

Chapter – 10

Neural Control and Coordination

Textbook Evaluation Solved

Question 1.

Which structure in the ear converts pressure waves to action potentials?

- (a) Tympanic membrane
- (b) Organ of Corti
- (c) Oval window
- (d) Semicircular canal

Answer:

- (b) Organ of Corti

Question 2.

Which of the following pairings is correct?

- (a) Sensory nerve – afferent
- (b) Motor nerve – afferent
- (c) Sensory nerve – ventral
- (d) Motor nerve – dorsal

Answer:

- (a) Sensory nerve – afferent

Question 3.

During synaptic transmission of nerve impulse, neurotransmitter (P) is released from synaptic vesicles by the action of ions (Q)? Choose the correct P and Q?

- (a) P = Acetylcholine, Q = Ca^{++}
- (b) P = Acetylcholine, Q = Na^+
- (c) P = GABA, Q = Na^+
- (d) P = Cholinesterase, Q = Ca^{++}

Answer:

- (a) P = Acetylcholine, Q = Ca^{++}

Question 4.

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 bright light intensities

Answer:

- (c) Cell-B is concerned with colour vision in bright light

Question 5.

Assertion: The imbalance in concentration of Na^+ , K^+ and proteins generates action potential.

Reason: To maintain the unequal distribution of Na^+ and K^+ , the neurons use electrical energy.

- (a) Both Assertion and Reason are true and Reason is the correct explanation of the Assertion.
- (b) Both Assertion and Reason are true but the Reason is not the correct

explanations of Assertion.

- (c) Assertion is true, but Reason is false.
- (d) Both Assertion and Reason are false.

Answer:

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

Question 6.

Which part of the human brain is concerned with the regulation of body temperature?

- (a) Cerebellum
- (b) Cerebrum
- (c) Medulla oblongata
- (d) Hypothalamus

Answer:

(a) Cerebellum

Question 7.

The respiratory centre is present in the

- (a) Medulla oblongata
- (b) Hypothalamus
- (c) Cerebellum
- (d) Thalamus

Answer:

(a) Medulla oblongata

Question 8.

Match the following human spinal nerves in column-I with their respective number in column-II and choose the correct option?

	Column -1		Column - II
P	Cervical nerves	(i)	5 pairs
Q	Thoracic nerve	(ii)	1 pair
R	Lumbar nerve	(iii)	12 pairs
S	Coccygeal nerve	(iv)	8 pairs

- (P – iv), (Q – iii), (R – i), (S – ii)
(b) (P – iii), (Q – i), (R – ii), (S – iv)
(c) (P – iv), (Q – i), (R – ii), (S – iii)
(d) (P – ii), (Q – iv), (R – i), (S – iii)

Answer:

- (a) (P -iv)
(b) (Q – iii)
(c) (R – i)
(d) (S – ii)

Question 9.

Which of the following cranial nerve controls the movement of eye ball ?

- (a) Trochlear nerve
(b) Optic nerve
(c) Olfactory nerve
(d) Vagus nerve

Answer:

- (a) Trochlear nerve

Question 10.

The abundant intracellular cation is

- (a) H^+
(b) K^+
(c) Na^+
(d) Ca^{++}

Answer:

- (b) K^+

Question 11.

Which of the following statement is wrong regarding conduction of nerve impulse?

- (a) In a resting neuron, the axonal membrane is more permeable to K^+ ions and nearly impermeable to Na^+ ions.
(b) Fluid outside the axon has a high concentration of Na^+ ions and low concentration of K^+ , in a resting neuron.
(c) Ionic gradients are maintained by Na-K pumps across the resting

membrane, which transport 3Na^+ ions outwards for 2K^+ into the cell.
(d) A neuron is polarized only when the outer surface of the axonal membrane possess a negative charge and its inner surface is positively charged.

Answer:

(d) A neuron is polarized only when the outer surface of the axonal membrane possess a negative charge and its inner surface is positively charged.

