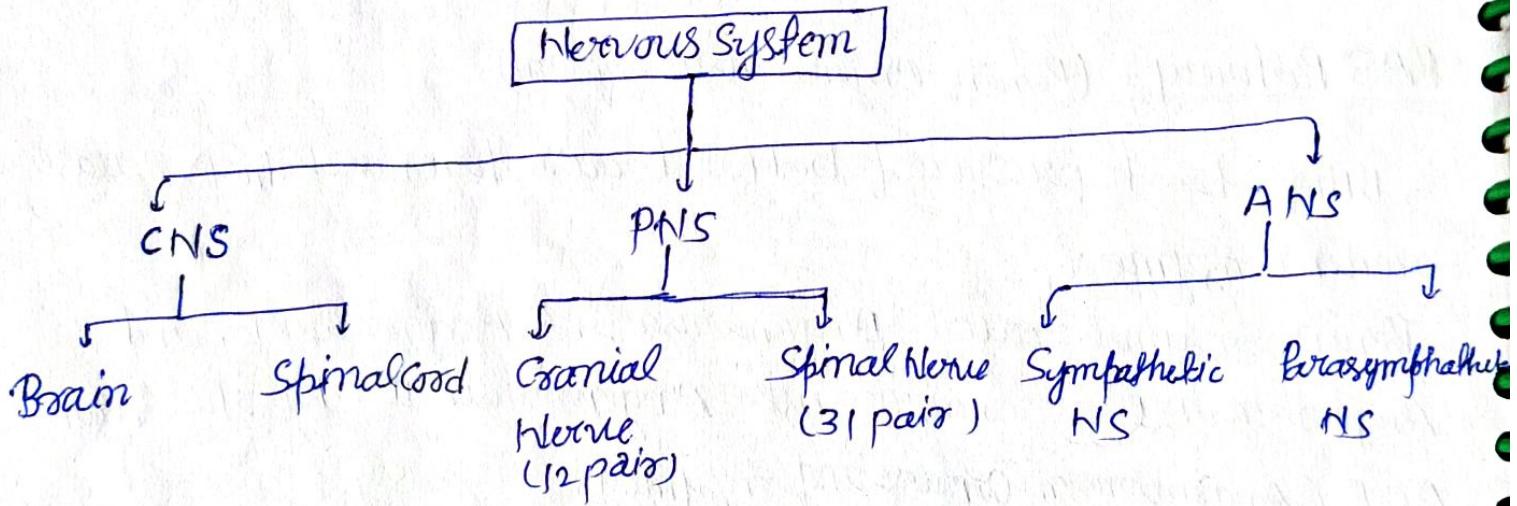


## Unit - 1 : Nervous System

### Organization of Nervous System :-

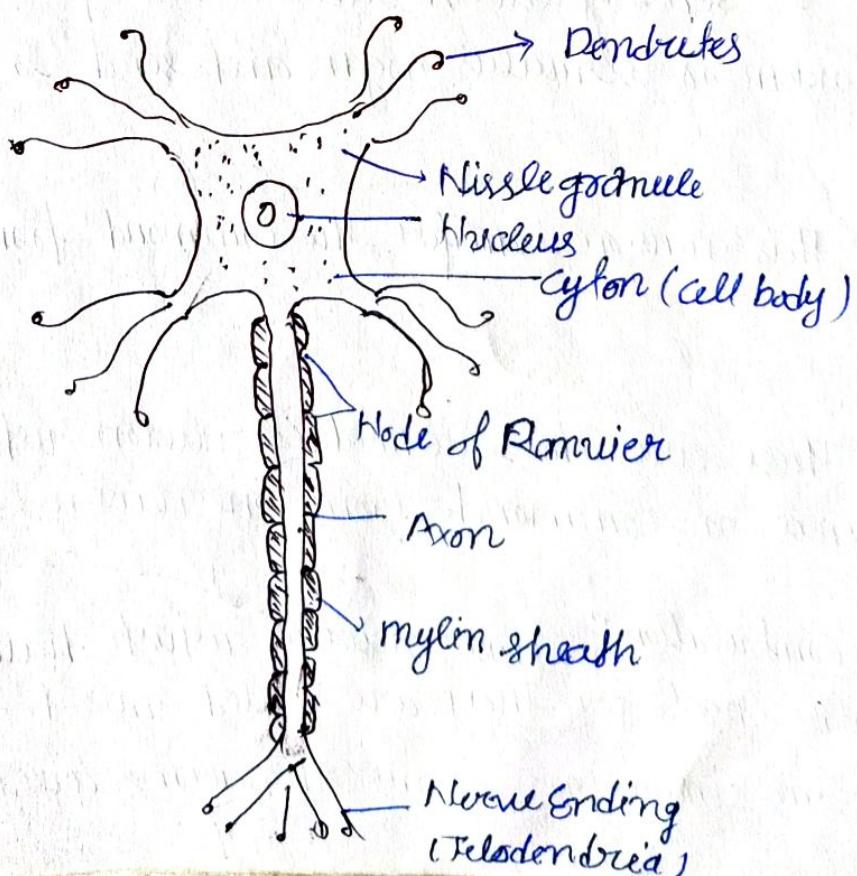
- The animal body is consist of diff. diff organ system and each organ system have diff function.
- But all the organ system is controlled by nervous system.
- On the basis of diff parts nervous system can be categories in to three part:
  - i) Central Nervous System -
  - ii) Peripheral Nervous System.
  - 3) Autonomic Nervous System.



