2) Composition of saliva

→ 1. Water - 99% → Facilitates taste, chewing & swallowing

2. Electrolytes

Na^+ → Maintains osmotic balance.

K^+ → controls salivary gland function

Ca^+ → Remineralizes teeth

Mg^+ → Enzyme cofactor

Cl^- → Activates salivary amylase

HCO_3^- → Buffers pH to protect teeth

PO_4^{3-} → Buffers acid, contributes to enamel repair.

3. Enzyme

Salivary Amylase

Lingual lipase

Lysozyme

Peroxidase

4. Mucins (Glycoproteins)

Provide lubrication

Form Protective mucous layer.

3) Functions of saliva

→ Lubrications of food and oral tissues.

Initial digestion of carbohydrates and lipids

Protection against pathogens (antibacterial, antiviral)

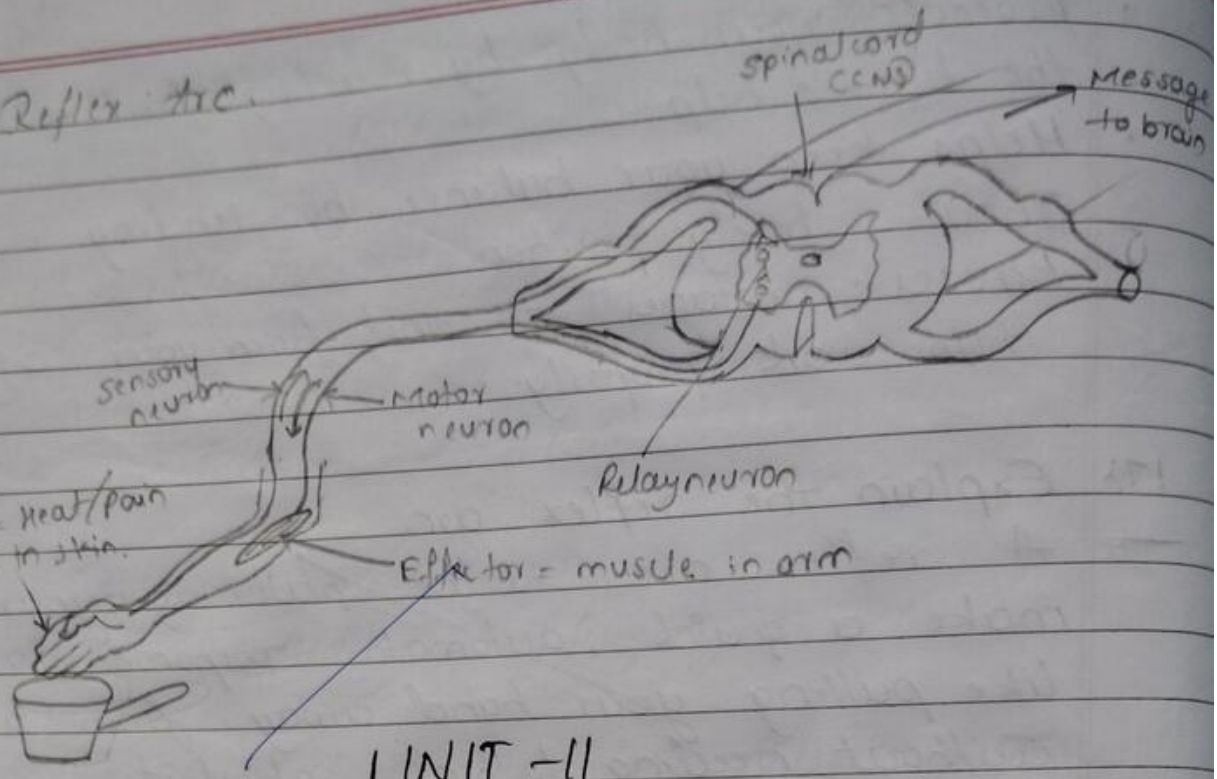
pH buffering & tooth remineralization

Taste facilitation by dissolving food molecules

Oral Hygiene.

