

## **CHAPTER – 21**

### **NEURAL CONTROL AND COORDINATION**

#### **One mark Questions:**

**1. Name the structural and functional unit of nervous system?**

A. Neuron.

**2. What does central Nervous System consists of?**

A. Brain and spinal cord.

**3. What is peripheral nervous system?**

A. Nerves arising from brain and spinal cord.

**4. Name the divisions of autonomic nervous system?**

A. Sympathetic and parasympathetic.

**5. What are neurotransmitters?**

A. Neurotransmitters are biochemical's secreted by terminal of one neuron for transmitting impulse to the next neuron.

**6. What is synaptic knob?**

A. Each axon terminates as a bulb like structure called synaptic knob.

**7. Where are nissl's granules located?**

A. Cellbody and dendrites of a neuron.

**8. What is the function of Schwann cells?**

A. Helps in the formation of myelin sheath.

**9. What is Node of ranvier?**

A. The gaps between two adjacent myelin sheaths.

**10. Why neurons are called excitable cells?**

A. Because their membranes are in a polarized state.

**11. Define synapses.**

A. Transmission of nerve impulse from one neuron to another through junctions.

**12. What is synaptic cleft?**

A. A gap between pre-synaptic and post synaptic neurons.

**13. What are meninges?**

A. They are protective membranous coverings of brain and spinal cord.

**14. Name the nerve fibres which connects cerebral hemisphere?**

A. Corpus callosum.

**15. What are association neurons?**

A. Neurons which are neither sensory nor motor nerves.

**16. Name the centre for sensory and motor signaling?**

A. Thalamus.

**17. Which is called as emotional brain?**

A. Limbic System.

**18. What is limbic system?**

A. The inner parts of cerebral hemispheres associated with deep structures and form a complex structure.

**19. Name the canal present between forebrain and hindbrain?**

A. Cerebral aqueduct.

**20. What is brain stem?**

A. The medulla, pons and mid brain are collectively called the brain stem.

**21. Which is the largest part of the human brain?**

A. Cerebrum.

**22. Mention two functions of medulla oblongata?**

A. Controls respiration, cardiovascular reflexes, gastric secretion.

**23. Where do you find corpora quadrigemina?**

A. Midbrain.

**24. Where is hunger centre located in human brain?**

A. Hypothalamus.

**25. Mention the layers of meninges?**

A. Dura mater, arachnoid and pia mater.

**26. Define nerve impulse?**

A. It is a wave of electrochemical disturbance that passes along the axon due to excitation.

**27. Mention the types of synapses?**

A. Electrical and Chemical.

**28. Name the command and control system of human body?**

A. Brain.

**29. Define reflex arc?**

A. It is the pathway taken by the nerve impulse during reflex action.

**30. Which part of the brain maintains body equilibrium?**

A. Cerebellum.

**31. Mention the layers of Eye?**

A. Sclera, Choroid and Retina.

**32. What forms iris of the eye?**

A. Ciliary body and choroid.

**33. Aperture surrounded by the iris is called?**

A. Pupil.

**34. Name the cells of Retina?**

A. Photoreceptor, bipolar and ganglion cells.

**35. Anterior portion of the sclera is called?**

A. Cornea.

**36. What are photoreceptor cells?**

A. Cells containing photopigments.

**37. Name the vitamin required for the formation of rhodopsin?**

A. Vitamin A.

**38. What is blind spot?**

A. The point on the retina from where optic nerve starts.

**39. Name the opaque and pigmented structure of eye?**

A. Iris.

**40. Name the ossicles of middle ear?**

A. Malleus, incus and stapes.

**41. What is the function of ossicles in middle ear?**

A. It increase the efficiency of transmission of sound waves to the inner ear.

**42. What is the function of Eustachian tube?**

A. It equalizes the pressures on either sides of the ear drum.

**43. Name auditory receptors?**

A. Organ of corti.

**44. Name the receptors responsible for maintenance of balance of the body and posture?**

A. Crista and macula.

**45. Where do you find bipolar neurons?**

A. Retina of the eye.

**46. Define reflex action?**

A. It is a spontaneous, automatic and mechanical response to a stimulus.

**47. Which cells of retina enable us to see colored objects?**

A. Cone cells.

**48. Name the exposed, transparent part of the eyeball?**

A. Cornea.

**49. Name the two chambers of the eye ball?**

A. Aqueous and vitreous.

**50. Name the gland present in the ear canal?**

A. Sebaceous gland.

### **Two mark Questions:**

**1. Differentiate between afferent and efferent fibres?**

A. Afferent:

The nerve fibres transmitting impulses from tissues/organs to central nervous system.

