Chapter



Neural Control and Coordination

TYPE A : MULTIPLE CHOICE QUESTIONS

- 1. The vagus nerve is the cranial nerve numbering [1997]
 - (a) 10th (b) 9th
 - (c) 5th (d) 8th
- 2. Sensation of stomach pain is due to [1998]
 - (a) interoceptors (b) exteroceptors
 - (c) teloreceptors (d) all of these
- 3. Which is the example of conditioned reflex ? [1999]
 - (a) Eyes closed when anything enter into it.
 - (b) Hand took up when piercing with needle.
 - (c) Salivation in a hungry dog in response to ringing of a bell.
 - (d) Digestion food goes forward in alimentary canal.
- 4. Otorhinolaryngology is the study of [1999] (a) brain cells
 - (b) bird anatomy
 - (c) locomotary organs
 - (d) ENT
- 5. If frog's brain is crushed, even then its leg moves on pinpointing. It is called [2001]
 - (a) simple reflex
 - (b) conditional reflex
 - (c) neurotransmitter function
 - (d) autonomic nerve conditions
- 6. Which of the following is not a mental disorder?
 - (a) Epilepsy (b) Neurosis [2001]
 - (c) Psychosis (d) Plague
- 7. The 5th cranial nerve of frog is called

[1998, 2001]

- (a) optic nerve (b) vagus nerve
- (c) trigeminal nerve (d) olfactory nerve
- 8. The crystal of lead zirconate is a key component of [2003]
 - (a) electroencephalography
 - (b) electrocardiography
 - (c) magnetoencephalography
 - (d) sonography

- 9. Excessive stimulation of vagus nerve in humans may lead to [2003]
 - (a) hoarse voice
 - (b) peptic ulcers
 - (c) efficient digestion of proteins
 - (d) irregular contraction of diaphragm
- 10. A person is wearing spectacles with concave lenses for correcting vision. While not using the glasses, the image of a distant object in his case will be formed [2003]
 - (a) on the blind spot
 - (b) behind the retina
 - (c) in front of the retina
 - (d) on the yellow spot
- **11.** Unidirectional transmission of a nerve impulse through nerve fibre is due to the fact that [2004]
 - (a) nerve fibre is insulated by a medullary sheath.
 - (b) sodium pump starts operating only at the cyton and then continues into the nerve fibre.
 - (c) neurotransmitters are released by dendrites and not by axon endings.
 - (d) neurotransmitters are released by the axon endings and not by dendrites.

[2006]

12. Examine the diagram of the two cell types A and B given below and select the correct option:



(a) Cell A is the rod cell found evenly all over retina.

- (b) Cell A is the cone cell more concentrated in the fovea centralis.
- (c) Cell B is concerned with colour vision in bright light.
- (d) Cell A is sensitive to low light intensities.

- **13.** A person, who shows unpredictable moods, outbursts of emotion, quarrelsome behaviour and conflicts with others, is suffering from
 - (a) borderline personality disorder (BPD)
 - (b) mood disorder [2006]
 - (c) addictive disorder
 - (d) schizophrenia
- 14. Which of the following is an eye disease?
 - (a) hepatitis (b) measles
 - (c) glaucoma (d) bronchitis
- 15. Given below is a table comparing the effects of sympathetic and parasympathetic nervous system for four features (1-4). [2006] Which one feature is correctly described?

	Feature	Sympathetic nervous system	Parasympahtetic nervous system
(a)	Salivary glands	Stimulates secretion	Inhibits secretion
(b)	Pupil of the eye	Dilate	Constricts
(c)	Heart rate	Decrease	Increase
(d)	Intestinal peristalsis	Stimulates	Inhibits

- 16. Hearing impairment affects which part of brain? [2007]
 - (a) Frontal lobe (b) Parietal lobe
 - (c) Temporal lobe (d) Cerebellum
- 17. The black pigment in the eye which reduces the internal reflection is located in [2007] (a) retina (b) iris
 - (d) sclerotic
 - (c) cornea
- 18. Bipolar nerve cells are present in [2012]
 - (a) Skin tactile corpuscles
 - (b) Spinal cord
 - (c) Retina of eye
 - (d) All the above
- **19.** Fenestra ovalis is the opening of [2012]
 - (a) Cranium (b) Tympanum
 - (c) Tympanic cavity (d) Brain

- **20.** Multipolar nerve cells are present in [2012]
 - (a) Cochlea
 - (b) Dorsal root ganglia of spinal cord
 - (c) Retina of eye
 - (d) Brain
- 21. Neurons receive signals through their and send signals to other neurons [2013]
 - through their _____.
 - (a) dendrites ... receptors
 - (b) end feet ... cell bodies and dendrites
 - (c) cell bodies and dendrites ... axons
 - (d) transmitter vesicles ... axons
- 22. Which of the following ions are required for nerve conduction ? [2016]
 - (a) Ca^{++} , Na^+ and K^+ (b) Ca^{++} and Mg^{++}
 - (c) Mg^{++} and K^{+} (d) Na⁺ and K^+
- 23. The following diagram indicates the reflex arc. Identify the parts labelled as A, B, C, D, E, F and G. Choose the correct option



- (a) A = sense organ; B = sensory nerve;C = dorsal horn;
 - D = interneuron; E = ventral horn;

F = motor nerve; G = effector

- (b) A = sense organ; B = sensory nerve;C = ventral horn:
 - D = interneuron; E = dorsal horn;
 - F = motor nerve; G = effector
- (c) A = effector; B = motor nerve;C = dorsal horn;D = interneuron; E = ventral horn;F = sensory nerve; G = effector
- (d) A = effector; B = motor nerve;
 - C = ventral horn; D = interneuron;
 - E = dorsal horn; F = sensory nerve;
 - G = sense organ.

