

BIOLOGY

NEET

CRASH COURSE

**NEURAL CONTROL AND
COORDINATION**

SMART ACHIEVERS
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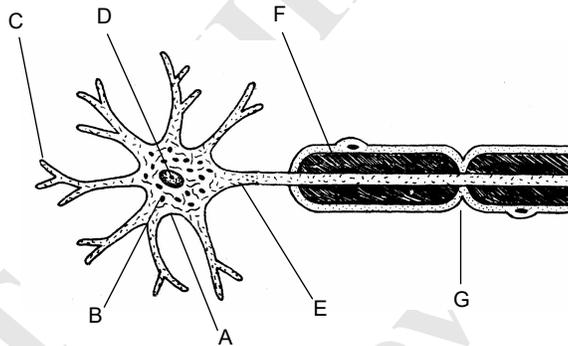
NEURAL CONTROL AND COORDINATION

1. The neural system is the most important system of our body. It coordinates and integrates functions as well as metabolic and homeostatic activities of all the organs.
2. Neurons, the functional units of neural system are excitable cells due to a differential concentration gradient of ions across the membrane.
3. The electrical potential difference across the resting neural membrane is called the 'resting potential'.
4. The nerve impulse is conducted along the axon membrane in the form of a wave of depolarisation and repolarisation.
5. 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. Synapses are of two types : (i) Electrical, (ii) Chemical.
6. Chemicals involved in the transmission of impulses at chemical synapses are called neurotransmitters.
7. Human neural system consists of two parts : (i) central neural system (CNS) and (ii) the peripheral neural system.
8. The CNS consists of the brain and spinal cord.
9. The brain can be divided into three major parts : (i) forebrain, (ii) midbrain and (iii) hindbrain.
10. The forebrain consists of cerebrum and diencephalon (thalamus and hypothalamus).
11. The cerebrum is longitudinally divided into two halves that are connected by the corpus callosum.
12. A very important part of the forebrain called hypothalamus controls the body temperature, eating and drinking.
13. Inner parts of cerebral hemispheres and a group of associated deep structures form a complex structure called limbic system which is concerned with olfaction, autonomic responses, regulation of sexual behaviour, expression of emotional reactions, and motivation.
14. The midbrain receives and integrates visual, tactile and auditory inputs.
15. The hindbrain comprises pons, cerebellum and medulla oblongata.
16. The cerebellum integrates information received from the semicircular canals of the ear and the auditory system.
17. The medulla contains centres, which control respiration, cardiovascular reflexes, and gastric secretions.
18. Pons consist of fibre tracts that interconnect different regions of the brain.
19. The entire process of involuntary response to a peripheral nervous stimulation is called reflex action.
20. Information regarding changes in the environment is received by the CNS through the sensory organs which are processed and analysed.
21. Signals are then sent for necessary adjustments.

22. The wall of the human eye ball is composed of three layers.
23. The external layer is composed of cornea and sclera.
24. Inside sclera is the middle layer, which is called the choroid.
25. Retina, the innermost layer, contains two types of photoreceptor cells, namely rods and cones.
26. The daylight (photopic) vision and colour vision are functions of cones and twilight (scotopic) vision is the function of the rods.
27. The light enters through cornea, the lens and the images of objects are formed on the retina.
28. The ear can be divided into the outer ear, the middle ear and the inner ear.
29. The middle ear contains three ossicles called malleus, incus and stapes.
30. The fluid filled inner ear is called the labyrinth, and the coiled portion of the labyrinth is called cochlea.
31. The organ of corti is a structure which contains hair cells that act as auditory receptors and is located on the basilar membrane.
32. The vibrations produced in the ear drum are transmitted through the ear ossicles and oval window to the fluid-filled inner ear.
33. Nerve impulses are generated and transmitted by the afferent fibres to the auditory cortex of the brain.
34. It is influenced by gravity and movements, and helps us in maintaining balance of the body and posture.

