STUDY GUIDE FOR chapter 3

This is not an exhaustive review of information you have learned. It is a set of questions that sample from the various topics we have covered. If you can reasonably answer all these questions, you appear to have a good grasp of the information, and you should do well. If you cannot, look up any information you are missing, and come to the review session.

CHAPTER 3. Neurophysiology: The Generation, Transmission, and Integration of Neural Signals

Communication Within a Neuron

1. What is the resting membrane potential?
2. Distinguish hyperpolarization and depolarization.
3. Describe the general distributions of chloride, sodium, and potassium ions in neurons (i.e., higher or lower on inside, etc.)
4. What is membrane permeability?
5. What is the relative permeability of sodium, chloride and potassium at resting potential?
6. Distinguish ion pumps and ion channels.
7. What are the forces that create membrane potentials?
8. What is the Nernst equation?
9. Describe the mechanism by which the Na^+-K^+ pump works.
10. Distinguish the resting membrane potential and the action potential.
11. Which ions are responsible for the inward and outward currents during an action potential?
12. How do voltage-gated ion channels contribute to an action potential?
13. Reconstruct the action potential in terms of the movement of ions across the plasma membrane.
14. What is meant by the all-or-none phenomenon of action potentials?
15. Describe the refractory period.
16. What is saltatory conduction?
17. How does the myelin sheath contribute to the propagation of an action potential down the axon, that is, how does it attenuates the cable properties of the axon?
18. How is an action potential conducted in an unmyelinated neuron?

Communication Between Neurons

19. What are synapses and where can they occur? (List 5 synapses)
20. Describe the structure of synapses.
21. What kinds of messages are conveyed *between* neurons?
22. Distinguish ionotropic and metabotropic receptors.
23. What is a second messenger?
24. What are autoreceptors?
25. Describe the EPSP and IPSP and explain how neurotransmitter-dependent ion channels contribute to postsynaptic potentials.
26. What are the four major types of neurotransmitter-dependent ion channels found in the postsynaptic membrane?
27. What are spatial and temporal summation?
28. Explain how spatial and temporal summation contribute to triggering an action potential.
29. What are the seven stages of neurotransmitter function?
30. What are the two mechanisms of deactivation of neurotransmitters released at the synapse?