

Module 5: Membranes

Comprehension & Critical Thinking Questions

Part 1: Understanding Core Concepts

1. Membrane Architecture

- Describe the **Fluid Mosaic Model**. Why is the membrane described as "fluid"? What makes up the "mosaic"?
- Sketch a **Phospholipid**. Label the hydrophilic head and hydrophobic tail. Explain how this structure naturally forms a bilayer in water.

2. Permeability

- Membranes are **Selectively Permeable**. What types of molecules can pass through freely? What types need help (transport proteins)? giving examples of each.

3. Transport Mechanisms

- Define **Diffusion**. Does it require energy?
- Define **Osmosis**. In which direction does water move? (Towards high solute or low solute?)

Part 2: Applying Biological Principles

1. Tonicity

- **Scenario**: Red blood cells are placed in three beakers:
 - Beaker A: Pure distilled water.
 - Beaker B: A salt solution matching the blood.
 - Beaker C: A very salty syrup.
- **Apply**: Predict what happens to the cells in each beaker (Swell/Burst, Stay the same, Shriveled). Identify which solution is **Hypotonic**, **Isotonic**, and **Hypertonic**.

2. Active Transport

- Contrast **Passive Transport** (Diffusion/Facilitated Diffusion) with **Active Transport**.
- The **Sodium-Potassium Pump** is a classic example of active transport. What is being moved? Is it moving with or against the gradient? Why does this cost ATP?

Part 3: Analyzing & Evaluating

1. Bulk Transport

- Some molecules are too big for protein channels. Describe **Endocytosis** (Phagocytosis/Pinocytosis) and **Exocytosis**.
- **Analysis:** How do these processes rely on the "fluidity" of the membrane you described in Question 1?

2. Cell Signaling

- Membranes are not just barriers; they are communication hubs. Explain the role of **Receptor Proteins** and **Glycoproteins** (ID tags). How does a cell "know" a hormone is outside?