

## NCERT Exemplar Solutions of Class 11 Biology – Chapter 21: Neural Control and Coordination

### MULTIPLE CHOICE QUESTIONS

#### Question 1

Chemicals which are released at the synaptic junction are called: a. Hormones  
b. Neurotransmitters  
c. Cerebrospinal fluid  
d. Lymph

**Solution: Option (b) is correct.**

**Enhanced Explanation:** Neurotransmitters are chemical messengers that transmit signals across synapses from one neuron to another. Examples include acetylcholine, dopamine, serotonin, and GABA. These chemicals are stored in synaptic vesicles at the axon terminals and are released when an action potential reaches the presynaptic terminal.

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#### Question 2

The potential difference across the resting membrane is negative. This is due to the differential distribution of the following ions: a.  $\text{Na}^+$  and  $\text{K}^+$   
b.  $\text{CO}_3^{2+}$  and  $\text{Cl}^-$   
c.  $\text{Ca}^{2+}$  and  $\text{Mg}^{2+}$   
d.  $\text{Ca}^{2+}$  and  $\text{Cl}^-$

**Solution: Option (a) is correct.**

**Enhanced Explanation:** The resting membrane potential (approximately  $-70\text{mV}$ ) is primarily maintained by the unequal distribution of  $\text{Na}^+$  and  $\text{K}^+$  ions across the membrane. The  $\text{Na}^+$ - $\text{K}^+$  pump actively transports 3  $\text{Na}^+$  ions out for every 2  $\text{K}^+$  ions pumped in, creating a net negative charge inside the cell. Additionally, the membrane is more permeable to  $\text{K}^+$  than  $\text{Na}^+$ , allowing more  $\text{K}^+$  to leak out.

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#### Question 3

Resting membrane potential is maintained by: a. Hormones  
b. Neurotransmitters  
c. Ion pump  
d. None of the above

**Solution: Option (c) is correct.**

**Enhanced Explanation:** The  $\text{Na}^+$ - $\text{K}^+$  ATPase pump (ion pump) is crucial for maintaining the resting membrane potential. This pump uses ATP energy to actively transport ions against their concentration gradients, maintaining the electrochemical gradient necessary for nerve impulse transmission.

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#### Question 4

The function of our visceral organs is controlled by:

- a. Sympathetic and somatic neural system
- b. Sympathetic and parasympathetic neural system
- c. Central and somatic nervous system
- d. None of the above

**Solution: Option (b) is correct.**

**Enhanced Explanation:** The autonomic nervous system, consisting of sympathetic and parasympathetic divisions, controls involuntary functions of visceral organs such as heart rate, digestion, breathing, and glandular secretions. The sympathetic system prepares the body for "fight or flight" responses, while the parasympathetic system promotes "rest and digest" activities.

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### Question 5

Which of the following is not involved in the knee-jerk reflex?

- a. Muscle spindle
- b. Motor neuron
- c. Brain
- d. Interneurons

**Solution: Option (c) is correct.**

**Enhanced Explanation:** The knee-jerk reflex is a monosynaptic spinal reflex that involves only the spinal cord, not the brain. The pathway includes: muscle spindle (receptor) → sensory neuron → motor neuron → quadriceps muscle. The brain is not involved in processing this reflex, making it very fast.

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### Question 6

An area in the brain which is associated with strong emotions is:

- a. Cerebral cortex
- b. Cerebellum
- c. Limbic system
- d. Medulla

**Solution: Option (c) is correct.**

**Enhanced Explanation:** The limbic system, including structures like the amygdala, hippocampus, and parts of the thalamus and hypothalamus, is primarily responsible for emotional processing, memory formation, and behavioral responses. It's often called the "emotional brain."

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### Question 7

Mark the vitamin present in Rhodopsin:

- a. Vit A
- b. Vit B
- c. Vit C
- d. Vit D

**Solution: Option (a) is correct.**

**Enhanced Explanation:** Rhodopsin is a photopigment found in rod cells of the retina, composed of opsin protein and retinal (a derivative of Vitamin A). Vitamin A deficiency can lead to night blindness because rhodopsin is essential for vision in low light conditions.

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**Question 8**

Human eyeball consists of three layers and it encloses: a. Lens, iris, optic nerve  
b. Lens, aqueous humour and vitreous humour  
c. Cornea, lens, iris  
d. Cornea, lens, optic nerve

**Solution: Option (b) is correct.**

**Enhanced Explanation:** The three layers of the eye are sclera (outer), choroid (middle), and retina (inner). These layers enclose the lens (for focusing), aqueous humor (fluid in anterior chamber), and vitreous humor (gel-like substance in posterior chamber). These structures maintain eye shape and provide refractive media for vision.

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**Question 9**

Wax secreting gland present in the ear canal is called: a. Sweat gland  
b. Prostate gland  
c. Cowper's gland  
d. Ceruminous gland

**Solution: Option (d) is correct.**

**Enhanced Explanation:** Ceruminous glands are modified apocrine sweat glands located in the external auditory canal. They secrete cerumen (earwax), which protects the ear canal by trapping dust, debris, and microorganisms, and has antimicrobial properties.

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**Question 10**

The part of the internal ear responsible for hearing is: a. Cochlea  
b. Semicircular canal  
c. Utriculus  
d. Sacculus

**Solution: Option (a) is correct.**

**Enhanced Explanation:** The cochlea is a spiral-shaped structure containing the organ of Corti, which houses hair cells that convert sound waves into electrical signals. The semicircular canals, utriculus, and sacculus are part of the vestibular system responsible for balance and spatial orientation.

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**Question 11**

- The organ of Corti is a structure present in:
- a. External ear
  - b. Middle ear
  - c. Semicircular canal
  - d. Cochlea

**Solution: Option (d) is correct.**

**Enhanced Explanation:** The organ of Corti is located within the cochlear duct of the cochlea. It contains hair cells (mechanoreceptors) that detect vibrations and convert them into nerve impulses, which are then transmitted to the brain via the auditory nerve for sound perception.

