzyme rather than Rubisco carries out first step in carbon fixation.
- 4- A pigment is any substance that absorbs light.
- 5- Cyclic Electron Flow Uses Photosystem I and II, Generates ATP only.
- 6- Non-Cyclic Electron Flow Generates O₂, ATP and NADPH.
- 7- Ribulose biphosphate carboxylase oxygenase (Rubisco) fixes CO₂ only.
- 8- Rubisco Has a much Higher Affinity for CO₂ than Does PEP Carboxylase.
- 9- Fixation of CO₂ with Rubisco in C4 Plants Occurs in the Bundle Sheath Cells, not Mesophyll Cells.

Fill the blanks with missing words:

- 1- Protons pumped into the lumen of the thylakoids flow back out, driving the synthesis of -----
-----.
- 2- -----Plants Are Called Cool-Season Plants.
1- ----- Plants Have Little Photorespiration because They Carry the CO₂ to the bundle Sheath Cells and can Build up High [CO₂].
- 2- The compound accept CO₂ in C3 plants is -----
- 3- The number of CO₂ enter Calvin cycle to produce 1 molecule of sucrose are-----

Choose correct answer:

- 1- The light reaction of photosynthesis(phs) supply calvin cycle with:
a-light energy b-CO₂ c-H₂O d-NADPH e-sugar
- 2- The stage of phs that actually produces sugar is:
a-photosystem I b- photosystem II c- The light reaction d- calvin cycle
- 3- The stage of phs that produces ATP:
a-water photolysis b- calvin cycle c- Non Cyclic Electron Flow
- 4- The stage of phs that generates O₂
a-Cyclic Electron Flow b- calvin cycle c- Non Cyclic Electron Flow
- 5- Chlorophyll Absorbs all Wavelengths of Visible Light Except:
a-Red b- blue c-green d-far red
- 6-Ferrdoxins (Fd) donate electrons to: a-NADP⁺ b- NADPH⁺H⁺ c- ATP
- 7-The oxygen released from photosynthesis comes from: a-water b- glucose c- carbon dioxide

Define the following:

Rubisco, Photolysis (Hill Reaction), Photophosphorylation, Light Compensation Point, Cyclic Electron Flow, Non Cyclic Electron Flow

Answer the following:

- 1- Draw schematic diagram of carbon dioxide fixation in Crassulacean (CAM)
- 2- What is the amount of energy in Kcal of a mole of light having 400 nm wavelengths?
- 3- Making schematic diagram the electron carrier sequences pathway of light reaction of photosynthesis (Z scheme).
- 4- Draw schematic diagram of carbon dioxide fixation in C4 plants
- 5- Draw schematic diagram of Calvin cycle reactions (C3 plants)
- 6-What is Photorespiration? Why is wasteful reaction?

Questions Sec 3

Put true (T) or false (F) at the end of the following sentences:

- 1-Aerobic respiration involves partially breakdown of glucose back to CO₂ and water.
- 2-Net energy outcome from glycolysis 1 NADH and 2 ATP.
- 3-Fermentation occurs in low-oxygen environments, wet or compacted soils for plants.

Fill the blanks with missing words:

- 1-Pyruvate broken down to CO₂ and the remaining 2 Cs (acetyl group) is attached to -----.
- 2-Oxidative phosphorylation occurs in the ----- of the mitochondria.
- 3-Breakdown of glucose (6C) to 2 pyruvate (3C each) called -----.

Choose correct answer:

- 1- Respiration is an ----- process:
a-endergonic b- exergonic c- anabolic
- 2- Occurs in cytoplasm without oxygen.
a- Oxidative phosphorylation b-Fermentation c-Krebs Cycle
- 3-Thylakoid membranes resemble cristae; they both contain;
a-electron transport carriers b- photosynthetic enzymes c- chlorophylls
- 4- Respiration starts by glycolysis in the: a-mitochondria b- cytosol c- chloroplasts

Answer the following:

- 1- Clear how much ATP produced from completely breakdown of glucose in aerobic respiration.
- 2- Draw the sequence of events in the glycolysis?
- 3-What are the 7 steps of Krebs cycle? Showing in diagram

Define the following:

Glycolysis, Krebs cycle, Oxidative Phosphorylation, Fermentation

Questions sec 4

Put true (T) or false (F) at the end of the following sentences:

- 1- Transport in the phloem is bi-directional.
- 2- Reducing sugars are generally translocated in the phloem.
- 3- roots, tubers and developing fruits are sinks.
- 4- P protein synthesized in companion cells.

