BiS200 Quiz#2 (2024-04-01) (Answer in English, Closed book, 15 minutes)

Fill-in-the-blank questions:

1. pK_A is equal to the pH at which half of the weak acid molecules are ionized. At physiological pH (values near 7.4), most acidic groups (pK_A<7.4) are ( ).
2. Cytoskeleton is a cell's internal skeleton for cell shape and coordination of movement and it is composed mainly of three biopolymers: ( ).
3. Transmembrane movement of small molecules mediated by ( ) can be either active or passive, whereas that mediated by ( ) is always passive.
4. Stem cells are undifferentiated precursors capable of ( ) and ( ) into specialized cell types.

Short-answer questions:

1. Describe the general mechanism by which insulin regulates blood glucose level, without mentioning specific molecular names.
2. How does the speed of signal transmission compare between ligand-gated ion channels and G-protein-coupled receptors (GPCRs) in neuronal signaling, and what accounts for this difference?
3. In the process of action potential generation within a neuron, which specific phase represents positive feedback, and which phase represents negative feedback? Explain briefly.
4. Among the four modes of cell signaling—contact-dependent, paracrine, synaptic, and endocrine—which are utilized by cytotoxic T-cells and helper T-cells in their immune functions?