Neuron :- Neuron is the structural and functional unit of nervous system.

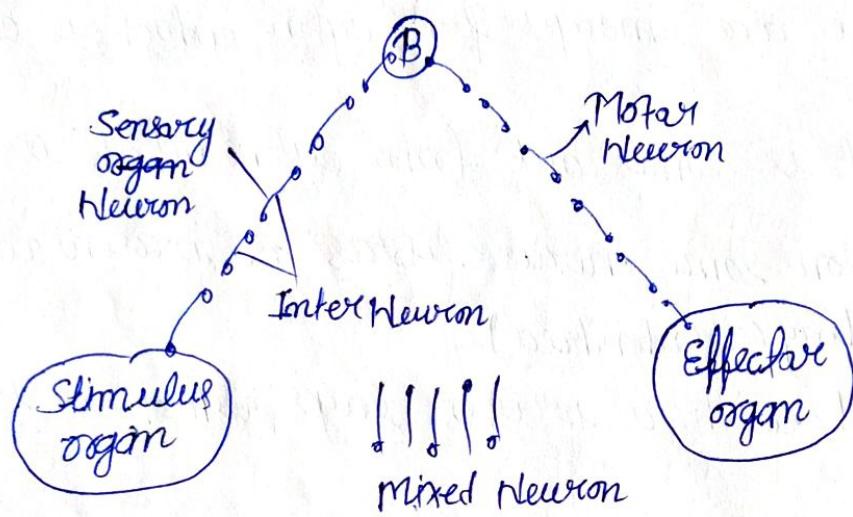
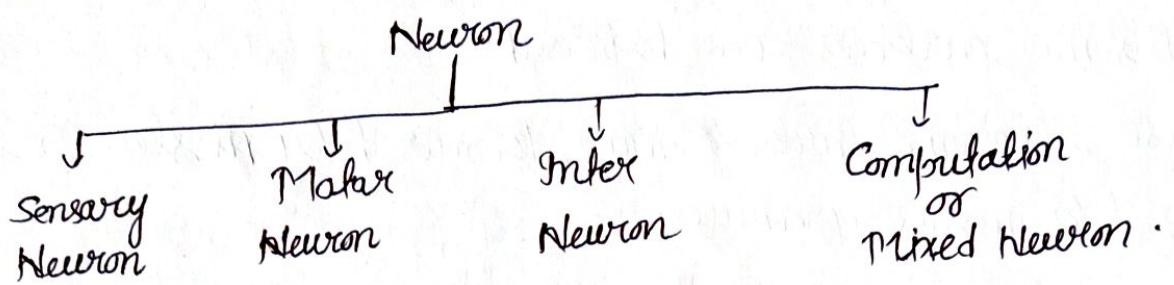
- The cell of brain and spinal cord.
- Neuron is the longest cell of animal body.
- The structure of neuron is composed of two part.
  - i) Cell body
  - ii) Axon

