Class : Zoology
Class : XI

Kannada

NEURAL CONTROL AND COORDINATION

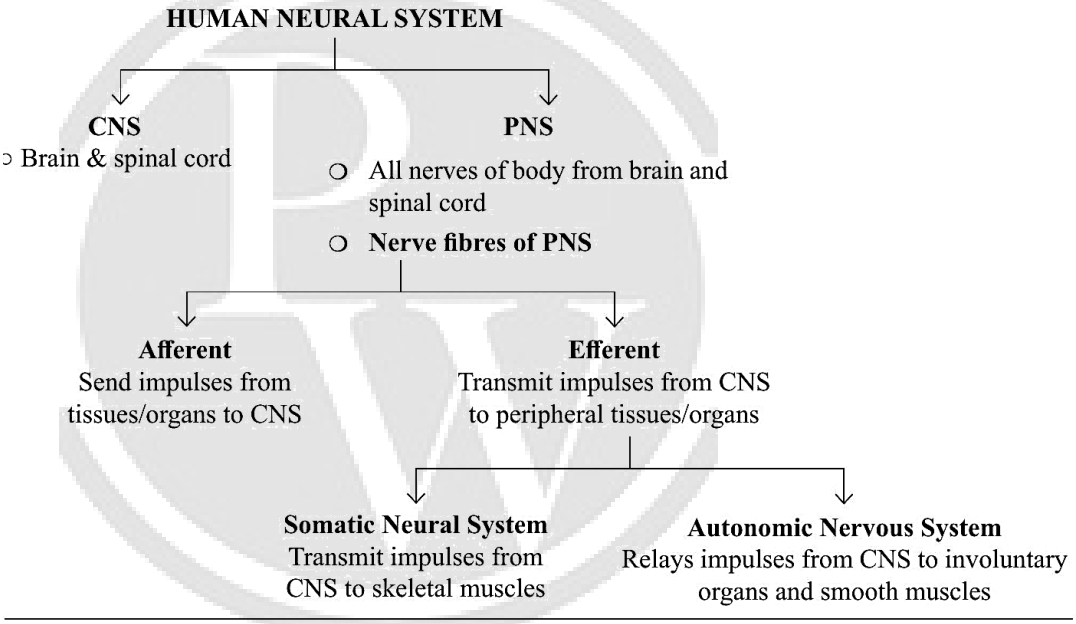
Introduction

The neural system and the endocrine system jointly coordinate and integrate all the activities of the organs so that they function in a synchronised manner

Neural System

Neurons can detect, receive & transmit stimulus

- Hydra – Network of neurons
- Insects – Organised neural system with brain and ganglia
- Vertebrates – Well developed neural system



Visceral nervous system (VNS):

- Part of Peripheral Nervous System (PNS)
- Complex of nerves, fibres, ganglia and plexuses

Neuron

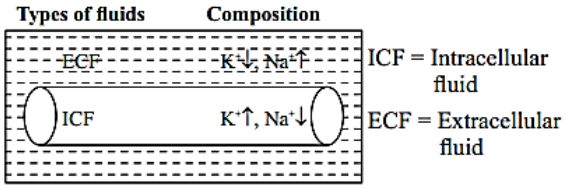
- Neuron is the structural and functional unit of the neural system.
- Composed of a cell body, dendrites and axon.

Nissl's Granules

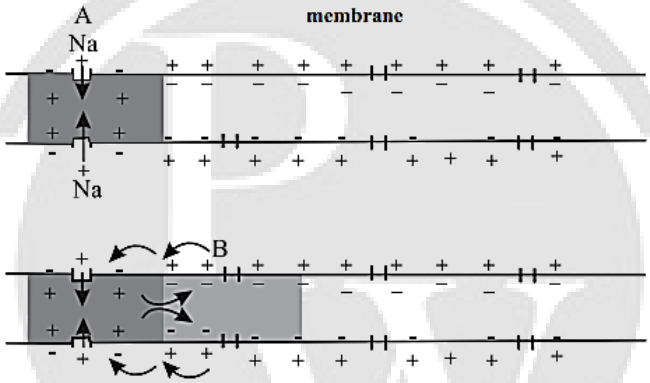
- Three types of Neurons: Multipolar, Bipolar, Unipolar.
- Cell body contains cell organelles except centriole.
- Axons can be myelinated or non-myelinated
- CNS → oligodendrocytes → myelination
- PNS → Schwann cells → myelination

Generation and Conduction of Nerve Impulse

Axon membranes (selectively permeable) →
- More permeable for K^+
- Nearly impermeable to Na^+
- Impermeable to negatively charged proteins
- Sodium-potassium pump maintain ionic gradients



❖ Flow of charge is from **A** ⇌ **B** (Inner membrane / Outer membrane)



Transmission of Impulse

❖ Done with the help of synapse.
❖ **Events:**
- ➢ Neurotransmitters released in synaptic cleft ↓
- ➢ Bind to receptors on post synaptic neuronal membrane ↓
- ➢ Opening of ion channels in post synaptic membrane ↓
- ➢ Generates a new potential in post synaptic membrane