Efferent:

These nerve fibres transmit regulatory impulses from the CNS to the concerned tissues/organs.

**2. Classify neurons based on number of axon and dendrites?**

A. 1. Unipolar neuron - Neuron with single process

2. Bipolar neuron – Neuron with two processes

3. Multipolar neuron – Neuron with more than two processes.

**3. Differentiate between grey and white matter?**

A. Grey matter: It is a grey coloured part of nervous system which consists of cyton, dendrites and non myelinated neurons.

White matter: It is white coloured part of nervous system which consists of axons with myelinated nerve fibres.

**4. Differentiate between myelinated and non myelinated neurons?**

A. Myelinated neurons:

Axon is covered by myelin sheath, conduction of nerve impulse is more faster.

Non myelinated neurons:

Axon is not covered by myelin sheath, conduction of nerve impulse is slow.

**5. What is somatic nervous system? Give one example?**

A. Somatic nervous system relays impulses from the central nervous system to voluntary regions.

Example: Skeletal muscles of hands.

**6. Mention any 4 functions of cerebrum?**

A. Memory, Intelligence, voluntary movements and communication.

**7. Where are the ear ossicles located? Describe ;**

A. Ear ossicles occur in the middle ear, malleus is attached to the tympanic membrane is attached to the tympanic membrane and incus is attached to malleus and stapes is attached to the oval window of cochlea.

**8. Mention the components of reflex arc?**

A. Receptor, sensory nerve fibre, interneurons motor nerve fibres and effector organ.

**9. Write any four differences between cones and rods?**

Rod cells:

1. Contains Rhodopsin pigment.
2. Sensitive to dim light and gives night vision.
3. Do not give colour vision.
4. Image is blurred.

Cone Cells:

1. Contains Iodopsin pigment.
2. Sensitive to bright light and gives day vision.
3. Gives colour vision.
4. Image is acute.

**Four mark Questions:**

**1. Explain mechanism of hearing?**

- The external ear receives sound waves and transmits them to ear drum.
- Ear drum vibrates and transmits it to ear ossicles that is malleus, incus and stapes then through oval window it reaches to fluid of cochlea.
- Cochlea generates waves in the lymphs and induce ripple in the basilar membrane.
- Movements of basilar membrane bend the hair cells, thus presses tectorial membrane.
- As a result nerve impulse is created and transmitted to auditory cortex of the brain by afferent neurons.
- Brain analysis the impulse and sound is recognized.

## **2. Explain the mechanism of reflex action?**

A. Reflex action is a spontaneous, involuntary response to the stimulus.

- When thorn picks the hand the stimulus is received by a receptor in the skin.
- Receptor sets sensory impulse and is carried to spinal cord through afferent neurons.
- From there it passes outwards through the motor neuron and reaches either a muscle or gland cell where response is felt.

## **3. Explain the mechanism of vision?**

A.

- Light rays focused on retina through the cornea and lens, generate potentials in rods and cones.
- The photopigments dissociates into opsin and retinal.
- The structure of opsin changes causes potential difference in photoreceptor cells.
- Thus it creates action potential and transmitted to ganglion cells through bipolar cells.
- This impulses are transmitted by the optic nerves to the visual cortex area of the brain.
- Nerve impulses are analysed and image is formed on the retina.

