ENGLISH

Date 15 December 2010

Examination NEVR2030

There are two types of questions.

SHORT ANSWER QUESTIONS and TRUE or FALSE questions.

Each short answer question requires only a short answer and behind each question is indicated how many points you will get in case of a correct answer. **Simple questions will yield 1 point** and a **higher number of points** indicate that a **more complex** and/or **elaborate** answer is required.

True or false questions always **score 1 point**. You are required to clearly indicate the right answer by writing either **True or False** on your answer document. **Do not add** to the answer in any way, because that may influence the mark you will get.

The exam comprises a total of 44 questions (*60 points) on 4 pages (including this cover* page).

You have 4 hours to complete the exam.

***Use of dictionaries and other tools of* assistance. You are allowed ONE dictionary that translates standard language from your mother tongue to English, i.e. French-English, German-English etc. NO SPECIALIZED DICTIONARIES WILL BE ALLOWED, such as English-English dictionaries that provide definitions, or medical dictionaries of any description. Native English or Norwegian speakers are not allowed any dictionary.**

SHORT ANSWER QUESTIONS

1. What is the functional difference between outer and inner hair cells? (**1**)
2. The auditory neural system is "tonotopical organized". What does this mean? (**1**)
3. What are the three most important sensory systems for balance control? (**2**)
4. Which part of the central nervous system is characteristically affected in Parkinson's disease? (**1**)
5. Which role has the cerebellum in controlling movements? (**2**)
6. Describe briefly the functional difference between the anteromedial (ventral) and lateral corticospinal tracts. (**2**)
7. What is the name of the cranial nerve that carries touch information from the face into the central nervous system? (**1**)
8. What are the names of the three cranial nerves relevant for eye movement? (**2**)
9. Give the name and origin in the brain of three modulatory systems. (**2**)
10. Describe briefly the functional relevance of the muscle spindle. (**2**)
11. There are three light sensitive elements in the retina. Briefly describe their main functional and organizational differences. (**2**)
12. Describe the pathways that mediate temperature information from the hand to the primary somatosensory cortex. (**3**)
13. Why does an axon potential normally travel only in one direction that is away from the soma? (**1**)
14. What conductance is responsible for resetting the neuron after firing an action potential? (**1**)
15. Describe the main mechanisms that are responsible for the resting membrane potential (ca. – 65 mV) in neurons. (**2**)
16. Give a short description of the three different levels of Marr's computational theory of cognition. (**3**)
17. What is (mental) representation? (**2**)
18. What is the name of the thalamic nucleus that receives afferent projections from the gustatory portion of the nucleus of the solitary tract? (**1**)

19. The taste system detects five perceptually distinct categories of tastants. Provide the name of the taste of glutamate and other amino acids. (**1**)
20. Name each of the brain vesicles at the 5 vesicle stage of development. (**2**)
21. The neural tube is comprised of three layers. Which layer results in grey matter, and which results in white matter? (**1**)
22. Explain the transduction mechanism of the olfactory sensory neurons, i.e. how the neurons transform chemical energy to electric signals. (**3**)
23. What is the name of the primary thalamic nucleus that conveys auditory information to the cortex? (**1**)
24. What is the name of the thalamic nucleus that defines the prefrontal cortex? (**1**)

Total 40 points

TRUE/FALSE QUESTIONS

1. If you lose a finger, the other fingers take over the space in the somatosensory cortex representing that finger. **True/false**
2. Pre-motor cortex is necessary to plan movements. **True/false**
3. The cerebellum plays an important role in motor learning. **True/false**
4. The circumvallate papillae are situated at the most posterior portion of the tongue. **True/false**
5. The G-protein coupled receptor gustducin is found only in taste cells that detect salt and sour substances. **True/false**
6. The notochord contains the signal to induce the folding of the neural tube. **True/false**
7. In the 6 layered cortex, neurons in layer 2 are the oldest neurons (outside in migration). **True/false**
8. The olfactory sensory neurons project directly to the brain. **True/false**
9. The vomeronasal system is mainly devoted to processing odor information about food. **True/false**

10. The muscle spindle is solely composed of nerve tissue. **True/false**
11. The major circadian clock in the brain is localized in the reticular formation of the mesencephalon. **True/false**
12. The superior colliculus is relevant for vestibulo-ocular reflexes. **True/false**
13. Sensory neurons in the dorsal root ganglia are neurons that migrated out of the dorsal horn of the spinal cord during development. **True/false**
14. Color is perceived in the primary visual cortex. **True/false**
15. The facial muscles on the left side are innervated by neurons in the right facial nucleus. **True/false**
16. The depolarization phase of an action potential is characterized by the opening of Na^+ channels in the membrane. **True/false**
17. Acetylcholine is a neurotransmitter. **True/false**
18. The membrane of a presynaptic element of a chemical synapse does contain receptor molecules. **True/false**
19. The two internal carotid arteries are the main blood supply of the forebrain. **True/false**
20. Energy is needed to maintain the resting membrane potential. **True/false**

Total 20 points