

Neural Control and Coordination — NEET MCQs with Solutions

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Q1. Which of the following correctly describes a multipolar neuron?

- (A) One axon and many dendrites
- (B) One axon and one dendrite
- (C) Single process dividing into two
- (D) Many axons and one dendrite

Q2. Which region of the neuron acts as the trigger zone for generation of action potential?

- (A) Dendritic spine
- (B) Axon hillock
- (C) Nissl body
- (D) Synaptic knob

Q3. The Na^+/K^+ ATPase pump maintains resting potential by pumping ions in which ratio?

- (A) 3 Na^+ out for every 2 K^+ in
- (B) 2 Na^+ out for every 3 K^+ in
- (C) Equal Na^+ and K^+ exchange
- (D) 3 K^+ out for every 2 Na^+ in

Q4. Which neuroglial cells act as macrophages in the central nervous system?

- (A) Astrocytes
- (B) Oligodendrocytes
- (C) Microglia
- (D) Ependymal cells

Q5. Which of the following represents an inhibitory event at a synapse?

- (A) Hyperpolarisation of postsynaptic membrane
- (B) Opening of voltage-gated sodium channels
- (C) Depolarisation of postsynaptic membrane
- (D) Calcium influx into presynaptic terminal

Q6. Which neuroglial cell forms the myelin sheath around axons in the peripheral nervous system?

- (A) Schwann cell
- (B) Astrocyte
- (C) Microglia
- (D) Oligodendrocyte

Q7. The subarachnoid space surrounding the spinal cord contains which fluid?

- (A) Cerebrospinal fluid
- (B) Blood
- (C) Lymph
- (D) Interstitial fluid

Q8. How many pairs of spinal nerves are present in the human body?

- (A) 30 pairs
- (B) 31 pairs
- (C) 32 pairs
- (D) 33 pairs

Q9. Which of the following correctly describes the arrangement of grey and white matter in the spinal cord compared to the cerebral cortex?

- (A) Spinal cord: grey central, white peripheral; Cerebral cortex: grey peripheral, white central
- (B) Spinal cord: white central, grey peripheral; Cerebral cortex: white peripheral, grey central
- (C) Both spinal cord and cortex have grey matter peripherally
- (D) Both spinal cord and cortex have white matter centrally

Q10. Which hindbrain structure is primarily responsible for maintaining posture and equilibrium?

- (A) Medulla oblongata
- (B) Cerebellum
- (C) Pons
- (D) Inferior colliculus

Q11. A patient suffers complete destruction of the medulla oblongata. Which consequence is most immediate and life-threatening?

- (A) Loss of voluntary movement
- (B) Inability to form new memories
- (C) Cessation of respiration and heartbeat
- (D) Loss of sensory perception

Q12. Which lobe of the cerebrum contains the primary motor cortex?

- (A) Parietal lobe
- (B) Occipital lobe
- (C) Frontal lobe
- (D) Temporal lobe

Q13. Which lobe of the cerebrum is primarily concerned with visual processing?

- (A) Occipital lobe
- (B) Frontal lobe
- (C) Parietal lobe
- (D) Temporal lobe

Q14. The minimum number of neurons in a monosynaptic reflex arc is

- (A) One
- (B) Two
- (C) Three
- (D) Four

Q15. Which neuron connects the sensory and motor neurons within the spinal cord in a polysynaptic reflex?

- (A) Ganglion cell
- (B) Projection neuron
- (C) Commissural fibre
- (D) Interneuron

Q16. Stimulation of Golgi tendon organs causes relaxation of the same muscle. This reflex is called

- (A) Stretch reflex
- (B) Withdrawal reflex
- (C) Inverse stretch reflex
- (D) Crossed extensor reflex

Q17. Which neuron forms the afferent limb of a reflex arc, carrying impulse from receptor to CNS?

- (A) Motor neuron
- (B) Interneuron
- (C) Projection neuron
- (D) Sensory neuron

Q18. The autonomic reflex arc differs from a somatic reflex arc in that its efferent pathway contains

- (A) No sensory neuron
- (B) Two motor neurons (preganglionic and postganglionic)
- (C) No integration centre
- (D) Only myelinated fibres

Q19. The primary function of the Eustachian tube is to

- (A) Transmit vibrations to cochlea
- (B) Equalise air pressure across tympanic membrane
- (C) Produce endolymph
- (D) Amplify incoming sound waves

Q20. Astigmatism results from unequal curvature of the cornea and is corrected using

- (A) Concave lens
- (B) Convex lens
- (C) Bifocal lens
- (D) Cylindrical lens

Q21. A person has normal vision in bright light but cannot distinguish red from green. Which specific deficit explains this?