- The cyton is main cell body and the largest part of the neuron.
- Inside the cyton a large nucleus is present and some ribosome particles are dispersed.
- These ribosome particle was discovered by nissle. So it is also k/a nissle granules.
- They helps in protein synthesis.
- Some nerve fibre are emerges from cyton which is called dendrites.
- A long thin part is comes out from cyton which is Axon.
- At the end of Axon some nerve fibres are present which is k/a nerve ending (Telodendria)
- The Axon is covered with a protein layer which is k/a myelin sheath.
- In myelin sheath layer some vacant space is present. which is k/a node of Ranvier.



## Types of Neuron

On the basis of function of transmission, neuron is of four type.



## Sensory Neuron

Sensory Neuron receive the information from sensory organ or stimulus organ and send to brain

## Motor Neuron

This neuron transfer the command from brain to organ.

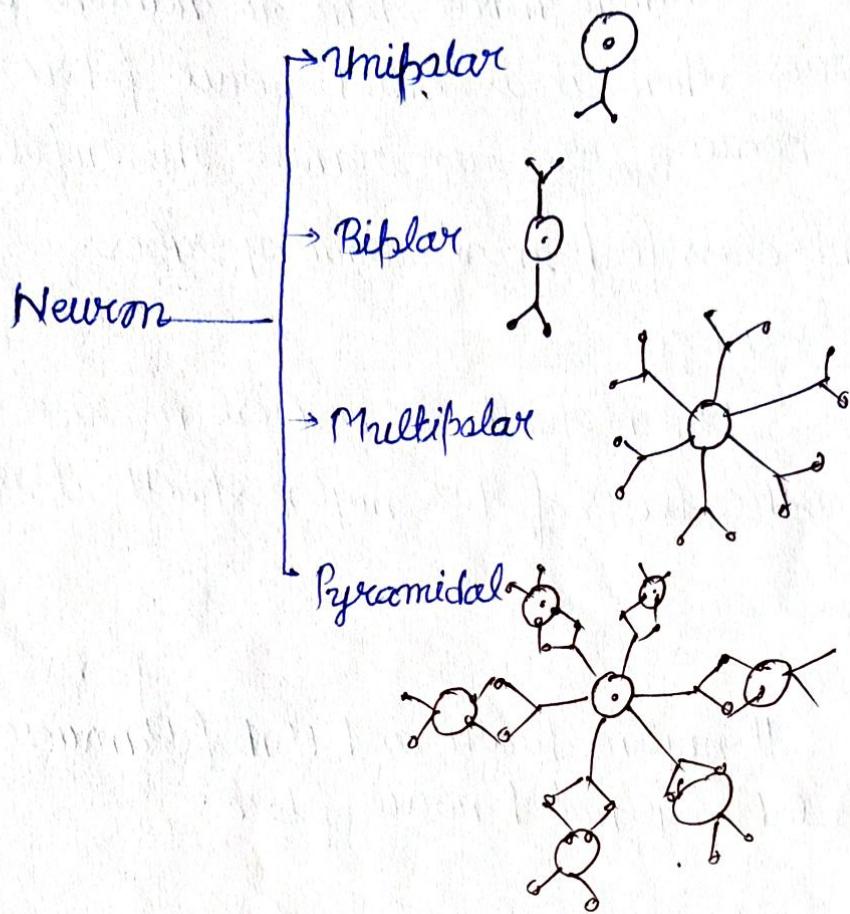
## Inter Neuron

These are the intermediate neuron which transfer the signal or command from one neuron to another.

## Mixed Neuron or Computation

Those neuron which have both sensory and motor property they are called mixed neuron. In vertebrate maximum no of mixed neurons are present.

