

1. Please define the following terms. (3 points each)
  - (a) Retrograde transport
  - (b) Dendritic spines
  - (c) Node of Ranvier
  - (d) Motor neuron
  - (e) Pyramidal decussation
  - (f) Gray matter
2. Please describe the neural circuits in movement control. (7 points)
3. Please explain below terms. (2 points each)
  - (a) Action potential
  - (b) Synapse
  - (c) Neurotransmitter
  - (d) Axon
  - (e) Dendrite
4. Describe all subtypes of glutamate receptors and explain the difference between ionotropic and metabotropic receptors. (8 points)
5. Please design an experiment to investigate the impact of neurotransmitters in the brain function. (7 points)
6. Classical and operant conditioning are widely used experimental paradigms to establish the associative learning. Please briefly lay out what you know about the main features of both paradigms and cite one example for each paradigm to explain your points. (6 points)
7. Please briefly write down what you know about the synaptic mechanisms underlying learning and memory. (7 points)
8. Attention is a cognitive function that plays a fundamental role in our daily activities. Please lay out what you know about the behavioral measures to study attention. (6 points)
9. Please briefly write down what you know about the neuroscience perspectives on motivation and cite one example to explain your point. (6 points)
10. Please name three neuropsychiatric disorders with abnormal dopaminergic activities and describe how the dopaminergic circuits are affected in these disorders. (12 points)
11. Please briefly describe how painful sensation is transmitted. Based on the pain circuits, explain how available analgesic agents can work but why it is still an unmet medical need to kill pain (13 points).

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