INDIAN SCHOOL AL WADI AL KABIR

CLASS: XI	**DEPARTMENT OF SCIENCE 2024 - 2025** **SUBJECT: BIOLOGY**	**DATE:03/02/2025**
WORKSHEET: 18	**UNIT- V- HUMAN PHYSIOLOGY** **CHAPTER:18- NEURAL CONTROL AND COORDINATION**	**NOTE:** **A4 FILE FORMAT**
CLASS & SEC:	**NAME OF THE STUDENT:**	**ROLL NO.**

I. MULTIPLE CHOICE QUESTIONS (1M)

1. Chemicals which are released at the synaptic junction are called:
   (a) Hormones
   (b) Neurotransmitters
   (c) Cerebrospinal fluid
   (d) Lymph
2. Resting membrane potential is maintained by:
   (a) Acetylcholine
   (b) Sodium
   (c) Potassium
   (d) Both b and c
3. Where are receptor sites for neurotransmitters found?
   (a) Pre-synaptic membrane
   (b) Tips of axon
   (c) Post-synaptic membrane
   (d) Membrane of synaptic vesicles
4. The myelinated nerve fibres are enveloped with_____ which form a myelin sheath around the axon.
   (a) Neuroglia cell
   (b) Schwann cells
   (c) Myelin cell
   (d) Multipolar cell
5. The two halves (left and right) cerebral hemispheres are connected by a tract of nerve fibres called:
   (a) Association areas
   (b) Corpus callosum
   (c) Hypothalamus
   (d) None of the above

Two statements are given - one labelled as **Assertion (A)** and the other labelled as **Reason (R)**.

Select the correct answer to these questions from the codes (A), (B), (C) and (D) as given below.

a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).

b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).

c) Assertion (A) is true, Reason (R) is false.

d) Assertion (A) is false, Reason (R) is true.

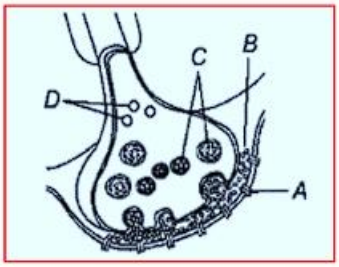
6. Assertion(A): The chemical stored in the synaptic vesicles are termed as neurotransmitters.
   Reason(R): Synaptic vesicles release these chemicals in the synaptic cleft.

7. Assertion (A): Electrical synapses are rare in our system.
   Reason (R): Impulse transmission across an electrical synapse is slower than that across a chemical synapse.

8. Assertion(A): Neurons are excitable cells.
   Reason (R): The membrane of neurons in a depolarised state is responsible for excitability.

II. VERY SHORT ANSWER TYPE QUESTIONS(2M)

9. What is the meaning of the visceral nervous system?
10. Identify A,B, C, and D in the given diagram.



11. What do grey and white matter in the brain represent?
12. Name the structure involved in protection of brain.
13. What is the difference between electrical transmission and chemical transmission?

III. SHORT ANSWER TYPE QUESTIONS (3M)

14. (i)What are the different types of synapses present in the neural system?
    (ii) What is synaptic cleft? Which chemical is released in this?
15. Explain the process of generation and conduction of nerve impulses.

IV. CASE STUDY BASED QUESTIONS (4M)

16.When you hold a pen, nerve signals are generated in nerve endings in the fingertips and sent to your brain. Once the touch has happened, an action potential (nerve signal) is generated at one end of a neuron.

A. What does it mean to generate an action potential on touch?

B. What causes the nerve signal to move from that point along the length of the neuron to the other end? Write in 7 steps.

