Question Bank for Neuroscience Course- 2021-2022

Type 1 Questions: Fill in the following GAPS with suitable words.

Set 01

1. There are approximately …….. neurons in the adult human brain.
2. Early in the nineteenth century, scientists discovered how to harden or fix tissues by immersing them in …… .
3. Pathological changes in an axonal MAP, called *tau*, have been implicated in the dementia that accompanies ……. disease.
4. The axon begins with a region called the ……., which tapers away from the soma to form the initial segment of the axon proper.
5. …….. cells are the main glial cell type in sensory ganglia.
6. Resting …….. release low levels of growth factors, such as nerve growth factor (NGF), which help neurons and other glial cells survive and thrive.
7. When gap junctions interconnect neurons, they can function as …….. synapses.
8. In chemical synapses, the protein accumulated in and under the postsynaptic membrane is called the …….. .
9. …… summation is the adding together of EPSPs generated simultaneously at many different synapses on a dendrite.
10. …… catalyzes the chemical reaction that converts adenosine triphosphate (ATP) into cyclic adenosine monophosphate, or cAMP.

Set 02

1. The postsynaptic neuron integrates all these complex ionic and chemical signals to produce a simple form of output, which is called …… .
2. ……. is a powerful toxin found in the seeds and bark of certain trees and shrubs. It is an antagonist of glycine at its receptor.
3. Cholinergic neurons also manufacture the ACh degradative enzyme, which is called …… .
4. The brains of mammalian species are either lissencephalic or …… .
5. Layer I of the neocortex, the molecular layer, contains …… .
6. The primary morphological characteristic of a growth cone is a sheet-like expansion of the growing axon at its tip called a …… .
7. The secreted factor ……. and its receptor robo (roundabout) are important for preventing an axon from crossing back the midline.
8. The first identified X-linked ID gene encodes a protein called ……., which acts as a GAP for Rho GTPases.
9. …… is a nuclear protein that binds methylated DNA, including CpG sites.
10. The skill that H.M. patient acquired in the mirror drawing task and the ability to ride a bicycle involve …… memory.

Type 2 Questions: Choose one correct answer for each of the following statements.

Set 01

1. Some nervous system disorders are caused by mutations in a gene. An example is ……., a disorder that manifests as intellectual disability and is caused by disruption of a single gene.

a. autism b. schizophrenia c. fragile X syndrome d. Alzheimer's disease

2. Kinesin moves material only from the soma to the terminal. All movement of material in this direction is called …… transport.

a. anterograde b. dendritic c. somatic d. retrograde

3. Some neurons have axons that form synapses with the muscles and command movements; these are called ……. neurons.

a. sensory b. stellate c. bipolar d. motor

4. Some neurons have long axons that extend from one part of the brain to the other; these are called …… neurons.

a. local circuit b. Golgi type I c. interneurons d. Golgi type II

5. The …… provide layers of membrane that insulate axons in the CNS. This has been shown as a wrapping, called myelin.

a. oligodendroctyes b. astrocytes c. microglia d. ependymal cells

6. ……. are one of the few cell types to bear cilia, whose beating action contributes to the flow of cerebrospinal fluid throughout the ventricles.

a. Schwann cells b. Satellite glial cells c. Ependymal cells d. Astrocytes

7. ……., a vesicle protein, is the critical Ca^{2+} sensor that rapidly triggers vesicle fusion and thus transmitter release.

a. Synaptobrevin b. Synaptotagmin c. SNAP-25 d. Syntaxin

8. A transient postsynaptic membrane depolarization caused by the presynaptic release of neurotransmitter is called …… .

a. v-SNAREs b. IPSP c. active zone d. EPSP

9. Numerous clinically useful antidepressant and antianxiety drugs, including fluoxetine (trade name Prozac), are selective inhibitors of …… reuptake.

a. serotonin b. GABA c. acetylcholine d. glutamate

10. …… neurons are the major source of synaptic inhibition in the nervous system.

a. Dopaminergic b. GABAergic c. Serotonergic d. Cholinergic

Set 02

1. The tiny response is a miniature postsynaptic potential (mPSP), often called simply a mini. Each mini is generated by the transmitter contents of …… .

a. ten vesicles b. one vesicle c. five vesicles d. fifty vesicles

2. ……. inhibits the action of ACh at nicotinic receptors.

a. Curare b. Nicotine c. Muscarine d. Atropine

3. …… generally has three layers and is found on the ventral surface of the cerebral hemispheres.

a. Neocortex b. Hippocampal cortex c. Archicortex d. Paleocortex

4. …… of neocortex is the main recipient of sensory input from the thalamus and is most prominent in primary sensory areas.

a. Layer II b. Layer III c. Layer IV d. Layer V
5. Which of the following does NOT belong to non-diffusible axon guidance molecules?
a. laminins b. CAMs c. cadherins d. netrins
6. The association of polymorphisms in neurexin and neuroligin genes with increased risk for …… .
a. schizophrenia b. Rett syndrome c. Fragile X syndrome d. None of them
7. Down syndrome results from having an extra copy of chromosome 21 (trisomy) and is the most common genetic form of …… .
a. Rett syndrome b. intellectual disability c. Fragile-X syndrome d. None of them
8. …….. is the initial formation of a memory as a consequence of experience and learning.
a. Storage b. Consolidation c. Acquisition d. Retrieval
9. The …… plays a central role in working memory.
a. prefrontal cortex b. cerebellum c. basal ganglia d. hippocampus
10. …….. is required for acquisition of new explicit memories.
a. prefrontal cortex b. cerebellum c. basal ganglia d. hippocampus

Type 3 Questions: Indicate whether each of the following statements is TRUE or FALSE.

Set 01

1. The cell body of the neuron contains the same organelles found in all animal cells.
2. The protein composition of the axon membrane is not different from that of the soma membrane.
3. One oligodendrocyte produces a single myelin sheath for one segment of one axon, whereas one Schwann cell produces myelin sheaths for segments of as many as 30 axons.
4. The presynaptic voltage-gated Ca^{2+} channels essential for neurotransmitter release are specifically blocked by tetrodotoxin.
5. Nicotine has little or no effect on skeletal muscle but is an agonist at the cholinergic receptor subtype in the heart.

Set 02

1. The precentral gyrus, the site of the primary motor cortex, has extremely prominent layer IV.
2. The guided growth of axons and recognition of appropriate synaptic targets do not depend on growth cones.
3. A polymorphic CGG trinucleotide repeat was found in the 5’ untranslated region (UTR) of the *Mecp2* gene.
4. H.M. patient was selectively incapable of forming new implicit memories after his surgery.
5. Implicit memory refers to memory requiring conscious recall.

Type 4 Questions: Answer the following questions briefly.

Set 01

1. The Spanish neuroscientist Santiago Ramón y Cajal was a skilled histologist and artist who learned about Golgi's method in 1888. Cajal used the Golgi stain to work out the circuitry of many regions of the brain. Golgi and Cajal drew completely opposite conclusions about neurons. How? Explain it.
2. The cytoplasm of the axon terminal differs from that of the axon in several ways. How? Explain it.
3. The most abundant glia in the brain are called astrocytes, which are restricted to the central nervous system (CNS). Explain the functions of astrocytes in the CNS.
4. There are different types of synapses in the CNS. What are they? Explain them.
5. What are the characteristics of catecholaminergic neurons. Explain it.