There are 6 physiology questions in this Biology 3058 GRADED QUIZ.
All these questions are "A, B, C, D, E, F, G, H" questions worth one point each.
There is a total of 6 points in this exam.
The format for this exam is:
Select A if A is the only correct answer.
Select B if B is the only correct answer.
Select C if C is the only correct answer.
Select D if both A and B are correct (and C is NOT correct).
Select E if both A and C are correct (and B is NOT correct).
Select F if both B and C are correct (and A is NOT correct).
Select G if A and B and C are all correct.
Select H if none of the above is correct (A is NOT correct, B is NOT correct, and C is NOT correct).

ONLY SELECT ONE LETTER PER PHYSIOLOGY QUESTION.

There are two honor questions. In order to receive credit for this GRADED QUIZ, you must truthfully answer TRUE for both questions. If you answer FALSE for either question or if you do not answer either question, your GRADED QUIZ grade is 0 (zero).

Q2:1. Consider Neuron B in the frog central nervous system whose plasma membrane has a newly discovered ligand-gated ionotropic receptor, named the LGD2 receptor. The channel in the same molecular complex as the LGD2 receptor is termed the LGD2 receptor channel and is a monovalent cation channel that, when open, is permeable to both sodium and potassium. The Nernst equilibrium potential for sodium in Neuron B is +100 mV, and the Nernst equilibrium potential for potassium in Neuron B is -100 mV. The threshold for an action potential in Neuron B is -45 mV and the resting potential for Neuron B is -60 mV. LGD2 is an agonist for the ligand-gated ionotropic receptor. When LGD2 binds to its binding site, there is an increase in conductance of both sodium and potassium in the LGD2 receptor channel. Neuron A synapses onto Neuron B. Neuron A's transmitter is LGD2.

A. Consider the situation that when the LGD2 receptor channel is open in Neuron B, its potassium conductance equals its sodium conductance. For this situation, in response to an action potential in Neuron A, there is an excitatory postsynaptic potential in Neuron B. In addition for this situation in response to an action potential in Neuron A, the absolute value of the change in the amount of intracellular sodium in Neuron B is greater than the absolute value of the change in the amount of intracellular potassium in Neuron B.
B. Consider the situation that when the LGD2 receptor channel is open in Neuron B, its potassium conductance equals four times its sodium conductance. For this situation, in response to an action potential in Neuron A, there is an inhibitory postsynaptic potential in Neuron B. In addition for this situation in response to an action potential in Neuron A, the absolute value of the change in the amount of intracellular sodium in Neuron B is equal to the absolute value of the change in the amount of intracellular potassium in Neuron B.
C. Consider the situation that when the LGD2 receptor channel is open in Neuron B, its potassium conductance equals nine times its sodium conductance. For this situation, in response to an action potential in Neuron A, there is an inhibitory postsynaptic potential in Neuron B. In addition for this situation in response to an action potential in Neuron A, the absolute value of the change in the amount of intracellular sodium in Neuron B is greater than to the absolute value of the change in the amount of intracellular potassium in Neuron B.
D. A and B.
E. A and C.
F. B and C.
G. A, B, and C.
H. None of the above.

Q2:2. Consider Neuron B in the frog central nervous system whose plasma membrane has a previously unknown channel that is selectively conductive to a newly discovered divalent anion named DVA with a valence of -2. The threshold for an action potential in Neuron B is -50 millivolts and the resting potential for Neuron B is -70 millivolts. The DVA channel in Neuron B is part of an ionotropic receptor with an extracellular binding site for the newly discovered ligand LGD10. When LGD10 binds to its binding site, there is an increase in the DVA conductance of Neuron B. Neuron A synapses onto Neuron B. Neuron A's neurotransmitter is LGD10. In this experiment, the temperature of the frog central nervous system is $20^{\circ}C$.

A. The extracellular concentration of DVA is 1000 times greater than the intracellular concentration of DVA. In response to an action potential in Neuron A, there will be: a decrease in the membrane voltage of Neuron B; an increase in the amount of intracellular DVA in Neuron B; and an inhibitory postsynaptic potential in Neuron B.
B. The extracellular concentration of DVA is 100 times greater than the intracellular concentration of DVA. In response to an action potential in Neuron A, there will be: an increase in the membrane voltage of Neuron B; a decrease in the amount of intracellular DVA in Neuron B; and an inhibitory postsynaptic potential in Neuron B.
C. The extracellular concentration of DVA is 10 times greater than the intracellular concentration of DVA. In response to an action potential in Neuron A, there will be: an increase in the membrane voltage of Neuron B; a decrease in the amount of intracellular DVA in Neuron B; and an excitatory postsynaptic potential in Neuron B.
D. A and B.
E. A and C.
F. B and C.
G. A, B, and C.
H. None of the above.

Q2:3. Which of the following are true?

A. Consider the channel associated with the AMPA Receptor and the channel associated with the $GABA_A$ Receptor. For both types of channel, there is a potassium conductance greater than zero when the channel is open.
B. Glutamate is an antagonist at both the AMPA Receptor and the NMDA Receptor.
C. Consider the channel associated with the $GABA_B$ Receptor and the channel associated with the Glycine Receptor. For both types of channel, there is a chloride conductance greater than zero when the channel is open.
D. A and B.
E. A and C.
F. B and C.
G. A, B, and C.
H. None of the above.

Q2:4. Person Z swallowed a large amount of substance X and, as a result, has convulsions (abnormal violent contractions of skeletal muscles). Swallowing which of the following substances could lead to convulsions?

A. An antagonist of the glycine receptor.
B. An antagonist of the nicotinic ACh receptor.
C. A blocker of the voltage-gated sodium channel.
D. A and B.
E. A and C.
F. B and C.
G. A, B, and C.
H. None of the above.

Q2:5. Which of the following is true in a skeletal muscle?

A. The binding of calcium to troponin leads to a movement of the tropomyosin molecule so that the tropomyosin molecule no longer blocks a binding site on an actin molecule for an activated (energized) myosin head.
B. The head of an actin molecule is activated (energized) during the hydrolysis of ATP (which is bound to the actin head) to ADP and P_i.
C. The binding of ATP to the head of the myosin molecule causes detachment of the head of the myosin molecule from its receptor site on the actin molecule.
D. A and B.
E. A and C.
F. B and C.
G. A, B, and C.
H. None of the above.

Q2:6. For a sarcomere of a skeletal muscle fiber, use the following definitions:
A is the length of the A Band; H is the length of the H Zone;
I is the total length of the I Bands in the sarcomere.
When the length of the sarcomere decreases during a shortening contraction of the entire muscle,

A. The value of A plus the value of I minus the value of H (= A + I - H) decreases.
B. The value of A plus the value of I (= A + I) decreases.
C. The value of A minus the value of H (= A - H) increases.
D. A and B.
E. A and C.
F. B and C.
G. A, B, and C.
H. None of the above.

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ANSWER KEY TO CORRECT ANSWERS:

Q2:1: D
Q2:2: G
Q2:3: H
Q2:4: A
Q2:5: E
Q2:6: F