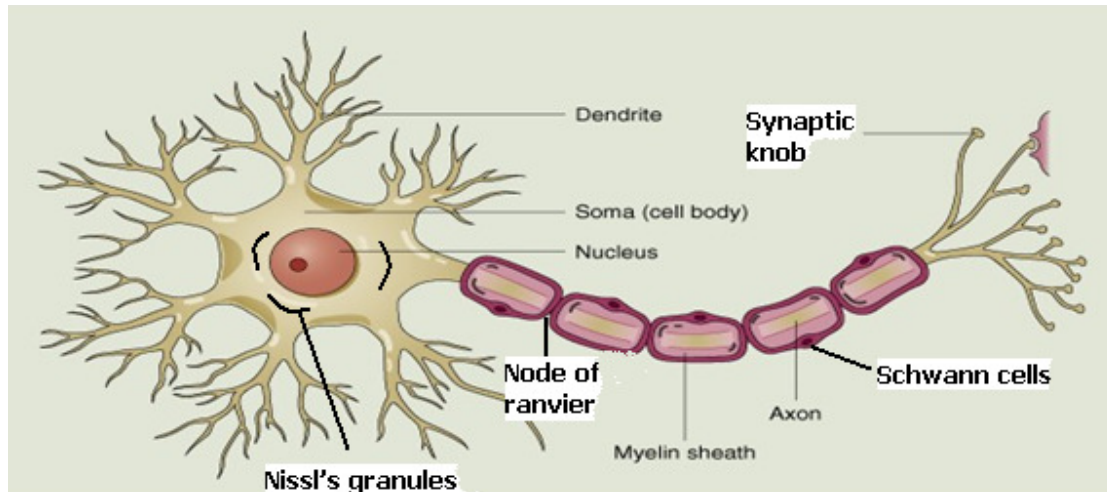
## **4. Explain the structure of cerebrum?**

A.

- Forebrain consists of cerebrum, thalamus and hypothalamus.
- Cerebrum forms the major part of the brain.
- A deep cleft divides cerebrum into right and left hemispheres.
- The hemispheres are connected by corpus callosum.
- The layer of cells which covers the cerebral hemisphere is called cerebral cortex and thrown in to prominent folds.
- Cerebral cortex is grey in colours because of the presence of more cell bodies and dendrites.
- It contains motor areas, sensory areas and association areas for complex functions.
- Inner part of cerebral hemisphere is cerebral medulla.
- It is white in colour due to the presence of axons.

## **5. Draw a neat diagram of neuron and label the following parts:- a) Dendrites b) Nissl's granules c) Schwann cells d) nodes of ranvier e) myelin sheath f)Synaptic knob**

A.

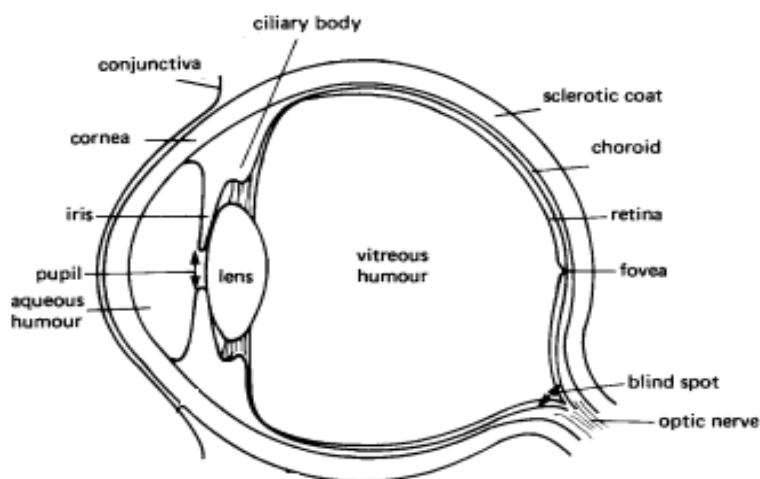


#### 6. Explain chemical synapses?

A. When an impulse arrives at the axon terminal, it stimulates the movement of the synaptic vesicles towards the membrane and fuses with the plasma membrane of pre synaptic neuron and releases neurotransmitters to the synaptic cleft which binds to the specific receptors present on the post synaptic membrane and opens ion channels allowing the entry of ions this generate a new potential in the post synaptic neuron.

#### 7. Draw neat labeled diagram of V.S of human eye?

A.



#### 8. Explain the structure and function of middle ear?

A. Middle ear consists of three ossicles called malleus, incus and stapes.

Malleus is attached to tympanum, incus is attached to malleus and stapes.