## ① On the basis of Structure



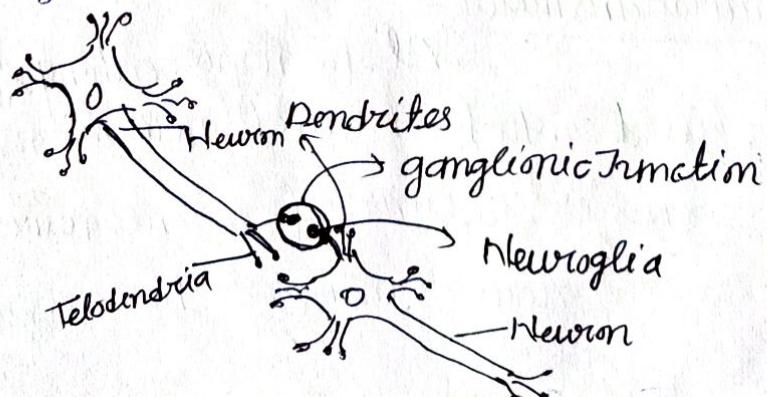
## Neuroglia :-

The term neuroglia is derived from two word

Neuro + glia  
↓      ↓  
Neuron    Glue

Neuroglia is a substance which connect the two neuron at ganglionic junction.

- Neuroglia does not take part in impulse transfer it only gained the dendrites and telodendria of neuron.



## Classification of Nerve fibre :-

When more than one neurons are connected in a series then it is called nerve fibre and the main function of nerve fibre is to transfer the impulse.

→ Nerve fibres can be classified into following types.

### i) on the basis of histology :-

Myelin sheath is a protein cover present over the axon and on the basis of this myelin sheath it is of two type.

#### (A) Myelinated Nerve fibre

If myelin sheath and Node of Ranvier is present then it is called myelinated nerve fibre.

#### (B) Non myelinated Nerve fibre

If myelin sheath and node of Ranvier is absent then it is called non myelinated fibre.

### ii) On the basis of impulse transfer :-

On the basis of function of impulse transfer it is of three type.

a) sensory

b) Motor

c) mixed.

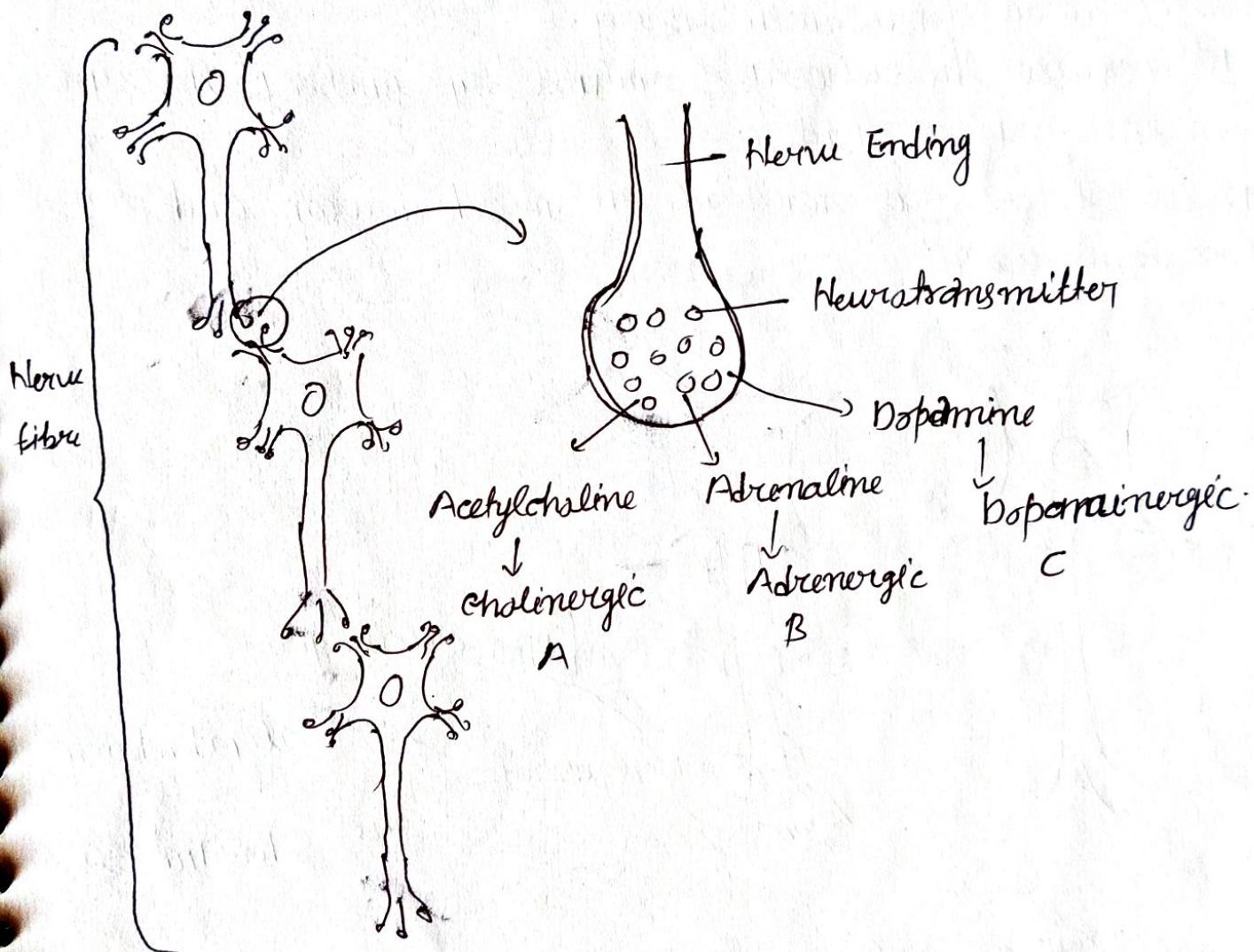
### iii) on the basis of neurotransmitter :-

