

Total 100 pt.

1. Please diagram and describe the pathways of water uptake by the root and water pathway through the leaf. (15 pt)
2. Please diagram and describe the three classes of membrane transport proteins. (10 pt)
3. Please draw the Z scheme of photosynthesis and indicate the sites of action of two important herbicides: dichlorophenyldimethylurea (DCMU, also known as diuron) and methyl viologen (paraquat). (10 pt)
4. Please compare the photosynthesis of C₃, C₄, and CAM (crassulacean acid metabolism) plants. (15 pt)
5. Please describe the concept of bottom-up regulation of plant respiration, how some of the substrates or products in the pathway of glycolysis, citric acid cycle, and electron transport chain stimulate or inhibit certain reactions. (10 pt)
6. Please describe some plant defenses against pathogens. (10 pt)
7. Please diagram and describe how plant phytochrome (serine/threonine kinase) phosphorylates itself and certain proteins. (10 pt)
8. Please describe the tumor induction by *Agrobacterium tumefaciens*. (10 pt)
9. Briefly describe the signal transduction pathway for osmotic stress in plant cells. (10 pt)