Page

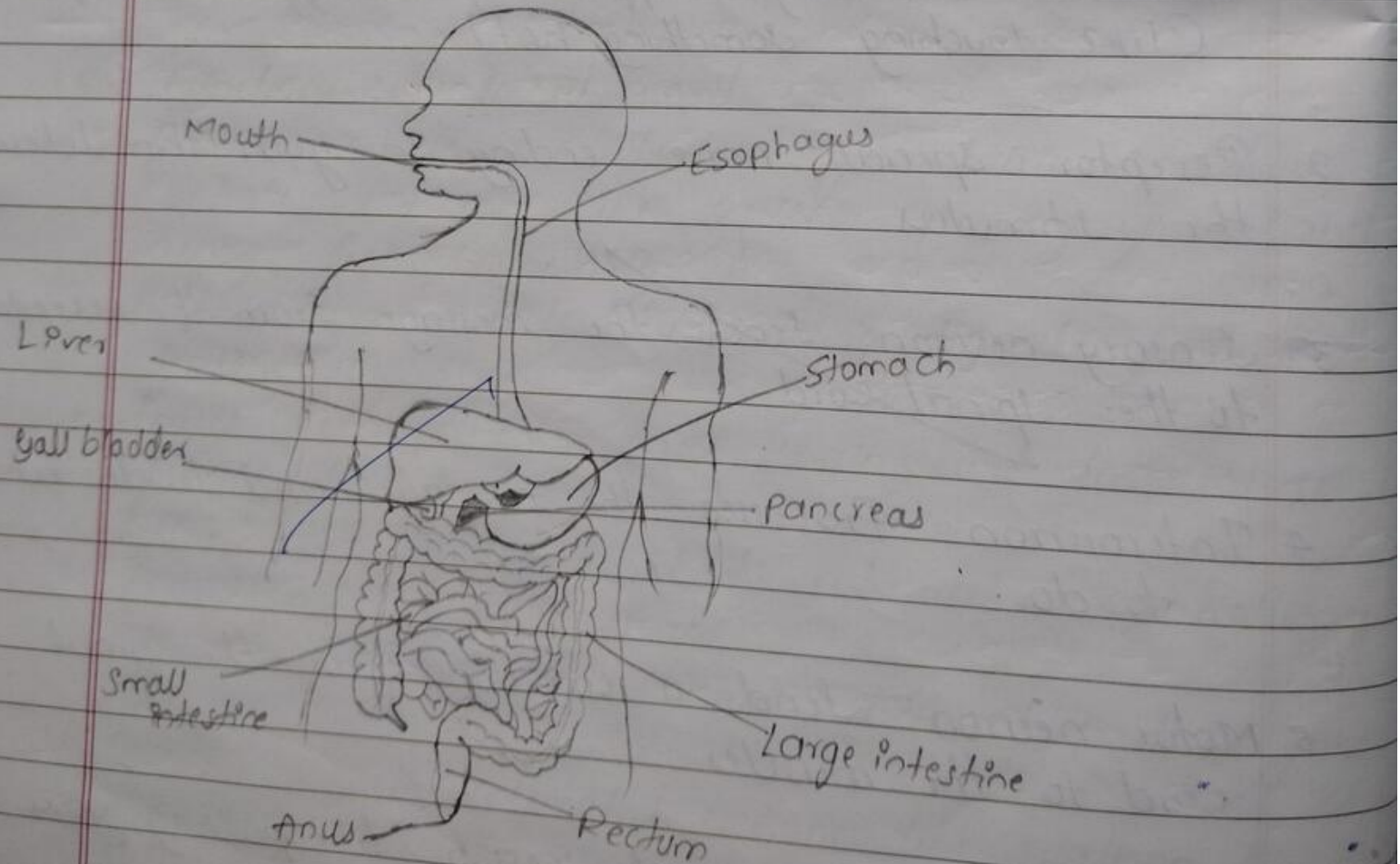
Reflex Arc.



UNIT - II

Digestive System.

* Draw a neat labelled diagram of digestive system



- Protects your body by reacting fast without needing the brain's help
- Helps keep your balance by sending information about body position
- Passes messages to and from your organs to help them work properly

17) Explain the reflex arc.

→ A reflex arc is the pathway your body uses to make a quick, automatic response to something - like pulling your hand away from a hot stove - without needing to think about it.

Steps of a Reflex Arc:

1. Stimulus : Something happens that triggers a reponse (like touching something hot)

2. Receptor : Special nerve endings in your skin detect the stimulus.

3. Sensory neuron: Sends the message from the receptor to the spinal cord

4. Interneuron : Processes the message and decides what to do.

5. Motor neuron : Sends a command from the spinal cord to the muscles.

6. Effector organ : The muscle reacts, like pulling your hand away.

Error correction during movement - Detects and corrects motor errors in real-time

Control of muscle tone - Regulates tension in muscles

Eye movement coordination - Helps coordinate eye tracking and gaze stability

Cognitive functions - Participitates in certain cognitive processes like attention and language.

Coordination of speech movements - Assists in smooth, coordinated speech articulation.