Stapes is attached to oval window of the cochlea, ossicles helps in amplification of sound waves.

The Eustachian tube connects the middle ear cavity with the parynx, it helps in equalizing the pressures on both sides of the ear drum.

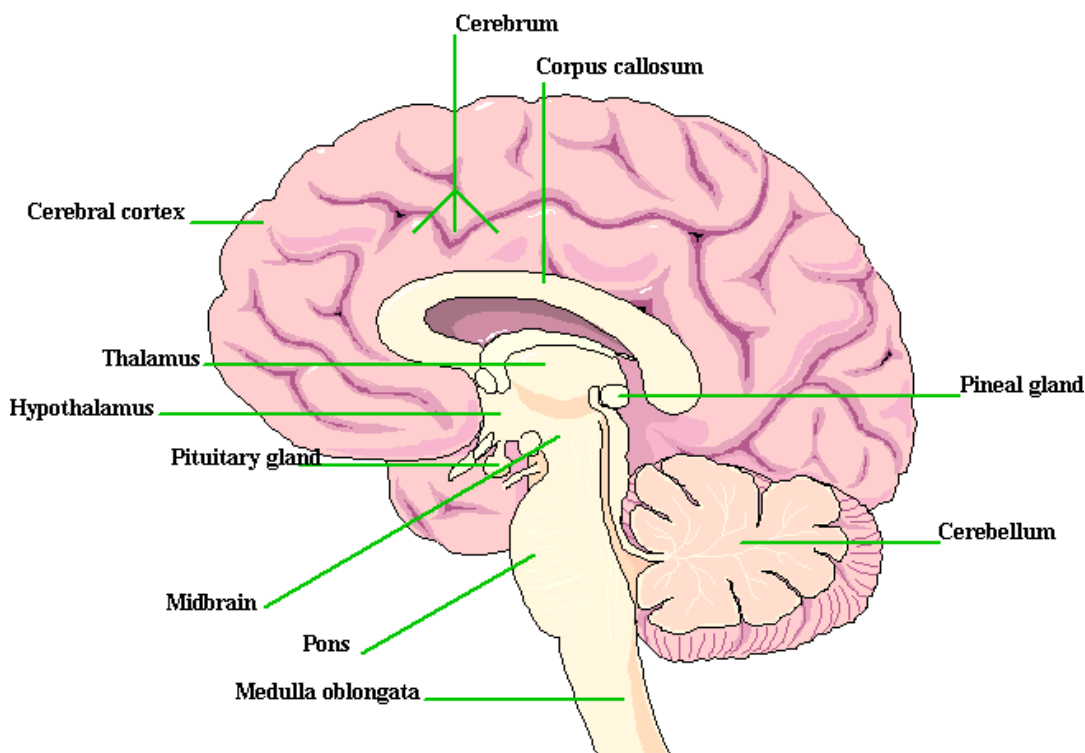
### 9. Differentiate between resting and action potential?

A. Resting potential: - When a neuron is not conducting any impulses, it is resting potential. Here axoplasm contains high concentration of  $K^+$  ions and negatively charged proteins and the fluid outside the axon contains high concentration of  $Na^+$  ions and positively charged.

Action potential: - When a neuron is stimulated at that site,  $Na^+$  is freely permeable, this leads to rapid influx of  $Na^+$  and out flow of  $K^+$  ions thus outer surface of the membrane becomes negatively charged and inner side becomes positively charged.