C. Why can't a nerve signal go backwards?

D. What is the role of sodium and potassium ions in the propagation of an action potential?

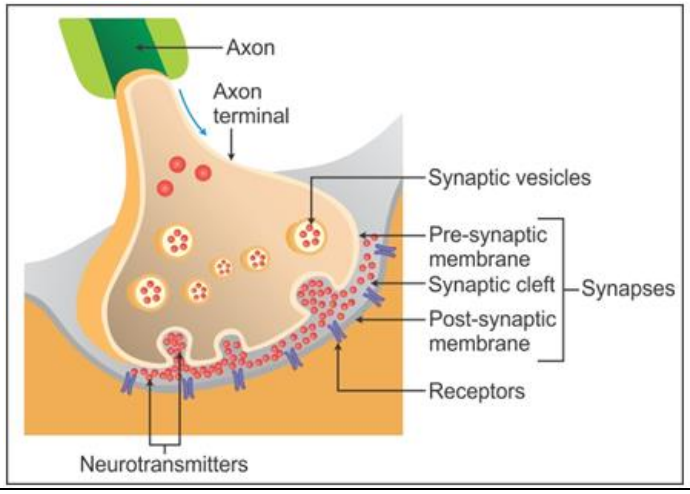
V. LONG ANSWER TYPE QUESTIONS (5M)

17. Name the parts of human forebrain indicating their respective functions.
18. Explain the process of the transport and release of a neurotransmitter with the help of a labelled diagram.

Answer Key

<table>
<tr><th>Q. No.</th><th>Answer</th></tr>
<tr><td>I.</td><td>MULTIPLE CHOICE QUESTIONS (1M)</td></tr>
<tr><td>1</td><td>(b) Neurotransmitters</td></tr>
<tr><td>2</td><td>(d) Both b and c</td></tr>
<tr><td>3</td><td>(c) Post-synaptic membrane</td></tr>
<tr><td>4</td><td>(b) Schwann cells</td></tr>
<tr><td>5</td><td>(b) Corpus callosum</td></tr>
<tr><td></td><td>ASSERTION & REASONING</td></tr>
<tr><td>6</td><td>b) Both Assertion (A) and Reason (R) are true and Reason (R) is not the correct explanation of the Assertion (A).</td></tr>
<tr><td>7</td><td>c) A is true but R is false.</td></tr>
<tr><td>8</td><td>a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).</td></tr>
<tr><td>II</td><td>VERY SHORT ANSWER TYPE QUESTIONS(2M)</td></tr>
<tr><td>9</td><td>The visceral nervous system is a part of the peripheral nervous system. It consists of all the nerves that relay information between the CNS and visceral organs (soft internal organs of the body).</td></tr>
<tr><td>10</td><td>A- postsynaptic knob, B- Neurotransmitters C- Synaptic vesicles with neurotransmitters D- Ions like Ca++</td></tr>
<tr><td>11</td><td>The cerebral cortex is referred to as the grey matter due to its greyish appearance. The inner part of cerebral hemisphere gives an opaque white appearance to the layer below grey matter and, hence, is called the white matter.</td></tr>
<tr><td>12</td><td>The human brain is well protected by the (i) Skull (bony cavity). Inside the skull, the brain is covered by (ii) Cranial meninges (consisting of an outer layer called dura mater, a very thin middle layer called arachnoid mater and an inner layer (which is in contact with the brain tissue) called pia mater.</td></tr>
<tr><td>13</td><td>
<table>
<tr><th>Electrical transmission</th><th>Chemical transmission.</th></tr>
<tr><td>Transmission of nerve impulse takes place via electrical synapse.</td><td>Transmission of nerve impulse takes place via chemical synapse.</td></tr>
<tr><td>Neurotransmitters does not required.</td><td>Neurotransmitters required</td></tr>
<tr><td>It is quick and faster. Nerve impulse transmit like a single neuron</td><td>Comparatively it is slower. Nerve impulse transmits from one neuron to next neuron via a synaptic cleft (gap/space between nerve endings of two neuron)</td></tr>
</table>
</td></tr>
<tr><td>III</td><td>SHORT ANSWER TYPE QUESTIONS (3M)</td></tr>
<tr><td>14</td><td>(i)Electrical synapse- the membrane of pre and post-synaptic neurons is very close to each other and current flows directly from one neuron to another. Chemical synapse- pre- and post-synaptic neurons are separated by a fluid-filled space called the synaptic cleft.</td></tr>
</table>

