* CNS *

- Introduction –

– Human Nervous System is Responsible for Judgment, Intelligene and memory.

– it is Chief controlling & coordinating System of the Body.

– Sensory Part :- collect Information from the Surrounding and Helps in gaining knowledge and Experience.

Motor Part :- Responsible for Responses of the Body.

– Avg. weight of adult brain weight is 1500 gm without CSF Brain weight is 50 gm.

– 200 Billion Neuron in adult Brain

Teacher's Signature.....

Q. Classification of Neurology.

- Anatomically
- morphology
- developmental
- Physiological.

1) Anatomically.

Central Nervous System	Peripheral Nervous System
- Brain & Spinal cord - learning, memory intelligence & emotions.	- 12 Pair of cranial Nerve - 31 Pair of Spinal Nerve. o→ afferent Impulse to CNS o→ efferent Impulse to Muscles & Blood vessels & glands.

Teacher's Signature.....

2. Acc. to length
   i) golgi Type (I) ⟶ long Neuron
   ii) golgi Type (II) ⟶ Short Neuron

3. Acc. to function.
   i) Sensory (afferent) ⟶ carry impules from Peripheral parts to CNS.
   ii) Motor (efferent) ⟶ carry impules from CNS to peripheral part.

* ⟶ Nerve fibres ⟶ an elongated process of Neuron & Nerve cell.

☆ - Nerve fibres form the major portion of the White Matter of Brain, Spinal cord & all Nerves.

• classification of Nerve fibres:

1) Acc. to Structure
   - Myelinated
   - un myelinated.

2) Acc. to Distribution
   - Somatic
   - Visceral (autonomic)

3) Acc. to origin
   - cranial
   - Spinal

4) Acc. Function
   - Sensory
   - Motor

Teacher's Signature.....

5.) Acc. to Neurotransmitter
- Adrenergic
- Cholenergic

6) Acc. to diameter
- Alpha → 12-24 µm.
- Beta → 6-12 µm.
- Gamma → 5-6 µm.
- Delta → 2-5 µm.

Teacher's Signature.....

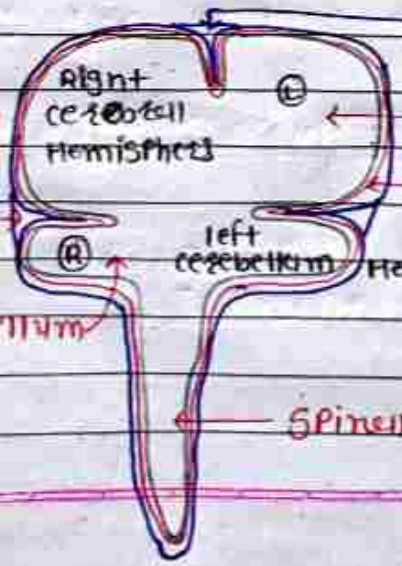
The Meninges

→ The Brain & Spinal cord are completely surround By three layer of tissue it is Meninges (Membranous covering)

→ Meninges provide Protection and lying B/w Skull and Brain and vertebral and Spinal cord.

Meninges (three layers of Tissue)

- Dural Matter (outer) — In B/w Sub dural Space
- Arachnoid Matter (Middle) — In B/w Sub-arachnoid Space - contain to CSF
- Pia Matter (Inner)



Teacher's Signature.....

1) Dural Matter

Outer Periosteal layer
- Tough, connecting fibrous Tissue
- connect to → Skull & Vertebral

Inner Meningial layer
- actual Dural layer
- forms Infolding that divide cranial cavity into Diff. compartment
  - In B/w cerebral Hemisphere - Falx cerebri
  - In B/w cerebellar Hemisphere - Falx cerebelli
  - In B/w cerebrum & cerebellar - Tentorium cerebelli

- B/w two layers run venous sinus.

→ falx cerebri form → Sup. Sagittal sinus.
→ Tentorium cerebelli form → Straight & Transverse sinus.

Teacher's Signature.....

2) Arachnoid Matter
→ Web-like structure (avoiding)
→ Middle layer connects to dural matter and Pia matter.

→ Separated from dural matter → Sub dural space (serous fluid)

→ Separated from Pia Matter → Sub-arachnoid space (CSF)

→ Projection called Arachnoid granulations Remove CSF from sub-arachnoid space into dural matter and Reabsorbed.