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TYPE B : ASSERTION REASON QUESTIONS

Directions for (Qs. 24-26) : These questions consist of two statements, each printed as Assertion and Reason. While answering these questions, you are required to choose any one of the following five responses.

- (a) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
- (b) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
- (c) If the Assertion is correct but Reason is incorrect.
- (d) If both the Assertion and Reason are incorrect.
- (e) If the Assertion is incorrect but the Reason is correct.
- 24. Assertion : Transmission of nerve impulse across a synapse is accomplished by neurotransmitters.

Reason : Transmission across a synapse usually requires neurotransmitters because there is a small space, *i.e.*, synaptic cleft, that separates one neuron from another. *[1999]*

- 25. Assertion : Tongue is a gustatoreceptor.
 Reason : Receptors for gustatory sensations are located in taste buds. [2000]
- **26.** Assertion : Astigmatism is due to uneven curvature of lens.

Reason : It is treated with cylindrical lenses. [2007]

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Directions for (Qs. 27-31) : Each of these questions contains an Assertion followed by Reason. Read them carefully and answer the question on the basis of following options. You have to select the one that best describes the two statements.

- (a) If both Assertion and Reason are correct and Reason is the correct explanation of Assertion.
- (b) If both Assertion and Reason are correct, but Reason is not the correct explanation of Assertion.
- (c) If Assertion is correct but Reason is incorrect.
- (d) If both the Assertion and Reason are incorrect.
- **27. Assertion :** The brain stem contains centres for controlling activities.
- Reason : Brain stem is very sensitive. [2012]
 28. Assertion : The chemical stored in the synaptic vesicles are termed as neurotransmitters.
 Reason : Synaptic vesicles release these chemicals in the synaptic cleft. [2013]
- Assertion: The imbalance in concentration of Na⁺, K⁺ and proteins generates resting potential.
 Reason: To maintain the unequal distribution of Na⁺ & K⁺, the neurons use electrical energy.

[2002, 2015]

- 30. Assertion: The axonal membrane of the neuron is more permeable to sodium ion (Na⁺) and nearly impermeable to potassium (K⁺).
 Reason: In a resting state neuron does not conduct any impulse. [2016]
- **31.** Assertion : A cerebellum is related with skillful voluntary movement and involuntary activity like body balance, equilibrium, *etc*.

Reason : It is part of hind brain and it is situated
behind the pons.[2010, 2017]

HINTS & SOLUTIONS

Type A : Multiple Choice Questions

- (a) Vagus is the 10th cranial nerve. Vagus is the longest cranial nerve. It has maximum branches and also called as wandering nerve.
- (a) The sensation of stomach pain is due to enteroceptors (visceroreceptors).
- 3 (c) Conditioned reflexes are acquired reflexes and dependent on past experiences, training and learning I.R. Pavlov demonstrated conditioned reflexes in a hungry dog. He called food and salivation in response to it as unconditioned stimulus and sound of bell and salivation in response to bell as conditioned reflexes.
- **4.** (d) Otorhinolaryngology is the study of ENT.
- 5. (a) The withdrawl of leg in a decapitated frog when pin pointed is a type of simple-reflex.
- 6. (d) Plague is a bacterial disease of rat, caused by *Pasteurella pestis*. Their vector is rat flea (*Xenopsylla cheopsis*). Bubonic plague affects lymph nodes. Pneumonic plague affects lungs and septicemic plague causes anaemia.
- 7. (c) The 5^{th} cranial nerve in frog is trigeminal.
- 8. (d) Lead zirconate is a key component of sonography. These crystals are housed in a transducer which gets excited and starts vibrating when an electric potential is applied to it. These vibrations are the source of ultrasound.
- 9. (d) Vagus nerve is a mixed nerve. It controls the visceral sensations and visceral movements, *e.g.* respiratory movements.
- 10. (c) Concave lenses correct the eye condition of near sightedness *i.e.* myopia by bringing the light rays to a focus on retina. In such cases light rays converge at a point in front of the retina.