EXERCISE

- Q.1 Junction of two nerve fibres is called
 (1) Synapse (2) Junction (3) Connection (4) None of these
- Q.2 Bipolar nerve cells and ganglion cells are found in the
 (1) Sclerotea (2) Cochlea (3) Retina (4) Cristae
- Q.3 Most of the neurons of our body are
 (1) Unipolar (2) Bipolar (3) Pseudounipolar (4) Multipolar
- Q.4 In the diagram of multipolar myelinated neuron given below, different parts have been indicated by alphabets; choose the answers in which these alphabets have been correctly matched with the parts which they indicate



- (1) A = Cell body, B = Nissl bodies, C = Nucleus, D = Dendrites, E = Naked portion of axon, F = Myelin sheath, G = Node of Ranvier
 (2) A = Cell body, B = Nissl bodies, C = Naked portion of axon, D = Dendrites, E = Nucleus, F = Myelin sheath, G = Node of Ranvier
 (3) A = Cell body, B = Nissl bodies, C = Naked portion of axon, D = Nucleus, E = Dendrites, F = Myelin sheath, G = Node of Ranvier
 (4) A = Cell body, B = Nissl bodies, C = Dendrites, D = Nucleus, E = Naked portion of axon, F = Myelin sheath, G = Node of Ranvier
- Q.5 Nissl's granules are characteristically found in
 (1) Nephrons (2) Neurons (3) Cytons (4) Dendrites
- Q.6 Node of Ranvier is found in
 (1) Right auricle (2) Muscle bundles (3) Dendrite (4) Axon
- Q.7 Propagation of action potential is very fast in nerve fibres which have
 (1) Large fibre diameter (2) Small fibre diameter
 (3) Covering of myelin sheath (4) (1) and (3) both are correct

- Q.8 The following hormones are neurotransmitters
(1) Acetylcholine and secretin (2) Cholecystokinin and acetylcholine
(3) Adrenalin and acetylcholine (4) Cholecystokinin and adrenalin
- Q.9 When an impulse passes, the membrane is depolarized and the charge of the cells is
(1) Outside positive and inside negative (2) Inside positive and outside negative
(3) Both sides have zero potential (4) Both sides are electronegative
- Q.10 Resting potential of the membrane is -
(1) -60 to -70 mV (2) -100 to -10 mV (3) 50 to 100 mV (4) -20 to -30 mV
- Q.11 The chemical causing the transmission of nerve impulse across synapses is
(1) Acetylcholine (2) Cholinesterase (3) Choline (4) Acetic acid
- Q.12 The action potential of a nerve cell is
(1) 60 mV (2) 55 mV (3) 80 mV (4) 75 mV
- Q.13 Suppose the terminal ends of axon are in contact with dendrites of four adjacent neurons, the nerve impulse of the axon will
(1) Travel in all the four neurons
(2) Get, distributed in all the four neurons resulting in a weak impulse
(3) Travel only in one neuron which is in closest contact and with the same intensity
(4) Travel in none of the neurons because the impulse travels from dendrites of one neuron into the axon of another neuron
- Q.14 Foramen of Monro is an aperture between
(1) 2nd and 3rd ventricle (2) Diocoel and metacoel
(3) Rhinocoel and diocoel (4) 3rd and 4th ventricle
- Q.15 The correct sequence of meninges from outer to the inner side is
(1) Arachnoid – piamater – duramater (2) Arachnoid – duramater – piamater
(3) Piamater – arachnoid – duramater (4) Duramater – arachnoid – piamater
- Q.16 Cerebrospinal fluid is produced by
(1) Ependymal cells (2) Choroid plexus (3) Neuroglial cells (4) Neurons
- Q.17 The hind brain consists of
(1) Pons + cerebellum (2) Hypothalamus + cerebellum
(3) Medulla oblongata + cerebellum (4) Medulla oblongata + cerebellum + pons