3) Pia Matter
→ Connect to direct Brain & Spinal cord
→ Thin, Fibrous membrane
→ Impermeable to fluid
→ Has Rich supply to Blood vessels (Nutrient to nervous tissue)
→ lines the contour of Brain [gyri & Fissure]
→ contain - Choroid Plexus
↓
- Produce of CSF
- Present in Ventricles of Brain

Teacher's Signature.....

- Functions of Meninges

→ Protect the Brain
→ Produces CSF → (Shock absorbed, Maintain uniform pressure)
→ Forms the Part of BBB (Blood Brain Barrier)

→ Diff B/w Brain & Spinal cord Mening

Brain	Spinal cord
- thicker & form Sinuses	- thinner & - allow for vertebral movement
- Brain dura → Periosteal, Meningeal	- Distal epidural space containing fat & Nerves Roots
	Spinal dura → ⊗, Meningeal

- Hemattomals → Bleeding into epidural & subdural.
- Migrain → Pain to trigeminal N.

- Functions of Menings & Applied Anatomy

→ Protect the Brain
→ Produces CSF → [Shock absorbed, Maintain uniform Pressure]
→ Forms the Part of BBB (Blood Brain Barrier)

→ Diff b/w Brain & Spinal cord Mening

Brain	Spinal cord

Viva & MCQ

o→ SCALP

covering of cranium

S Skin → Hair & sebaceous gland

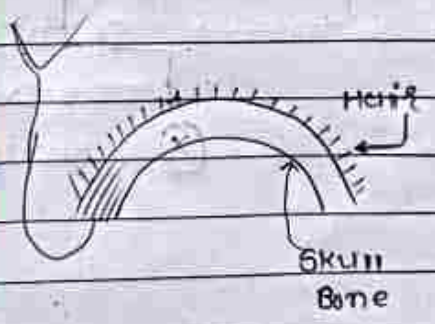
C Dense connective Tissue → Richly vascularised & Innervated

A Epicranial Aponeurosis → Thin Tendon like Structure
- connects the occipitalis & frontalis muscle

L Loos Areolar connective Tissue → Thin

P Pericranium → outer layer of Skull

→ Blood Supply o→ external carotid & opthalamic



Teacher's Signature.....

Q. Describe the structure and classification of Neuron.

Structure &

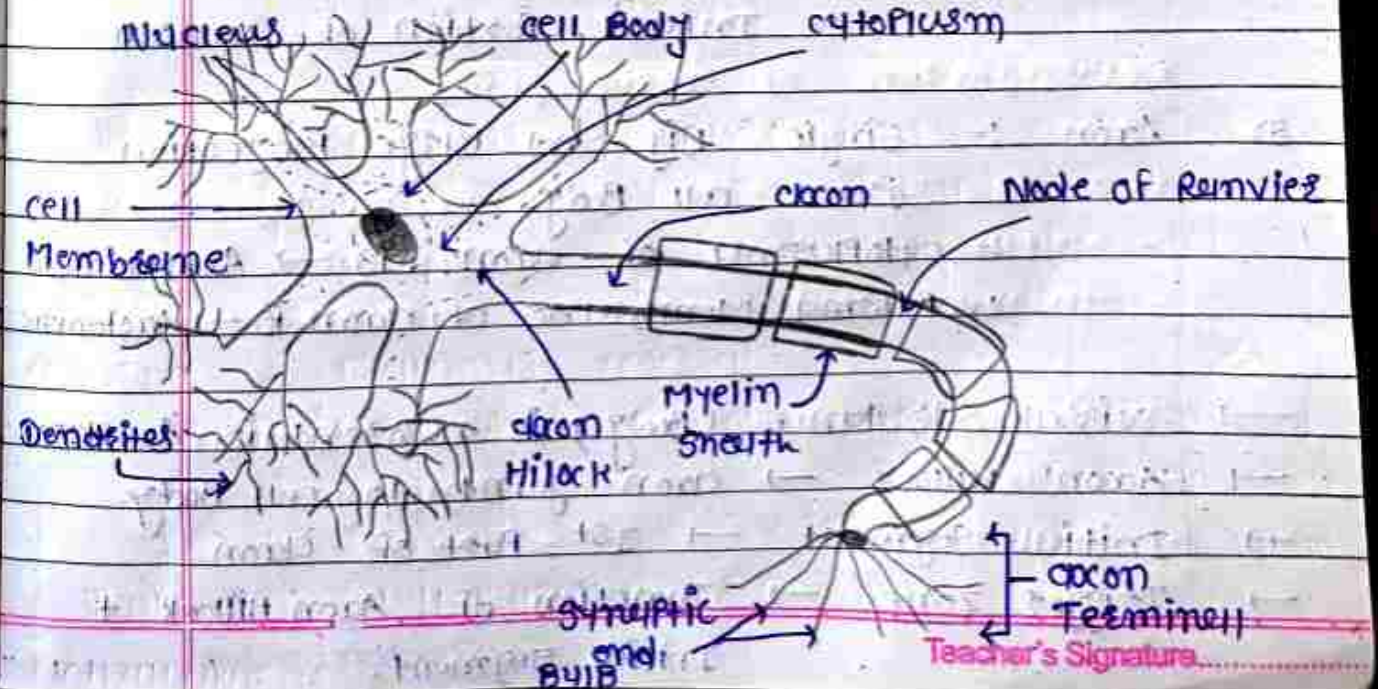
→ Neuron is Functional unit Nervous System.