Synapse
- Electrical → No synaptic cleft
- Chemical → Synaptic cleft

Central Nervous System (CNS)

Protective coverings → Skull

Meaning ↓

	Outer	Middle	Inner
Name of meninx	Duramater	Arachnoid (thin)	Painmater
In contact with	skull		Brain

Brain

Forebrain

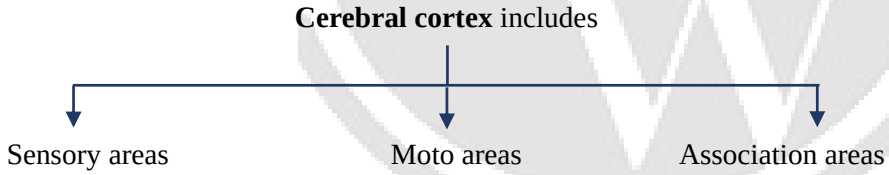
- Cerebrum → cerebral hemesphere connected by corpus corrosum.
- Thalamus.
- Hypothalamus.
- Limbic system → complex structure involve amygdala, hippocampus, inner part of cerebral hemisphere and Hypothalamus.

Midbrain

- Corpora Quadrigemina → 4 lobes on dorsal side.
- Cerebral Aqueduct → canal passes through midbrain.
- Brain stem: Midbrain, pons and medulla oblongata.

Hindbrain

- Pons
- Cerebellum
- Medulla oblongata

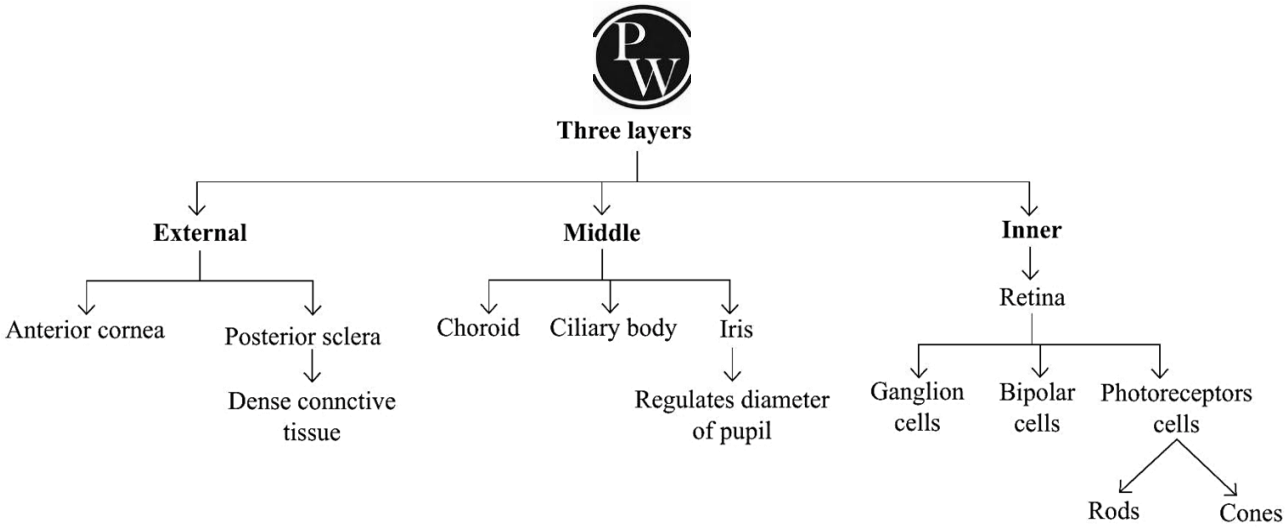


Reflex Action and Reflex ARC

- Entire process of response to a peripheral nervous stimulation that occur involuntarily and require the involvement of a part of the CNC.

Sense Organs

- Sensory organs senses all type of changes that takes place in the surrounding.
  E.g. Nose → Smell → Olfactory receptors.
  Tongue → Taste → Gustatory receptors.
  Eye → Sight
  Ear → Hearing