- (A) Absence of red- or green-sensitive iodopsin cones
- (B) Rhodopsin deficiency in rods
- (C) Damaged bipolar cells only
- (D) Optic nerve compression

Q22. Vitreous humour is located between which two structures?

- (A) Cornea and iris
- (B) Lens and retina
- (C) Iris and lens
- (D) Pupil and cornea

Q23. Which of the following is INCORRECT regarding fovea centralis?

- (A) It has the highest visual acuity
- (B) It contains predominantly cones
- (C) It is located at the centre of macula lutea
- (D) It contains both rods and cones equally

Q24. The fluid filling the anterior chamber between the cornea and lens is

- (A) Aqueous humour
- (B) Vitreous humour
- (C) Endolymph
- (D) Perilymph

Answer key and explanations

Q1. Answer: (A) One axon and many dendrites

Multipolar neurons have one axon and multiple dendrites; they are the most common type in the CNS, including motor neurons. Bipolar neurons have one axon and one dendrite.

Q2. Answer: (B) Axon hillock

The axon hillock integrates all excitatory and inhibitory inputs from dendrites; when net depolarisation reaches threshold, it initiates the action potential. Synaptic vesicles and Nissl bodies have no role in initiation.

Q3. Answer: (A) 3 Na⁺ out for every 2 K⁺ in

The Na⁺/K⁺ ATPase actively transports 3 Na⁺ out and 2 K⁺ in per cycle, creating net negative charge inside and contributing to resting membrane potential. Option B reverses the ratio — a common NEET trap.

Q4. Answer: (C) Microglia

Microglia are small, phagocytic glial cells that remove cellular debris and pathogens in the CNS — functioning as resident macrophages. Astrocytes provide metabolic support; oligodendrocytes form myelin in CNS.

Q5. Answer: (A) Hyperpolarisation of postsynaptic membrane

Hyperpolarisation (IPSP) makes the postsynaptic membrane more negative, moving it further from threshold and reducing the likelihood of action potential generation. Option B and C describe excitatory events.

Q6. Answer: (A) Schwann cell

Schwann cells produce myelin sheath in PNS; oligodendrocytes perform this function in CNS. Astrocytes and microglia have structural and phagocytic roles respectively.

Q7. Answer: (A) Cerebrospinal fluid

The subarachnoid space between the arachnoid mater and pia mater contains CSF, providing buoyancy and cushioning for the spinal cord. This space is accessed during lumbar puncture to sample CSF.

Q8. Answer: (B) 31 pairs

Humans have 31 pairs of spinal nerves: 8 cervical, 12 thoracic, 5 lumbar, 5 sacral, and 1 coccygeal. This is a direct NCERT recall frequently tested in NEET.

Q9. Answer: (A) Spinal cord: grey central, white peripheral; Cerebral cortex: grey peripheral, white central

In the spinal cord, grey matter is central (H-shaped) surrounded by peripheral white matter. In the cerebral cortex, grey matter forms the outermost layer over deeper white matter — a classic reversal trap tested in NEET.

Q10. Answer: (B) Cerebellum

The cerebellum maintains posture, equilibrium, and coordinates fine voluntary movements. The inferior colliculus is a midbrain structure involved in auditory reflexes — a deliberate high-difficulty distractor.

Q11. Answer: (C) Cessation of respiration and heartbeat

The medulla oblongata contains vital autonomic centres controlling respiratory rhythm and cardiovascular function. Their destruction is immediately fatal. Memory loss implicates hippocampus; voluntary movement implicates motor cortex — not medulla.

Q12. Answer: (C) Frontal lobe

The primary motor cortex resides in the frontal lobe and controls voluntary movements. The parietal lobe contains somatosensory cortex; occipital lobe handles vision; temporal lobe processes auditory information.

Q13. Answer: (A) Occipital lobe

The primary visual cortex is located in the occipital lobe. This is a direct NEET recall question — frontal (motor), parietal (sensory), and temporal (auditory/olfactory) lobes serve different functions.