Question 12.

All of the following are associated with the myelin sheath except

- (a) Faster conduction of nerve impulses
- (b) Nodes of Ranvier forming gaps along the axon
- (c) Increased energy output for nerve impulse conduction
- (d) Saltatory conduction of action potential

Answer:

(c) Increased energy output for nerve impulse conduction

Question 13.

Several statements are given here in reference to cone cells. Which of the following option indicates all correct statements for cone cells?

Statements:

- (i) Cone cells are less sensitive in bright light than Rod cells
- (ii) They are responsible for colour vision
- (iii) Erythropsin is a photo pigment which is sensitive to red colour light
- (iv) They are present in fovea of retina

- (a) (iii), (ii) and (i)
- (b) (ii), (iii) and (iv)
- (c) (i), (iii) and (iv)
- (d) (i), (ii) and (iv)

Answer:

(b) (ii), (iii) and (iv)

Question 14.

Which of the following statement concerning the somatic division of the

peripheral neural system is incorrect?

- (a) Its pathways innervate skeletal muscles
- (b) Its pathways are usually voluntary
- (c) Some of its pathways are referred to as reflex arcs
- (d) Its pathways always involve four neurons

Answer:

- (d) Its pathways always involve four neurons

Question 15.

When the potential across the axon membrane is more negative than the normal resting potential, the neuron is said to be in a state of

- (a) Depolarization
- (b) Hyperpolarization
- (c) Repolarization
- (d) Hypopolarization

Answer:

- (b) Hyperpolarization

Question 16.

Why is the blind spot called so?

Answer:

The optic nerves and the retinal blood vessels enter the eye slightly below the posterior pole which is devoid of photo receptors hence this region is called blind spot.

Question 17.

Sam's optometrist tells him that his intraocular pressure is high. What is this condition called and which fluid does it involve?

Answer:

The aqueous humour present in between iris and lens and the cornea and iris is produced and drained at the same rate, maintaining a constant intra ocular pressure of about 16 mm Hg. Any block in the canal of schlemm increases the intra ocular pressure of aqueous humour. This condition is called 'Glaucoma'.

Due to pressure, optic nerve and the retina are compressed. This leads to blindness.

Question 18.

Why are we getting running nose while crying?

Answer:

The action potential occurs in response to a threshold stimulus but does not occur at sub-threshold stimuli. This is called the all or none principle.

Question 19.

The action potential occurs in response to a threshold stimulus; but not at subthreshold stimuli. What is the name of the principle involved?

Answer:

All or none principle.

Question 20.

The pleasant smell of food urges Ravi to rush into the kitchen. Name the parts of the brain involved in the identification of food and emotional responses to odour?

Answer:

The olfactory nerve carries the sense of smell to the sensory strip present in the cerebrum. The sensory areas are present in the parietal lobe of the cerebrum. The stimuli of smell reach the mammillary bodies present in the hypothalamus. This produces olfactory reflexes and emotional responses to odour.

Question 21.

Cornea transplant in humans is almost never rejected. State the reason?

Answer:

The cornea is the only tissue in the body that can be transplanted from one person to another with little or no possibility of rejection. This is because cornea does not have blood vessels.

Question 22.

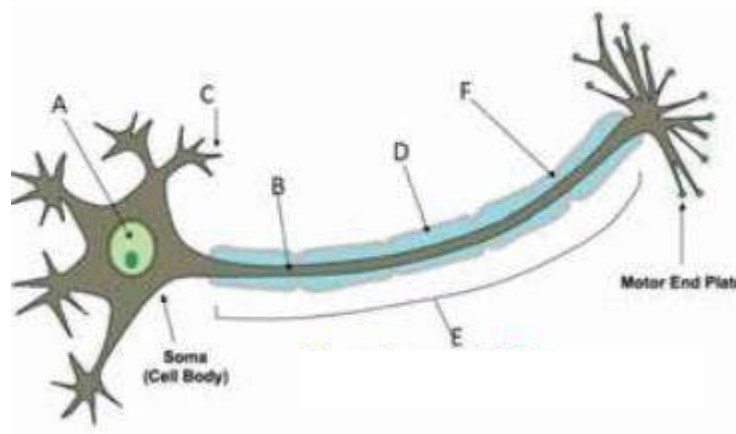
At the end of repolarization, the nerve membrane gets hyperpolarized. Why?