	Neurotransmitters are involved in the transmission of impulses. (ii) Gap between the presynaptic and postsynaptic neurons. The chemical released is the neurotransmitter Acetylcholine.
15	The ion channels of the neuron plasma membrane are selectively permeable. In the resting, stage membrane is more permeable to K+ ions and nearly impermeable to Na+ ions and negatively charged proteins present in the axoplasm. Thus axoplasm has a high concentration of K + and negatively charged proteins and a low concentration of Na+ . This difference in concentration forms a concentration gradient. The ionic gradient is maintained by the sodium-potassium pump. The Na- K pump transports 3 Na+ outwards for 2 K+ into the cell. Due to this the outer surface of the membrane acquires a positive charge while its inner surface becomes negatively charged and therefore is polarised (resting potential). When a stimulus is applied at a site on the polarised membrane, the membrane at site A becomes freely permeable to Na+, which leads to a rapid influx of Na+ followed by the reversal of the polarity at that site, and the membrane is depolarised. (Action potential) Depolarisation is followed by the increase in permeability of K+ to the membrane leading to a change in polarization. (repolarisation).
IV	**CASE STUDY BASED QUESTIONS (4M)**
16	A. The nerve fibre is in the resting phase when it is not stimulated by any impulse and it possesses the potential difference along the membrane, which is known as the resting potential (-70mv). When this potential difference changes due to a signal, it is called generation of action potential. B. 1. In response to a signal (touch), the membrane becomes permeable to sodium ions rather than potassium ions. 2. A rapid inflow of sodium ions happens. 3. The membrane of the nerve end depolarises as it becomes a positive charge inside and a negative charge outside the nerve fibre. 4. At the peak action potential, permeability to sodium ions decreases and that to potassium ions increases. 5. A rapid outflow of potassium ions happens. 6. The first part of the membrane repolarises 7. The depolarization spreads down the axon as opened Na+ gates stimulate neighbouring Na+ gates to open. C.When a segment of nerve fibre is depolarised, the previous segment is always in a repolarised state and cannot be depolarised immediately. This is why a nerve signal cannot travel backwards. D. Sodium ions flow into the neuron during depolarization, causing the action potential to start, while potassium ions exit during repolarization, restoring the resting potential.
V	**LONG ANSWER TYPE QUESTIONS (5M)**
17	(i) Cerebrum: It forms major part (approx. 80%) of brain. A deep cleft divides the cerebrum longitudinally into two halves, which are termed as the left and right cerebral hemispheres. The hemispheres are connected by a tract of nerve fibres called corpus callosum. The layer of cells which covers the cerebral hemisphere is called cerebral cortex. The cerebral cortex is referred to as the grey matter due to its greyish appearance. The neuron cell bodies are concentrated here giving the colour. The cerebral cortex contains motor areas, sensory areas and large regions that are neither clearly sensory nor motor in function. These regions called as

	the association areas are responsible for complex functions like intersensory associations, memory and communication. Fibres of the tracts are covered with the myelin sheath, which constitute the inner part of cerebral hemisphere. They give an opaque white appearance to the layer and, hence, is called the white matter. (ii)Thalamus: The cerebrum wraps around a structure called thalamus, which is a major coordinating centre for sensory and motor signalling. (iii) Hypothalamus: It is very important part of the brain. It lies at the base of the thalamus. It contains a number of centres which control body temperature, urge for eating and drinking. It also contains several groups of neurosecretory cells, which secrete hormones called hypothalamic hormones / neurohormones. The inner parts of cerebral hemispheres and a group of associated deep structures like amygdala, hippocampus, etc., form a complex structure called the limbic lobe or limbic system. Along with the hypothalamus regulates sexual behaviour, expression of emotional reactions (e.g., excitement, pleasure, rage and fear), and motivation.
18	A nerve impulse is transmitted from one neuron to another through junctions called synapses. A synapse is formed by the membranes of a pre-synaptic neuron and a post-synaptic neuron, which may or may not be separated by a gap called synaptic cleft. There are two types of synapses, namely, electrical synapses and chemical synapses. At a chemical synapse, the membranes of the pre- and post-synaptic neurons are separated by a fluid-filled space called synaptic cleft. Chemicals called neurotransmitters are involved in the transmission of impulses at these synapses. The axon terminals contain vesicles filled with these neurotransmitters. When an impulse (action potential) arrives at the axon terminal, it stimulates the movement of the synaptic vesicles towards the membrane where they fuse with the plasma membrane and release their neurotransmitters in the synaptic cleft. The released neurotransmitters bind to their specific receptors, present on the post-synaptic membrane. This binding opens ion channels allowing the entry of ions which can generate a new potential in the post-synaptic neuron. The new potential developed may be either excitatory or inhibitory. 

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