- Q.18 The dorsal root of spinal cord contains
(1) Somatic motor fibres (2) Visceral motor fibres
(3) Somatic sensory fibres (4) Visceral sensory fibres
- Q.19 The spinal cord terminates in
(1) Corpus terminale (2) Coput terminale (3) Cauda terminale (4) Filum terminale
- Q.20 Dicondylic skull and 10 pairs of cranial nerves are found in
(1) Reptilia (2) Aves (3) Amphibia (4) All of these
- Q.21 Which of the following cranial nerve of man is both sensory and motor
(1) Olfactory (2) Trigeminal (3) Optic (4) Auditory
- Q.22 The number of spinal nerves in man is
(1) 27 pairs (2) 31 pairs (3) 37 pairs (4) 47 pairs
- Q.23 The smallest cranial nerve in human being is
(1) Trochlear (2) Ophthalmic (3) Abducens (4) Vagus
- Q.24 The nervous system and endocrine glands are
(1) Antagonistic (2) Synchronous (3) Independent (4) Interdependent
- Q.25 Which of the following is an example of reflex action
(1) To shoot the bird after aiming (2) Watering of the mouth on seeing good edibles
(3) To obey the order (4) To read the story
- Q.26 Heart is innervated by
(1) Trigeminal (2) Vagus (3) Glossopharyngeal (4) Facial
- Q.27 Conditioned reflexes are different than unconditioned reflexes in that
(1) Conditioned reflexes are limited to brain (2) Unconditioned reflexes are limited to brain
(3) Both (1) and (2) (4) None of the above
- Q.28 The fovea centralis is located in
(1) Blind spot (2) Yellow spot (3) Macula lutea (4) (2) and (3) both
- Q.29 Rhodopsin (visual purple) of eye will require
(1) Guava (2) Mango (3) Carrot (4) Wheat

- Q.30 The spot where no image is formed is known as blind spot because it has
(1) Nerves but no cones
(2) Nerves and rods
(3) No cones, rods and nerves
(4) Cones and rods but contains no photochemical substance within them
- Q.31 In eyes the bipolar cells are present in
(1) Sclerotic (2) Choroid (3) Retina (4) Yellow spot
- Q.32 Vitamin A is necessary for the proper physiological function of eye because
(1) It is necessary for nerve impulses in retina
(2) Rhodopsin is made up of vitamin A
(3) Oxidation of rhodopsin requires vitamin A
(4) None of the above
- Q.33 Cones contain a photosensitive chemical known as
(1) Rhodopsin (2) Acetylcholine
(3) Acetylcholinesterase (4) Iodopsin
- Q.34 Glaucoma is an eye disease arising from
(1) Increased pressure of fluid in eye ball (2) Elongation of eye ball
(3) Shortening of eye ball (4) Irregularity in the surface of cornea
- Q.35 The central opening of iris is called as
(1) Pupil (2) Cornea (3) Lens (4) Fovea centralis
- Q.36 Which of the following nerve supplies organ of corti
(1) Auditory (2) Olfactory (3) Trochlear (4) Vagus
- Q.37 The site from which the nerve impulse for hearing originates
(1) Ear ossicles (2) Cochlea (3) Auditory nerve (4) Tympanum
- Q.38 Main function of eustachian tube is to
(1) Protect tympanic membrane
(2) Support the bones of middle ear
(3) Equalize pressure on two sides of tympanic membrane
(4) Prevent infection entering ear drum

- Q.39 Ear drum is known as
(1) Tympanic membrane (2) Tensor tympani
(3) Scala tympani (4) Scala vestibuli
- Q.40 Organ of corti is found in
(1) Internal ear (2) External ear (3) Both (1) and (2) (4) None of these
- Q.41 In mammalian ear, a membranous structure which separate the scala vestibuli and scala media is
(1) Basilar membrane (2) Reissner's membrane
(3) Autolith membrane (4) Tectorial membrane
- Q.42 Human ear ossicles are
(1) Incus and stapes (2) Stapes
(3) Incus, malleus and stapes (4) Incus and malleus
- Q.43 Internal ear is filled with
(1) Perilymph (2) Endolymph (3) Lymph (4) Both (1) and (2)

AIIMS Special

Instructions for following questions (Q.43 to Q.57).