Fill the blanks with missing words:

- 1-The ----- disperses through the pore; it plugs the pore when the cell is damaged.
- 2-Sugars are moved from photosynthetic cells and actively (energy) loaded into -----.

Choose correct answers:

- 1- Metabolites move from source to sink. Which is sink from following:
a- immature leaves b- seed endosperm c- roots d- mature leaves
- 2- Sugars which are not generally translocated in the phloem:
a- Sucrose b- glucose c- mannitol d-fructose

Define the following:

Sink, Source, P protein, Phloem loading, Phloem unloading

Answer the following:

- 1-What are the evidences to show that translocation takes place in the phloem?
- 2-Draw how phloem loading uses a proton/sucrose symport.

Questions section 5 &6

Put true (T) or false (F) at the end of the following sentences and correct the false ones:

- 1-Appoplast involves cytoplasm and plasmodesmata.
- 2-Pressure decreases speed of molecules, therefore, decrease the rate of diffusion.
- 3-Aquaporins facilitate the diffusion of water and small neutral solutes across plant cell membranes.
- 4-The rate of flow is inversely proportional to 4 times the viscosity of the fluid.
- 5- Dialysis is specialized case of diffusion; it is the diffusion of solvent across a semi-permeable membrane.
- 6-The mole fraction of solvent = # solute molecules/ total (# solvent molecules + # solute molecules).
- 7- A cell in a hypotonic solution will take up water, generating a hydrostatic pressure (turgor pressure) in the cell.

Fill blanks with missing words:

- 1-If movement results from random motion of molecules caused by their own kinetic energy, as in evaporation, the process is called -----.
- 2-The extent to which a membrane permits or restricts the movement of a substance is called ---
-----.

3-Solutes always decrease the free energy of water, thus their contribution is always -----.

Choose correct answers:

1-Diffusion of a solvent across a membrane called.

- a- Dialysis b- Diffusion c- Osmosis

2-Apoplast is transport through:

- a- cytoplasm b- plasmodesmata c- porous cell walls

3-Short-Distance Transport Involves:

- a-simple diffusion b-bulk flow c- Passive transport

Answer the following:

1-Why the units of water potential are in pressure.

2-The solute potential of a solution can be calculated with the van's Hoff equation.

3- Ψ_S of any solution at atmospheric pressure is always negative – why?

4-Diffusion will fail to explain movement when the distance gets larger, how?

5-Bulk flow explains long-distance water movement. Explain.

Define the following:

Fick's First Law , Diffusion, Dialysis, Bulk flow, Water Potential, Aquaporins, osmotic pressure, Pressure Potential

Questions sec 7

Put true (T) or false (F) at the end of the following sentences and correct the false ones:

1- Water is drawn up and out of the plant by the force of transpiration.

2- The pathway along apoplast involves the movement of water through the “living” portions of cells.

3- When water reaches the endodermis, it can continue to the vascular cylinder ONLY through the apoplast pathway.

4- Root pressure is enough to bring water up all trees.

5- Potassium concentrations increase in the guard cells upon closing.

6- Movement of solutes against a chemical potential gradient is known as passive transport.

7- Carriers bind a solute on one side of the membrane and release it on the other side.

8- The root pressure is because of inactive involvement of living cells.

Fill the blanks with missing words:

1-Movement of solutes against a chemical potential gradient is known as -----.

2-The apoplastic movement of water beyond cortical cells region is blocked by present in endodermis.

3- Carbohydrates - make up ----- of xylem sap.

4- When water reaches the endodermis, it can continue to the vascular cylinder ONLY through the -----pathway.

5-Transpiration is a process of loss water from plant in a form of -----.

Define the following:

Field capacity, Permanent wilting percentage, Capillary action, Root pressure, Guttation, Symport, Antiport, Channels, Cohesion-tension theory