Q14. Answer: (B) Two

A monosynaptic reflex arc requires only two neurons: one sensory (afferent) and one motor (efferent), with a single synapse between them. Addition of an interneuron would make it polysynaptic.

Q15. Answer: (D) Interneuron

Interneurons (relay neurons) within the spinal cord grey matter synapse between the afferent sensory neuron and the efferent motor neuron. Commissural fibres connect the two sides of the spinal cord but are not the integrating interneuron.

Q16. Answer: (C) Inverse stretch reflex

Golgi tendon organs detect excessive muscle tension and trigger the inverse stretch reflex (autogenic inhibition), causing the muscle to relax and preventing tendon damage. This is distinct from the stretch reflex, which causes contraction.

Q17. Answer: (D) Sensory neuron

The sensory (afferent) neuron carries impulses from the receptor to the spinal cord or brainstem. The motor (efferent) neuron carries impulses from the CNS to the effector; interneurons connect them within the CNS.

Q18. Answer: (B) Two motor neurons (preganglionic and postganglionic)

The autonomic efferent pathway has two neurons: a preganglionic neuron (CNS to ganglion) and a postganglionic neuron (ganglion to effector). Somatic efferent pathways have a single motor neuron from CNS to skeletal muscle.

Q19. Answer: (B) Equalise air pressure across tympanic membrane

The Eustachian tube connects the middle ear to the nasopharynx, equalising air pressure on both sides of the tympanic membrane. Unequal pressure causes the membrane to bulge, impairing vibration transmission.

Q20. Answer: (D) Cylindrical lens

Cylindrical lenses correct astigmatism by compensating for the unequal refractive power in different meridians of the cornea. Concave and convex lenses correct myopia and hypermetropia respectively but cannot correct meridional irregularities.

Q21. Answer: (A) Absence of red- or green-sensitive iodopsin cones

Red-green colour blindness results from absence or malfunction of red-sensitive (L-cone) or green-sensitive (M-cone) iodopsin. Rod function is unaffected, so dim-light vision is normal. This is an X-linked recessive condition.

Q22. Answer: (B) Lens and retina

Vitreous humour fills the large posterior chamber between the lens and retina, maintaining the spherical shape of the eyeball and holding the retina in place. Aqueous humour occupies the anterior chamber.

Q23. Answer: (D) It contains both rods and cones equally

The fovea centralis contains only cones — no rods are present here. This exclusive cone concentration gives it the highest visual acuity and colour discrimination. Rods predominate in the peripheral retina.

Q24. Answer: (A) Aqueous humour

Aqueous humour fills the anterior chamber (between cornea and lens), maintains intraocular pressure, and supplies nutrients to the avascular cornea and lens. Vitreous humour fills the posterior chamber between lens and retina.

Neural system facts to remember

Topic	Key fact
Neuron types	Multipolar (cerebral cortex); bipolar (retina); unipolar (embryonic stage)
Myelinated fibres	Schwann cells form the myelin sheath; gaps are nodes of Ranvier; found in spinal and cranial nerves
Resting potential	Na^+/K^+ pump moves 3 Na^+ out for every 2 K^+ in; axon membrane is more permeable to K^+ at rest

Synapses	Electrical synapses (rare, faster) and chemical synapses (neurotransmitters cross the synaptic cleft)
Meninges	Dura mater (outer), arachnoid (middle), pia mater (inner)
Forebrain	Cerebrum (hemispheres joined by corpus callosum), thalamus, hypothalamus
Hypothalamus	Controls body temperature, hunger and thirst; secretes neurohormones
Limbic system	Amygdala, hippocampus — emotions, motivation, sexual behaviour
Midbrain	Corpora quadrigemina — visual and auditory reflexes
Hindbrain	Pons, cerebellum, medulla; medulla controls respiration, cardiovascular reflexes and gastric secretion
Brain stem	Midbrain + pons + medulla oblongata
Reflex arc	Receptor → afferent (sensory) neuron → CNS → efferent (motor) neuron → effector; knee-jerk reflex
Eye	Rods (rhodopsin, dim light); cones (colour, bright light); fovea has only cones; blind spot has no receptors
Ear	Ossicles: malleus, incus, stapes; organ of Corti in the cochlea for hearing; vestibular apparatus for balance