- (1) If both Assertion & Reason are true and the reason is the correct explanation of the assertion, then mark (1).
- (2) If both Assertion & Reason are true but the reason is not the correct explanation of the assertion, then mark (2).
- (3) If Assertion is true statement but Reason is false, then mark (3).
- (4) If both Assertion and Reason are false statements, then mark (4).

Q.44 **Assertion :** In the nervous system generation of action potential depends upon influx of sodium ion into axoplasm.

Reason : Influx of sodium ion during nerve impulse generation is due to efflux of potassium ions.

Q.45 **Assertion :** Presence of myelin sheath increases the rate of conduction of nerve impulse.

Reason : Ionic channels are absent in the area covered by myelin sheath therefore, depolarization occurs only at the nodes of Ranvier, resulting in saltatory or jumping conduction.

Q.46 **Assertion :** Sharpest vision is in fovea centralis.

Reason : The relationship of receptor to bipolar cells to ganglion cells is 1 : 1 : 1 within fovea centralis.

- Q.47 **Assertion :** Postganglionic nerve fibre of parasympathetic nervous system have acetylcholine while sympathetic nervous system have adrenaline as the neurotransmitter.
Reason : Sympathetic nervous system inhibit the intestinal peristalsis while parasympathetic stimulate peristalsis.
- Q.48 **Assertion :** Brain and spinal cord has a common covering.
Reason : Both the brain and spinal cord possess meninges.
- Q.49 **Assertion :** Cerebrospinal fluid is present throughout the central nervous system.
Reason : CSF has no such function.
- Q.50 **Assertion :** The brain stem contains centres for controlling activities.
Reason : Brain stem is very sensitive.
- Q.51 **Assertion :** Spinal cord has a column of both grey and white matter.
Reason : Grey matter forms the central spinal canal.
- Q.52 **Assertion :** Motor end plate is a neuromuscular junction.
Reason : Motor end plate is the junction between motor neuron and muscle fibre.
- Q.53 **Assertion :** Corpus callosum is present in the space between the pia and arachnoid maters.
Reason : It serves to maintain a constant pressure inside the cranium.
- Q.54 **Assertion :** With the evolution of multicellularity, it became imperative to develop nervous system.
Reason : Special senses such as vision, hearing are produced by sense organs associated with the nervous system.
- Q.55 **Assertion :** The auditory ossicles help in hearing.
Reason : Auditory ossicles maintain the balance of air pressure between two sides of the eardrum.
- Q.56 **Assertion :** Image focussed on the fovea is seen most accurately.
Reason : Fovea of retina contains numerous photoreceptor rod cells.
- Q.57 **Assertion :** Blind spot on the retina of the eye is devoid of the ability for vision.
Reason : The photoreceptor cone cells are absent at the blind spot.

ANSWER KEY

Q.1	1	Q.2	3	Q.3	4	Q.4	4	Q.5	3	Q.6	4	Q.7	4
Q.8	3	Q.9	2	Q.10	1	Q.11	1	Q.12	1	Q.13	1	Q.14	1
Q.15	4	Q.16	2	Q.17	4	Q.18	3	Q.19	4	Q.20	3	Q.21	2
Q.22	2	Q.23	1	Q.24	4	Q.25	2	Q.26	2	Q.27	1	Q.28	4
Q.29	3	Q.30	1	Q.31	1	Q.32	2	Q.33	4	Q.34	1	Q.35	1
Q.36	2	Q.37	2	Q.38	3	Q.39	1	Q.40	1	Q.41	2	Q.42	3
Q.43	4	Q.44	3	Q.45	3	Q.46	2	Q.47	2	Q.48	1	Q.49	3
Q.50	2	Q.51	3	Q.52	1	Q.53	4	Q.54	2	Q.55	3	Q.56	3
Q.57	2												