neurons.

✓ neurons are excitable cells.
✓ neuroglial cells protect, support and nourish the neurons. (more than one half volume of neural tissue)
✓**nissl granules** are the granular bodies also present in branched projections of the cell body called **dendrites.**
✓ dendrites transmit impulses towards cell body
✓distal branched ends of **axon** are bulb-like structures called **synaptic knob**. they possess vesicles that release neurotran-smitters.
✓ axons transmit nerve impulse away from cell body to **synapse** a neuro-muscular junction.

types of axons
1. **myelinated nerve fibres.**
schwann cells that form a myelin sheath around the axon.
gaps b/w two adjacent myelin sheaths are **nodes of ranvier**
these nerves are found in spinal and cranial nerves.

2. **unmyelinated nerve fibre**
schwann cellls present but do not form a myelin shetah.
found in ANS and SNS.

hindbrain

➢ **pons**
-consists of fibre tracts that interconnect different regions of the brain
➢ **cerebellum**

hindbrain (cont)

-provides additional space for more neurons
➢**medulla**
-connected to the spinal cord
-centres that control respiration, cardiovascular reflex, gastric secretions
➢**brain stem**
-midbrain, pons, medulla oblongata

ear

➢ **1. outer ear**
-pinna and external auditory meatus (canal)
-pinna collects vibrations in the air
-canal has fine hairs and wax-secreting ceruminous gland
-tympanic membrane composed of connective tissue with skin outsde and mucus membrane inside.
➢**2. middle ear**
-3 ossicles called malleus, incus, stapes.
-malleus attached to tympanic membrane and stapes to oval window of the **cochlea**
-eustachian tube connects the middle ear cavity to **pharynx**
-it helps in equalizing the pressures
➢**3. inner ear**

ear (cont)

-fluid filled ear is called **labyrinth** which can be divided into bony and membranous
-bony labyrinth is a series of channels inside which lies membranous labyrinth surrounded by **perilymph**
-membranous labyrinth is filled with the fluid **endolymph**
-coiled portion of the labyrinth is called **cochlea**
-reissner's and basilar divide the perilymph into upper scala vestibuli and lower scala vestibuli
-space within cochlea is called scala media
-organ of corti is located on the basilar membrane contains hair cells acting as auditory receptors.

types of neurons

unipolar	*bipolar*	*multipolar*
1 axon only	1 axon	1 axon
0 dendrites	1 dendrite	2/more dendrites
embryonic stage	retina of eye	cerebral coretx

brain overview.

✓ information processing organ-command and control system

brain overview. (cont)

✓voluntary and involunatary movements, balance, thermo-regulation,hunger thirst, circadian, endocrine and behaviour.
✓cranial meninges- outer layer **dura mater**, thin middle layer **arachanoid**, inner layer in contact with brain tissue **pia mater**

midbrain

-located between **hypothalamus** of the forbrain and **pons** of the hindbrain
-cerebral aqueduct, a canal passes through midbrain
-dorsal portion consists of 4 round lobes called **corpora quadrigemina**

! important info !

- cranial nerves (12 pairs)
- spinal nerves (31 pairs)
➢reflex pathway.
-atleast 1 afferent neuron (receptor) and one efferent neuron in series.
-afferent neuron receives signal from sensory organ via dorsal nerve root into CNS
- efferent neurons then carry the signals from CNS to effector and this mechanism is called the **reflex arc**

rods and cones

rods	cones
scotopic	photopic
rhodopsin	red light
derived from vit. A	green light
opsin + retinal	blue light

generates action potentials in ganglion cells through bipolar cells

ear pt.2

-basal end of hair is in close contact with the afferent nerves
-a large no. of processes called stereo cilia are projected from the apical part of ech hair cell.
-thin elastic membrane above hair cells **tectorial membrane**
-above the cochlea, a complex system called **vestibular apparatus**
which is composed of **3 semi-circular canals** and **otolith**
-projecting ridge containing hair cells **crista ampullaris**
-saccule and utricle contain a projecting ridge called **macula**
-crista and macula are specific receptorsof vestibular apparatus.
maintenance of body and posture

generation and conduction of nerve impulses

✓ ion channels are **selectively permeable**
1. *resting state*
K+ more permeable and Na+, -ve proteins impermeable.
axoplasm inside has high conc of K+ and -ve proteins and low conc of Na+.
ECF (extra cellular fluid) has low K+ and -ve proteins but more Na+ therefore forms a **concentration gradient**
ionic gradient maintained by *active transport* and sodium potassium pup by 3Na+ out 2K+ in.
outer surface = +ve charge *inner* surface+ -ve charge
polarised state has a potential difference of -70mV
resting potential
2. *depolarisation*
site permeable to Na+ causing rapid influx therefore **reversal of polarity**
outer = -ve charge *inner*= +ve charge
this is now called **action potential** or nerve impulse
3. *repolarisation*
Na+ permeability was short lived, therefore, followed by a rise in permeabilty of K+

generation and conduction of nerve impulses (cont)

where K+ diffuses outside restoring the resting potential.

parts of an eye

➢ **1. sclera**
-dense connective tissue
-anterior portion turns transp-arent and is then called **cornea**
➢**2. choroid**
-middle layer, many blood vessels
-thin posterior, anterior thick which forms the **ciliary body**
➢**3. ciliary body**
-continues forward to form a pigmented opaque structure **iris**
-eye call contains transparent crystalline lens held in place by ligaments
➢**4.retina**
-3 layer of neural cells **ganglion cells, bipolar cells, photor-eceptor cells**
-blind spot = no photoreceptor cells present
-macula lutea- fovea, concen-tration of cones
-space b/w cornea and lens= **aqueous chamber** containing aqeuous humor
- space b/w lens and retina = **vitreous chamber**

forebrain

➢ **cerebrum**
- 2 halves called the left and right cerebral hemispheres
- tract of nerve fibres that connect the hemispheres **corpus callosum** covered with myelin sheath, giving whitish appearance therefore called **white matter**
-layer that covers cerebral hemisphere and forms prominent folds is **cerebral cortex**
-cerebral cortex referred to as **grey matter** due to concentration of neurons there.
-contains motor areas, sensory areas, and association areas (neither motor nor sensory)
-cerebral cortex is responsible for intersensory associations, memory and communication.
➢ **thalamus**
-cerebrum wraps around this structure
- major coordinating structure for sensory and motor signaling
➢ **hypothalamus**
-lies at the base of thalamus
-body temp, eating, thirst

forebrain (cont)

-groups of neurosecretory cells secrete hormones called *hypothalamic hormones*

➢limbic system

-inner parts of cerebral hemispheres and structures like **amygdala**, **hippocampus**, etc

-along with hypothalamus involved in rage, pleasure, motivation, sexual behaviour

nose and tongue

➢ **nose**

-contains mucus-coated receptors called **olfactory receptors**

-made of olfactory epithelium that consist of 3 kinds of cells

-neurons of olfactory epithelium extend directly in broad bean-sized organs called **olfactory bulb** this is an extension of the brain's limbic system.

➢ **tongue**

-detection through tastebuds that contain **gustatory receptors**

-both nose and tongue detect dissolved chemicals.