Answer:

At the end of repolarization, the membrane potential inside the axolemma becomes negative due to the efflux of K^+ ions. When it becomes more negative than the resting potential -70 mV to about -90 mV, it becomes hyperpolarised.

Question 23.

Label the parts of the neuron?

Answer:

1. Nucleolus
2. Node of Ranvier
3. Dendrite
4. Myelin sheath
5. Axon
6. Nucleus

Question 24.

The choroid plexus secretes cerebrospinal fluid. List the function of it?

Answer:

- CSF provides buoyancy to CNS structures, CSF acts as a shock absorber for the brain and spinal cord.
- It nourishes the brain cells by transporting a constant supply of food and oxygen.

- It carries harmful metabolic wastes from the brain to the blood
- Maintains constant pressure inside the cranial vessels.

Question 25.

What is the ANS controlling centre? Name the parts that are supplied by the ANS?

Answer:

Hypothalamus is the ANS controlling centre. The Autonomic neural system innervates smooth muscles, glands and cardiac muscle.

Question 26.

Why the limbic system is called the emotional brain? Name the parts of it?

Answer:

The limbic system is called the “emotional brain because it plays a primary role in the regulation of pleasure-pain anger fear sexual feelings and affection. The main components of the limbic system are olfactory bulbs:

- Cingulate gyrus
- Mammillary body
- Amygdale
- Hippocampus
- Hypothalamus.

Question 27.

Classify receptors based on the type of stimuli?

Answer:

Receptors	Stimulus	Effector organs
Mechano receptors	Pressure and vibration	Mechano receptors are present in the cochlea of the inner ear and the semicircular canal and utricle
Chemoreceptors	Chemicals	Taste buds in the tongue and nasal epithelium

Thermoreceptors	Temperature	Skin
Photoreceptors	Light	Rod and cone cells of the retina in the eye

Question 28.

Name the first five cranial nerves, their nature, and their functions?

Answer:

	Cranial nerves	Nature of nerve	Function
1.	Olfactory nerve	Sensory	Sense of smell
2.	Optic nerves	Sensory	Sense of sight
3.	Oculomotor nerves	Motor	Movement of the eye
4.	Trochlear nerve	Motor	Rotation of the eyeball
5.	Trigeminal nerve	Sensory and motor (mixed)	The functioning of facial parts

Question 29.

The sense of taste is considered to be the most pleasurable of all senses? Describe the structure of the receptor involved with a diagram?

Answer:

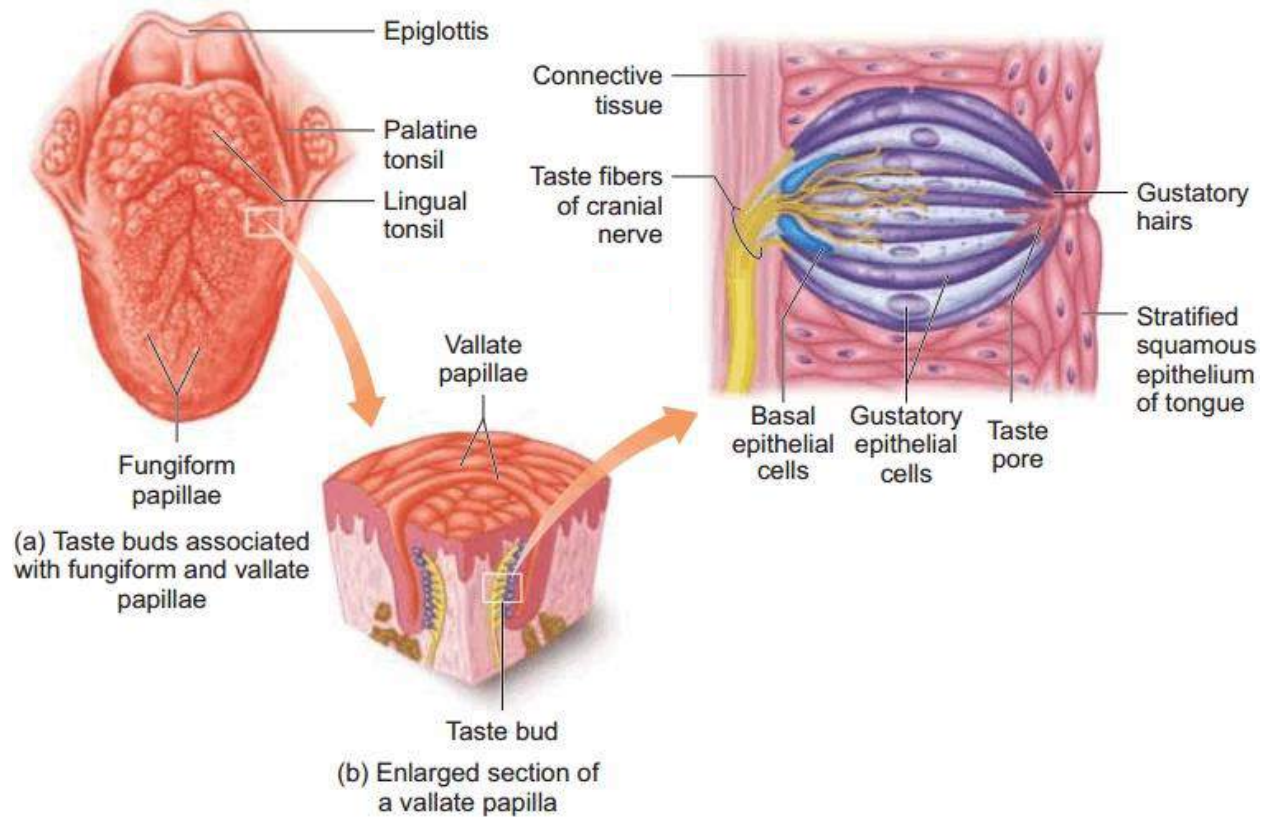
Gustatory receptor: The sense of taste is considered to be the most pleasurable of all senses. The tongue is provided with many small projections called papillae which give the tongue an abrasive feel. Taste buds are located mainly on the papillae which are scattered over the entire tongue surface.

Most taste buds are seen on the tongue few are scattered on the soft palate, inner surface of the cheeks, pharynx and epiglottis of the larynx. Taste buds are flask-shaped and consist of 50 – 100 epithelial cells of two major types.

Gustatory epithelial cells (taste cells) and Basal epithelial cells (Repairing cells). Long microvilli called gustatory hairs project from the tip of the gustatory cells and extends through a taste pore to the surface of the epithelium where they are bathed by saliva.

Gustatory hairs are the sensitive portion of the gustatory cells and they have sensory dendrites which send the signal to the brain. The basal cells that act as stem cells, divide and differentiate into new gustatory cells.

Taste buds



Question 30.

Describe the structures of olfactory receptors?

Answer:

- The yellow coloured patches of olfactory epithelium from the olfactory organs are located on the root of the nasal cavity.
- The olfactory epithelium is covered by a thin coat of mucus layer below and olfactory glands bounded connective tissues above.
- It consists of three types of cells. Supporting cells, basal cells.

- Millions of pin-shaped olfactory receptor cells.
- The unmyelinated axons of the olfactory receptor cells are gathered to form the filaments of the olfactory nerve which synapses with cells of olfactory nerves.
- The impulse is transmitted to the frontal lobe of the brain for identification of smell and the limbic system for the emotional responses to odour.