→ Neuroglia is connective tissue of N.S it is provide nourishment to Neuron cell.

→ Property :- Electrical Excitability & Produce to Impulse in Respons to Stimuli.

→ Function :- Reception (ग्रहण), Integration (एकीकरण), Interpretation (व्याख्या), Transmission (संचरण)

→ Parts of Neuron
i) Dendrites ii) cell Body (Soma) iii) axon



Teacher's Signature.....

→ Axon Terminal :- end part of axon. Divided Many Branches.

→ Axon surround By ⟶ Myelin Sheath.
Made up
lipids & protien.

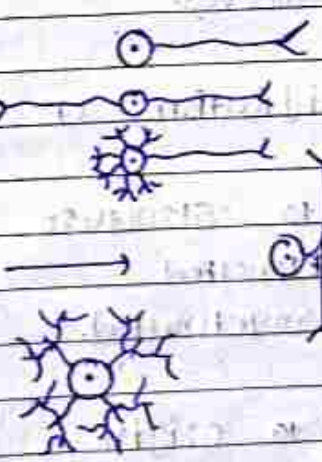
→ Gap's in Myelin Sheath ⟶ is ⟶ Node of Ranvier.

- In CNS Myelin Sheath ⟶ Produce ⟶ to oligodendrocytes
- In PNS Myelin Sheath ⟶ Produce ⟶ to Schwann cells.

→ Impuls
Dendrite ⟶ towards ⟶ cell Body ⟶ axon

- Classification of Neuron

1. Acc. to Poles.
   i) unipolar ⟶
   ii) Bipolar ⟶
   iii) Multipolar ⟶
   iv) Pseudounipolar ⟶
   v) an-axonic ⟶



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1) Cell Body :- Also called Perikaryon
:- It is mass of cytoplasm surrounded by the cell membrane
→ All the organelles (like Mitochondria, lysosome, golgi apparatus, microfilament etc.) are present.

→ High amount of granular endoplasmic reticulum is found called as Nissal (Body) substance.

→ Nissal Body are use for growth & Regeneration of Neuron.

2) Dendrites :- Short Branching projections from the cell Body.
:- cytoplasm of dendrites contain its Mitochondria, Nissal Body and other substance
:- Input portion of Neuron.

3) Axon :- Single Big and large projection from cell Body.
:- cytoplasm of axon is → Axoplasm.
:- Plasma membrane of axon is → Axolemma

→ Nissal substance (Body) is absent is Axoplasm
→ Axon Hillock → axon joint to cell Body.
→ Initial Segment → 1st part of axon.
→ Trigger zone → Junction of Axon Hillock + Initial Segment.

Teacher's Signature.....

stine, part of large
Preganglionic axons of sacral parasympathetic
es which synapse in terminal ganglia. The parasympathe
cle and glands in the wall of the
pathetic preganglio-

↳ Describe ANS.

→ it is controlled By 1) Reticular formation of Brain Stem 2) thalamic Nuclei 3) Hypothalamic Nuclei 4) limbic lobe 5) Prefrontal cortex.

* Sympathetic Nervous System

→ consist of 1) Preganglionic Neurons.
2) Sympathetic ganglia
i) Para-vertebral ganglia (Sympathetic Trunk)
ii) Pare-vertebral ganglia (collateral ganglia)

1) Preganglionic Neurons-

→ 1st Part of Sympathetic nervous system Pathway.
→ originated to Thoraco-Lumber spinal cord T1 to L3
→ Fibers :- Short, Myelinated axons (Preganglionic fibers) exit the Spinal cord.
→ Fibers are Travel via Ant. Spinal Nerve. enter to Sympathetic Trunk. (chain of ganglia) through white Rami communicates.