### Five mark Questions:

#### 1. Draw a neat labeled diagram of sagittal section of human brain?



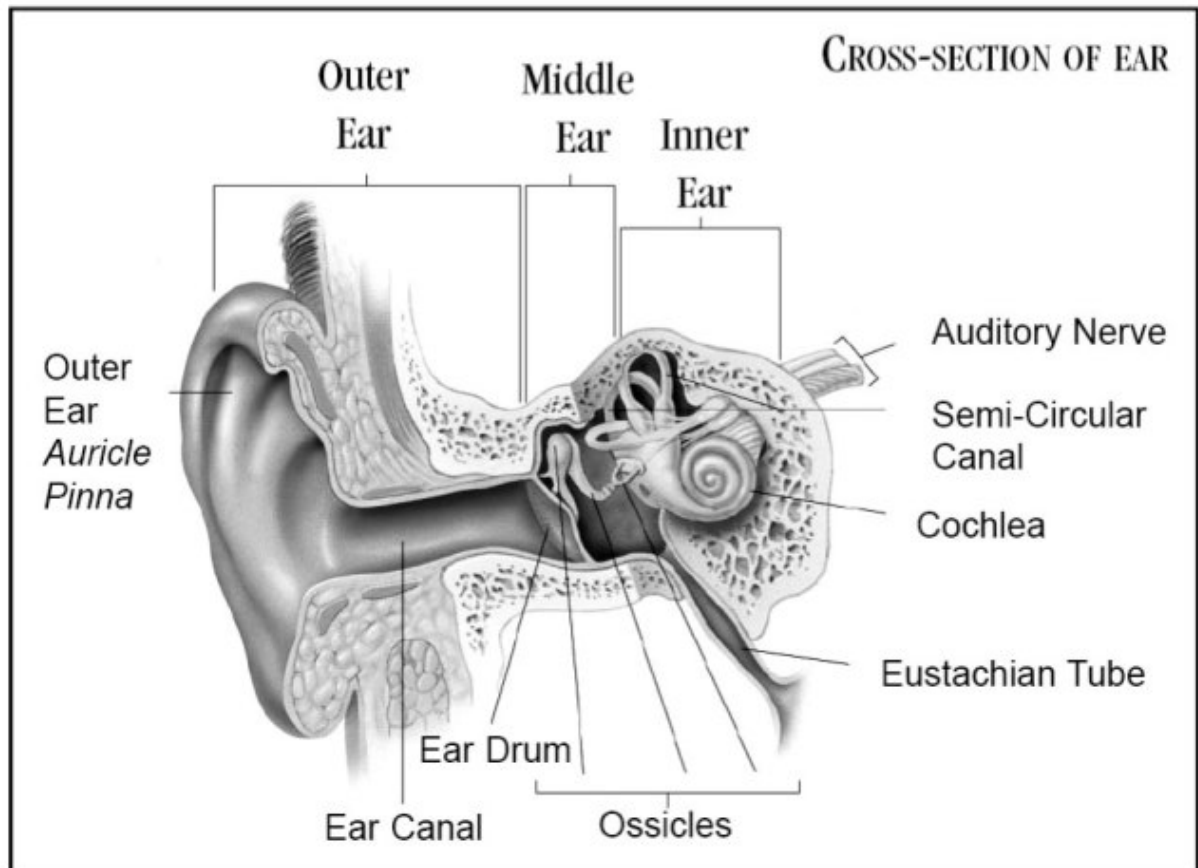
#### 2. Explain the structure of inner ear?

A. Inner ear consists of two parts bony and membranous labyrinth.

Membranous labyrinth is filled with endolymph and surrounded by perilymph of bony labyrinth. The coiled portion of the labyrinth is called cochlea. The Reissner's and basilar membrane divide perilymph into upper scala vestibuli and lower scala tympani.

Basilar membrane contains hair cells in rows containing stereocilia at the apex, above this rows is a thin elastic membrane called tectorial membrane thus forming organ of corti which act as auditory receptors.

**3. Draw a neat labeled diagram of ear?**



**4. Explain the structure of human eye?**

A. Eye ball is spherical in structure, consisting of three layers.  
External sclera made up of connective tissue, anterior of this is cornea.



Middle choroid, thin posteriorly and becomes thick anteriorly to form ciliary body which continues further to form iris. Lens is held in place by ligaments. Pupil is the aperture present in front of the lens. Inner retina which contains three types of nerve cells, ganglion, bipolar and photoreceptors. Optic nerves and blood vessels enter and leave at the posterior pole of the eye ball. Photoreceptor cells are absent at this region hence called blind spot. Lateral to the blind spot yellowish pigmented spot called macula lutea with central pit called fovea is present. The space between cornea and the lens is called aqueous chamber containing aqueous humor. The space between lens and the retina is vitreous chamber containing vitreous humor.

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