

1. Please outline and describe the composition of plant cell wall, and describe how it relates to cell growth. (15%)
2. Please describe membrane systems of chloroplast and how protein imports into the chloroplast. (10%)
3. Please describe cytokinesis during mitosis in plants, and compare its difference from animals. In addition, please also describe how cytoskeleton is involved in cytokinesis in plants. (10%)
4. Please describe how cell to cell communicates in plants. (5%)
5. Please describe and compare different types of plastids in plant cells. (5%).
6. Please describe peroxisome functions in plant cells. (5%)
7. Please describe the structures and functions of organelles, which can generate ATP by chemiosmosis? Also describe how these organelles produce ATP. (5 %)
8. Please describe the structures and functions of nuclear envelope. (5 %)
9. What is the function of snoRNA in cells? What are RNAi and microRNA? (10 %)
10. Why are the membrane-spanning regions of transmembrane proteins frequently α helical? What other protein structure is capable of spanning membranes? Which of the following amino acids would most likely be found in a membrane-spanning α helix? Lysine, Glutamine, Aspartic acid, Alanine, Arginine. (10 %)
11. The second messenger plays important roles in the signal transduction pathway. Describe the functions of the following second messengers in cells: calcium ion, cAMP, cGMP, diacylglycerol, and inositol triphosphate. (10 %)
12. The following questions are related to light microscope. What is resolution? The refractive index? The numerical aperture of an objective lens? What are the effects of wavelength and the numerical aperture on resolution? How does immersion oil improve resolution? (10 %)