Teacher's Signature.....

→ Releases acetylcholine (Ach) at the Sm synapse.

• Preganglion neurons → enter Symathetic trunk ganglion

3 Diff. Route — Paravertebral / Sym. / Trunk.

1) An axon synaps with Postganglionic Neurons in the same ganglion.

2) Ascend / Descend
Fibers travel up / down the Sy. chain

3) Pass Through Splanchnic Nerves
- Fibers pass through the chain without synapsing ~~forming~~ → splanchnic Nerves. then go to Prevertebral ganglia

2) Sympathetic ganglia.
- In B/w to Preganglionic Neuron and Postganglionic Neuron.

- 2 types of ganglia (group)
i) Para-vertebral (near spinal cord)
ii) Pre-vertebral (away spinal cord)

Teacher's Signature........

ine, part of large intestine.)
Preganglionic axons of sacral parasympathetic outfl
...k synapse in terminal ganglia. The parasympathetic p...
...le and glands in the wall of the ureters, ...
...thetic preganglio-

i) • Sympathetic Trunk ganglia. & Sympathetic chains / Para-vertebral ganglia

- arranged vertically on the antero-lateral sides of the vertebral column.

- extending from the base of skull to coccyx.

- Divided into
  - cervical 3 ganglia
  - thoracic 11-12 ganglia
  - lumbar 4-5 ganglia
  - sacral 4-5 ganglia
  - coccygeal 1 ganglia.

1) cervical part (3 cervical ganglia)
- Present in Neck Region.
  i) Superious cervical ganglion.
  - Sweat gland, Blood supply of face, Parotic gland, all face Region gland Heart

  ii) Middle cervical ganglion.
  - Heart

  iii) Inferior cervical ganglion.
  - Heart

2) Thoracic part (11-12 ganglia)
- Heart, lung, Bronchi, Skin etc---

Teacher's Signature.....

3) Lumbar Part (4-5 Lumbar ganglia)

4) Pelvic Part (4-5 Sacral ganglia + 1 coccygeal ganglia)

ii) • Pre-vertebral ganglia.

→ Anterior of vertebral column.

1) celiac ganglion
2) Superior Mesenteric ganglion
3) Inferior Mesenteric ganglion

• 4 Splanchnic Nerve.

1) Greater Splanchnic Nerve:
- Formed from T5 to T9 Thoracic Preganglionic axons.
- Nerve enters to celiac ganglion
- Post ganglionic neuron from this Plexus innervents - Stomach, Spleen liver, Kidney, Small intestine

2) Lesser Splanchnic Nerve.
- Formed T10 - T11 Thoracic Preganglionic axons.
- Nerves Passes through celiac Plexus and enters to Sup. Mesenteric ganglion-Plexus.
- Postganglionic neurons → Small intestine & colon

Teacher's Signature

Para-Sympathetic N.S.

→ Preganglionic Neuron located in Brain Stem via cranial Nerve 3, 7, 9, 10 and S2, S3, S4 Sacral Nerves.

→ Terminal ganglia are present mostly near to visceral organ.

→ 4 Pair of ganglion.

1) ciliary ganglion → controls the iris and ciliary muscles (eye)

2) Pterygopalatine ganglion → Controls lacrimal & Nasal glands

3) Submandibular ganglion → Innervates Submandibular gland, Sublingual gland, Salivary gland.

4) Otic ganglia → Innervates to Parotid gland (Salivary gland)

Teacher's Signature.....

es which synapse in ter...
ese ganglia supply smooth muscle and g...
r, colon, reproductive organs.
...nic neurons- The axons of parasympath...
...within a visceral organ and synapse with ...