At the nerve ending of nerve fibres some chemical are filled which is called neurotransmitter and this neurotransmitter transfer the signal from one neuron to another on the basis of release of neurotransmitter nerve fibre is of following types -

i) Cholinergic Nerve fibre → Release Acetylcholine.

ii) Adrenergic N - f Release Adrenaline

iii) Dopamine Nerve fibre Release Dopamine



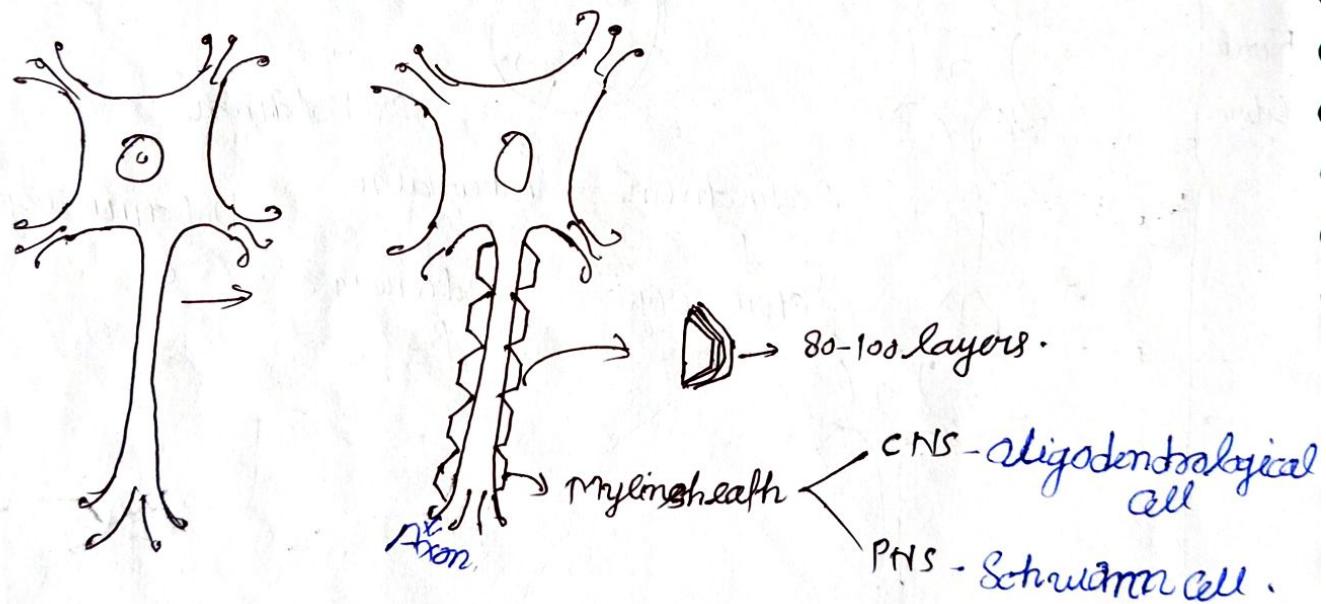
## Myelinogenesis :-

The process of covering of axon by myelin sheath layer is called myelinogenesis.

- About 80 to 100 layers of myelin sheath covered the axon.
- In PNS the myelin sheath is made up of Schwann cell and in CNS it is made up of oligodendroglial cell.

## Function of Myelin Sheath :-

- It provides strength to the axon and protect nerve fibre with injury.
- It increases the velocity of impulse by jumping the signals from one node to another.
- It also behaves as insulator in mixed neuron and prevent cross transmission.



## Properties of Nerve fibre :-

### i) Excitability :-

Nerve fibres when stimulated they instantly get excited for conduction.