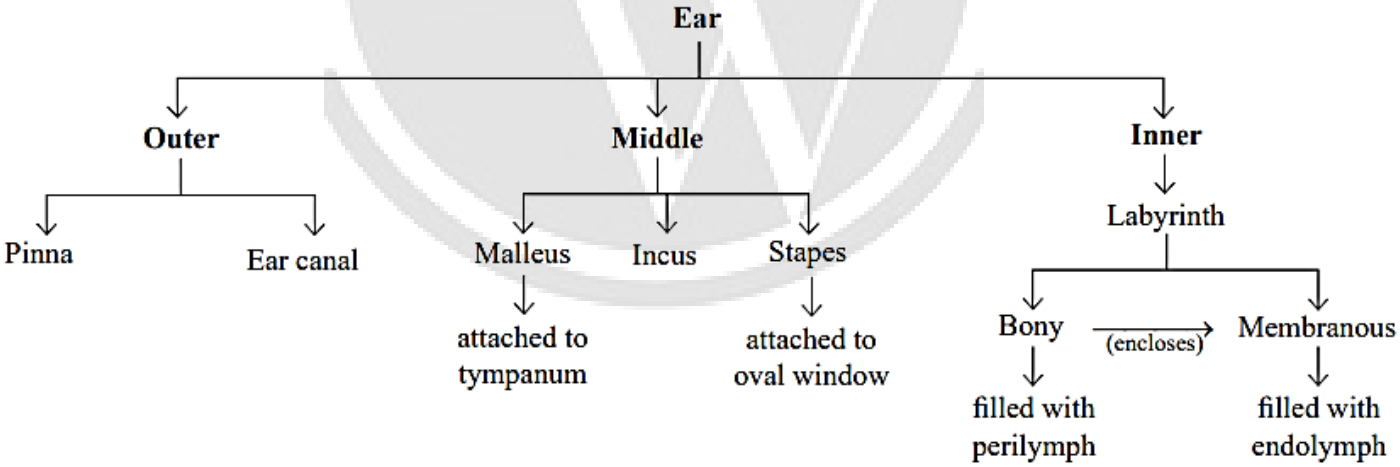
- ❖ Macula lutea - Yellowish pigmented spot lying at the posterior pole of eye lateral to the blind spot with a central pit called fovea centralis.

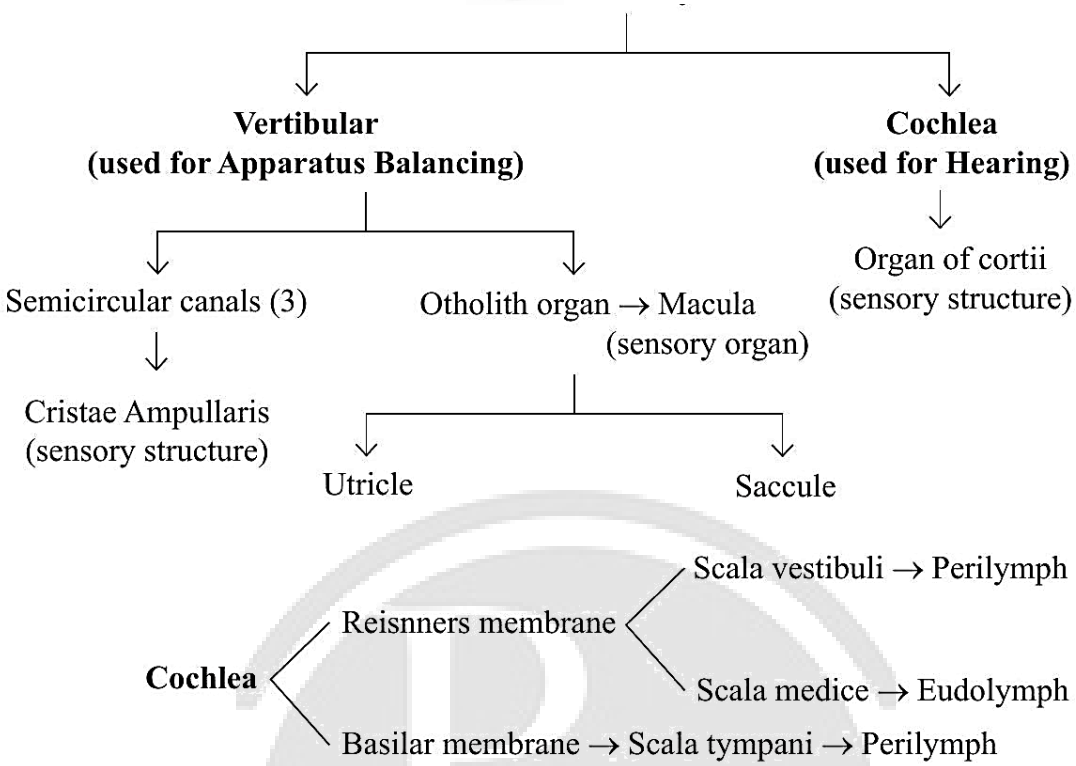
- ❖ Photoreceptors contain photopgment which is an aldehyde of vitamin A/retinal and protein, opsin.

Mechanism of Vision

- ❖ Visible light → Photosensitive → Rhodopsin (retinal + opsim) → Trans-retinal → Opsin (Change in structure) → Membrane permeability changed → Action potential generate → Ganglionic cells → Bipolar cells → Optic nerve → Visual cortex.

Ear




Vertibular
(used for Apparatus Balancing)
Cochlea
(used for Hearing)
Semicircular canals (3)
Otholith organ → Macula
(sensory organ)
Organ of cortii
(sensory structure)
Cristae Ampullaris
(sensory structure)
Utricle
Saccule

Cochlea
Reisnners membrane
Scala vestibuli → Perilymph
Scala medice → Eudolymph
Basilar membrane → Scala tympani → Perilymph