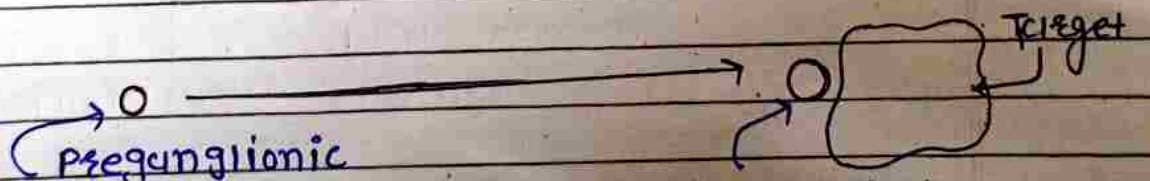
- Preganglionic axons of -

Vagus

- Terminate in many Terminal ganglia of
  i) Thorax - Heart
  - airway of lungs
  ii) Abdomen - liver
  - gallbladder
  - Stomach
  - Pancreas
  - Small & large Intestine

Sacral

- Pelvic Splanchnic Nerve which Synapse in Terminal ganglia
- Supply to Nerve
  - Smooth muscle
  - glands
  - wall of ureters
  - urinary bladder
  - Reproductive organs.



Teacher's Signature.....

Preganglionic axons

art, airways of the lungs) and abdomen (liver, gall

estine, part of large intestine.)

Preganglionic axons of sacral parasympathetic outflow- They form pelv

which synapse in terminal ganglia. The parasympathetic postganglionic axons

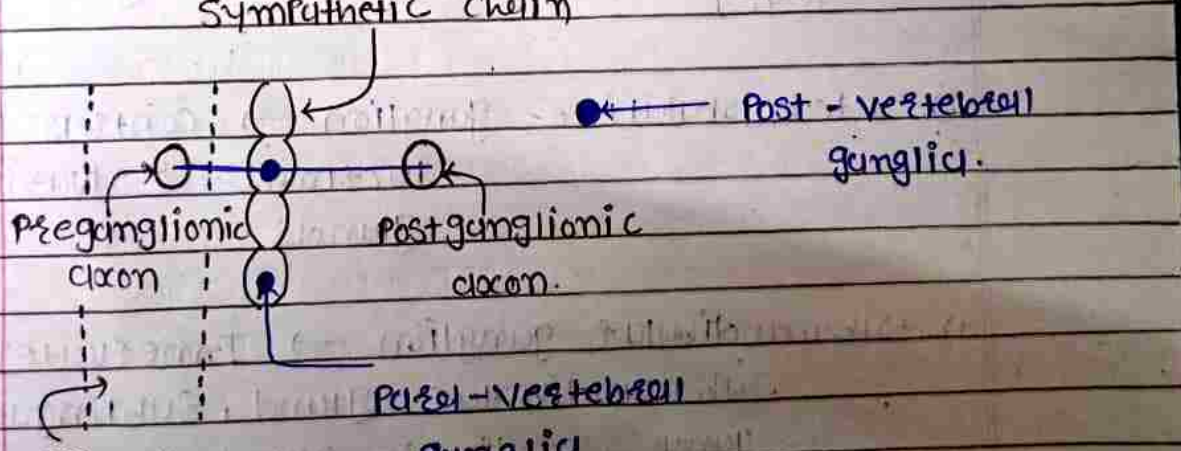
mooth muscle and glands in the wall of the ureters, urinary

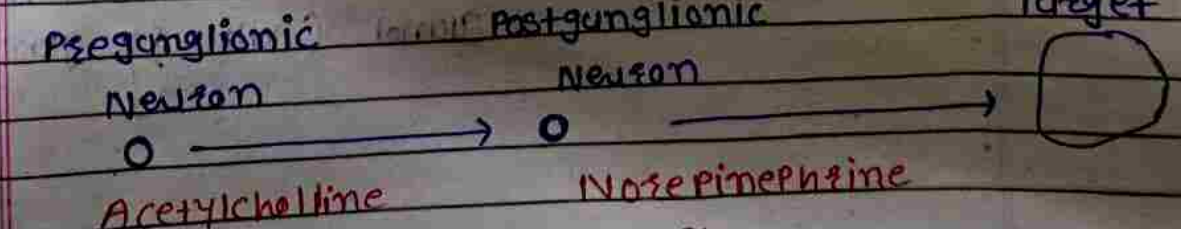
parasympathetic preganglio

with 4 to

3) Lowest Splanchnic nerve.
- formed T12 Preganglionic axon
- Nerve enters in Renal Plexus.
- Postganglionic neurons → kidney & urethra.

4) Lumbar Splanchnic nerve.
- formed L1, L2, L3 lumbar Preganglionic axons.
- Nerve enters in Inferior Mesenteric ganglia
- Postganglionic Neurons → Distal colon, Rectum, urinary Bladder, genital organs





★ - except
- Acetylcoline → sweat gland
- epinephrine → adrenal medulla.

Teacher's Signature