### ii) Conductivity :-

Nerve fibre helps in conduction from organ to brain or brain to organ.

## Refractory period :-

This is the time period gap between two stimuli and conduction.

## All or None law

If the intensity of stimulus is more than threshold value then impulse will generate beat if the stimulus is below the threshold value then no conduction when start.

## Generation of action potential :-

When our body or sensory organ receive any stimulus then they generate an action potential and transfer the impulse to CNS (Brain).

- The impulse is transfer due to potential difference.
- The generation of action potential involve in three step.

i) At resting Stage

ii) Depolarisation.

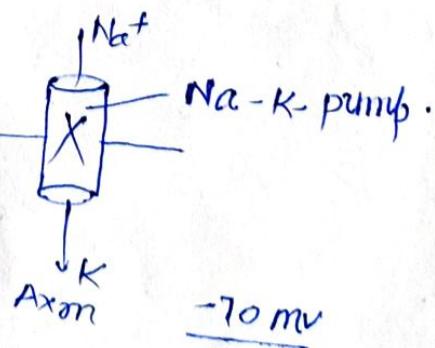
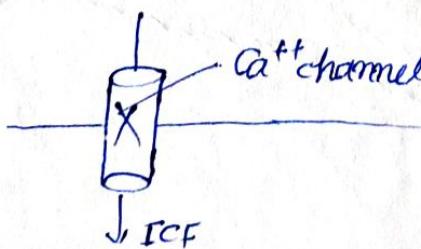
iii) Repolarisation.

### i) At resting Stage :-

At resting stage when no stimulus is obtained then all calcium ion channel, Protein channel and Na. K pump are closed

→ In this condition the ions are accumulated at ECF and -ve ions are accumulated inside the ICF

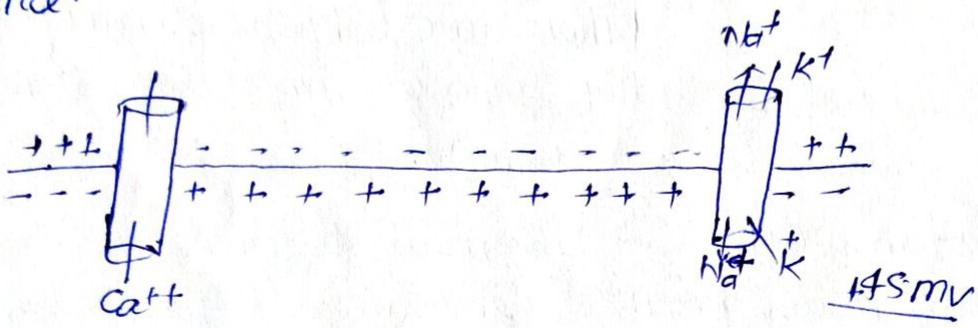
→ At this stage the resting membrane potential is  $-70 \text{ millivolt (mV)}$