- 11. (d) Transmission of nerve impulse is always from axon of one neuron to the dendrite of another neuron *i.e.* unidirectional because neurotransmitters are produced by axons and not by dendrites.
- 12. (b) Cell A is the cone cell more concentrated in the fovea centralis/yellow spot of the eye. Cone cells are sensitive to bright light hence helps in differentiating colours and give high resolution. These cells are specialized for colour vision.
- (a) Borderline personality disorder is an emotionally unstable personality disorder charactarised by impulsivity, unpredictable moods, outburst of emotion, behavioural explosions, quarrelsome behaviour and conflicts with others.
- 14. (c) Glaucoma is an eye disease characterized by increased occular pressure within the eye ball. Glaucoma is a group of diseases of the optic nerve involving loss of retinal ganglion cells in a characteristic pattern of optic neuropathy. Untreated glaucoma leads to permanent damage of the optic nerve and resultant visual field loss that can progress to blindness.Measles is a highly infectious viral disease that usually spread by droplet infection. Bronchitis is the inflammation of the membrane lining of the bronchial tubes.
- 15. (b) Sympathetic nervous system inhibits salivary gland secretion, accelerate heart rate, decreases intestinal peristalsis and dilate pupil of the eye. Whereas parasympathetic nervous system stimulates salivary gland secretion, slows heart rate, sitmulates intestinal peristalsis and constricts pupil of the eye. The sympathetic and the parasympathetic nervous system are parts of what is commonly called the autonomic nervous

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system. These systems work in balance with each other and directly or indirectly affect almost every structure in the body (*e.g.* heart frequency, heart capacity, lumbar function, kidneys, blood vessels, stomach and intestines). The sympathetic nervous system has an active "pushing" function, the parasympathetic has mainly a relaxing function.

Sympathetic	Structure	Parasympathetic
Rate increased	Heart	Rate decreased
Force increased	Heart	Force decreased
Bronchial muscle	Lungs	Bronchial muscle
relaxed		contracted
Pupil dilation	Eye	Pupil constriction
Motility reduced	Intestine	Digestion increased
Sphincter closed	Bladder	Sphincter relaxed
Decreased urine	Kidneys	Increased urine
secretion		secretion

- 16. (c) Forebrain is the largest part of the brain consisting of two halves called cerebral hemispheres separated by longitudinal fissures. Each cerebral hemisphere is divided into four lobes-frontal lobe, parietal lobe, temporal lobe and occipital lobe. Temporal lobe has cells that bring to consciousness, the sensations of hearing and smell. The frontal lobe has centers that are concerned with voluntary movements and personality. The parietal lobe is concerned with general sensations like temperature, touch, pressure, pain, and proprioception. The occipital lobe has centers of visual sense.
- 17. (a) The inner layer of the posterior two-thirds of the eyeball consists of a light sensitive layer, called retina that possesses two types of photoreceptors called the rods and the cone cells. Retina reduces the internal reflection so any damage to it leads to greater internal reflection of light often causing an increase in light sensitivity.

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- 18. (c) Bipolar nerve cells are present in retina of eye. Bipolar nerve cell posses one axon and one dendron.
- **19.** (c) Fenestra ovalis is membrane covered opening leading from tympanic cavity into the vestibule of the internal ear.
- **20.** (b) Multipolar nerve cells are present in dorsal root ganglia of spinal cord.
- 21. (c) Dendrites generally receive inputs and conduct signals toward the cell body, whereas axons conduct signals away from the cell body.
- 22. (a) 23. (a)

Type B : Assertion Reason Questions

- 24. (a) Transmission of nerve impulse access synapses is accomplishes by neurotransmitter because synapses comprises of a synaptic cleft between the end of one nerve fibres and the beginning of the next.
- **25.** (a) Gustatoreceptors are chemoreceptors, enclosed within taste buds.
- 26. (b) Astigmatism is a kind of defect of vision in which the image of an object is distorted. It is because all the light rays do not come to focus on retina. It is due to abnormal curvature of the lens. It can be corrected by wearing cylindrical lenses.
- 27. (b) The brain stem consists of pons varoli, medulla oblongata, mid brain and diencephalon. The brain stem is the connection between brain and spinal cord. It contains centres for controlling many vital activities like respiration, body temperature, urge for eating and drinking etc. It also carries nerve tracts between the spinal cord and the higher brain structure.
- 28. (b) The axon terminal of the neuron contains many membrane bound vesicles called synaptic vesicles, in its cytoplasm. Within these vesicles, chemical substances such as adrenaline and acetylcholine remain

stored. These chemicals are called neurotransmitters, because they help to transmit nerve impulses across the synapses. When a nerve impulse passes the axon terminal, its synaptic vesicles release their stored chemicals to the synaptic cleft. These diffuse through the cleft to reach the membrane of the next neuron, stimulating the latter. This causes the nerve impulse to be transmitted along the next neuron.

- **29.** (c) Resting potential is due to differential distribution of ions on two sides of cell membrane.
- **30.** (d) The axonal membrane of neuron is more permeable to potassium ions (K⁺) and

nearly impermeable to sodium ions (Na⁺). In a resting state neuron does not conduct any impulse. In the resting state the period during which a neuron is not conducting the fluids outside the cell membrane carry a relatively high positive charge. The fluids inside the cell membrane. Carry a less positive, or relatively negative, charge.

31. (b) Hind brain consists of cerebellum located dorsally to medulla oblongate and pons varolii. It contains centres for maintenance of posture and equilibrium of the body and for the muscle tone. All activities of the cerebellum are involuntary but may involve learning in their early stages.

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