Module 05: Membranes — Study Questions

Membrane Structure

1. Describe the fluid mosaic model of cell membrane structure. Why is it called "fluid" and why is it called "mosaic"?
2. What are phospholipids, and how does their structure make them ideal for forming cell membranes?
3. Why do phospholipids spontaneously form a bilayer when placed in water?
4. What role does cholesterol play in the cell membrane?
5. How do temperature changes affect membrane fluidity?

Membrane Proteins

1. What is the difference between integral proteins and peripheral proteins?
2. Name three functions that membrane proteins can perform.
3. How do glycoproteins on the cell surface help with cell recognition?
4. Why is the plasma membrane described as "selectively permeable"?
5. How might a cell recognize that another cell is from the same organism versus a foreign invader?

Passive Transport

1. What is passive transport, and why doesn't it require cellular energy?
2. Define diffusion. What determines which direction molecules will move?
3. A drop of food coloring is placed in a glass of water. Describe what happens and why.

4. What is the difference between simple diffusion and facilitated diffusion?
5. Why do some molecules need transport proteins to cross the membrane even though no energy is required?
6. What is osmosis? How is it different from other types of diffusion?

Tonicity and Osmotic Effects

1. Define isotonic, hypertonic, and hypotonic solutions.
2. What happens to a red blood cell placed in distilled water? Why?
3. What happens to a plant cell placed in a hypertonic saltwater solution?
4. Why is it dangerous to drink large quantities of seawater?
5. How do freshwater fish maintain water balance compared to saltwater fish?

Active Transport

1. What is the main difference between passive transport and active transport?
2. Describe how the sodium-potassium pump works. Why is it important?
3. What is the difference between endocytosis and exocytosis?
4. Compare phagocytosis, pinocytosis, and receptor-mediated endocytosis.
5. Give an example of a cell that uses phagocytosis as part of its normal function.
6. How does a cell maintain different concentrations of ions inside versus outside the cell?