### B) Depolarisation:

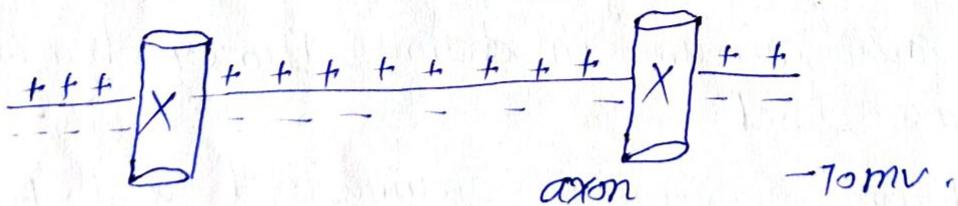
This stage is start when body receive stimulus now all the channel are open so the  $\text{Cl}^-$  ion and polarization goes from ICF to ECF, and all the ions like  $\text{Na}^+$ ,  $\text{K}^+$ , and  $\text{Ca}^{++}$  ion goes from ECF to ICF and the depolarisation potential of  $+45 \text{ mV}$  is generated.

So the impulse transfer towards the CNS due to this potential difference.



### c) Repolarisation:

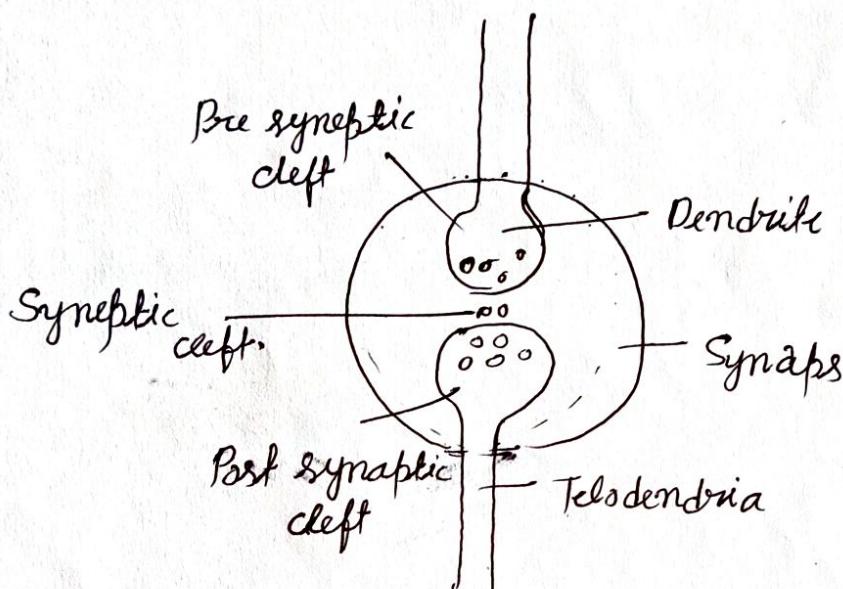
After generation of impulse again the ions goes from ECF to ICF and channels becomes close. again the repolarisation potential of  $-70 \text{ mV}$  is established.



## Synaps

Synaps is a junction b/w two neurons in neural fibre.  
in ganglionic junction dendrites of one neuron is attached with telodendria of other neuron.

The space b/w two neurons is called synaptic cleft. and on the basis of synaptic cleft nerve fibres is divided into pre-synaptic cleft and post-synaptic cleft.



## Neurotransmitter

Neurotransmitters are the chemical mediators which are fill in the nerve fibre during generation of action potential neurotransmitter release in to synaptic cleft and bind with the particular receptor.

There are following types of neurotransmitter and each of them perform diff - diff function.

- i) Acetyl choline
- ii) Adrenaline (Epinephrine)
- iii) Dopamine
- iv) GABA
- v) Glutamate
- v) Serotonin

## Receptor

Receptors are the active sites which is made of protein present on the surface of body organ.

- Receptors are selective in nature. one selective neurotransmitter can bind with their receptor.
- for each neurotransmitter separate receptors are present.
- When new transmitter bind with the receptor then transducer mechanism start and organ perform diff function.
- on the basis of structure receptors are of two type.
- i) Ligand gated Receptors.
- ii) G protein coupled receptor (GPCR)

Ex:-