Draw a neat labelled diagram of cross section of spinal cord

Functions of spinal cord

- Carries messages between your brain and body
- Controls reflexes like quickly pulling your hand away from something hot.
- Helps move muscles by sending signals from the brain
- Senses feelings like touch, pain, and temperatures from the body.
- Helps with automatic body jobs like controlling bladder & blood pressure.
- Works in sections to control different parts of your body
- Helps in with repeated actions like walking by sending rhythmic signals.

2) Pons :- The middle portion of the brainstem, connecting the midbrain and medulla.
Functions
- Relay centre between cerebrum & cerebellum
- Regulates breathing rhythm
- Facilitates sleep and dreaming.
- Posture and motor control.

3) Medulla oblangata
The lowest part of the brainstem, directly connecting to the spinal cord.
Functions
- Autonomic control of vital functions:
Heart rate (cardiac centre)
Blood pressure (vasomotor center)
Breathing (Respiratory center)
- Swallowing, coughing, sneezing, vomiting, reflexes.
- Coordination of motor signals to spinal cord
- Crossing of motor fibers.

14. Mention the function of cerebellum
→ 1) Coordination of voluntary movements -
It ensures smooth, balanced muscle activity
2) Balance and posture maintainance -
Helps keep body equilibrium.
3) Motor learning - Involved in learning and refining new motor skills.
4) Timing and rhythm - Regulates timing of muscle contractions
5) Fine motor control - Enhances precision of small movements like writing.

Sexual Behaviour and Reproduction → Influences sexual development, arousal & reproductive function

Control of endocrine functions → Secretes releasing and inhibiting hormones that affect glands like the thyroid and adrenal glands.

List out the functions of Brain stem (including mid-brain, pons, medulla oblangata).

Functions of Brain stem
Control of vital life functions (Breathing, Heartrate)
Cranial nerve functions
Consciousness and sleep regulation
Motor and sensory pathway conduction
Reflex centres (coughing, sneezing, vomiting, gag reflex)
Posture and balance

The brain stem includes the midbrain, pons and medulla oblangata.

Midbrain (Mesencephalon)
Located at the top of the brainstem, just below the cerebral cortex
Functions
Visual & auditory processing
Motor control
Regulation of alertness and arousal
Eye movement coordination
Pain modulation

6) Emotions → Helps regulate emotions and emotional responses, in coordination with the limbic system.

7) Consciousness and Awareness → Enables self-awareness, attention, and perception of the environment.

8) Learning → Involved in acquiring new knowledge and adapting behaviour through experience.

12) List out the functions of Hypothalamus.

→ Functions of Hypothalamus

1) Regulation of Body temperature → Maintains internal temperature (acts as the body's thermostat)

2) Control of Hunger and thirst → Mangages appetite and water intake through the hunger and thirst centres.

3) Sleep-wake cycle (Circadian Rhythm) → Regulates the body's biological clock and sleep patterns.

4) Emotional Response → Involved in emotions like fear, anger, and pleasure (part of the limbic system).

5) Control of the Autonomic Nervous System → Regulates involuntary functions such as heart rate, blood pressure, and digestion.

6) Hormone Regulation → Controls the pituitary gland, which in turn regulates many hormones in the body.

Threshold → A signal only happens if the stimulus is strong enough (reaches a certain level).

All or None law → Once triggered, the signal is always the same size - no half signals

Fatigue → If stimulated too much, the nerve may stop responding for a while.

Mention the functions of cerebrum

The cerebrum is the largest part of the br and is responsible for many vital functions. Its main functions include:

Sensory Processing → It receives and interprets sensory information (e.g. touch, vision, sound, taste, sm

Motor control → Controls voluntary muscle movemen through the motor cortex

Speech and language → Involved in speech production (Broca's area) and language comprehension (wernicke's area).

Thinking and Reasoning → Responsible for problem-solving, planning, decision-making & logic (mainly in the frontal lobe)

Memory → Stores and retrieves information, especially through structures like the hippocampus in the temporal lobe.

* Conducts from nerve impulses from smooth (visceral) organs to CNS

C fibers →

* These are unmyelinated
* Smallest diameter (0.5 - 1.5 mm)
* Slowest conduction (0.5 - 2 m/s) (1 - 4 mile/hr)
* Conducts from skin to CNS or visceral organs to CNS.

Properties

1) Excitability → Nerve fibers can respond to a stimulus.

2) Conductivity → They can carry signals (electrical impulses) along their length.

3) Myelination → Fibers with myelin conduct signals faster (like A and B fibers)
Fibers without myelin (like C fibers) conduct slower.

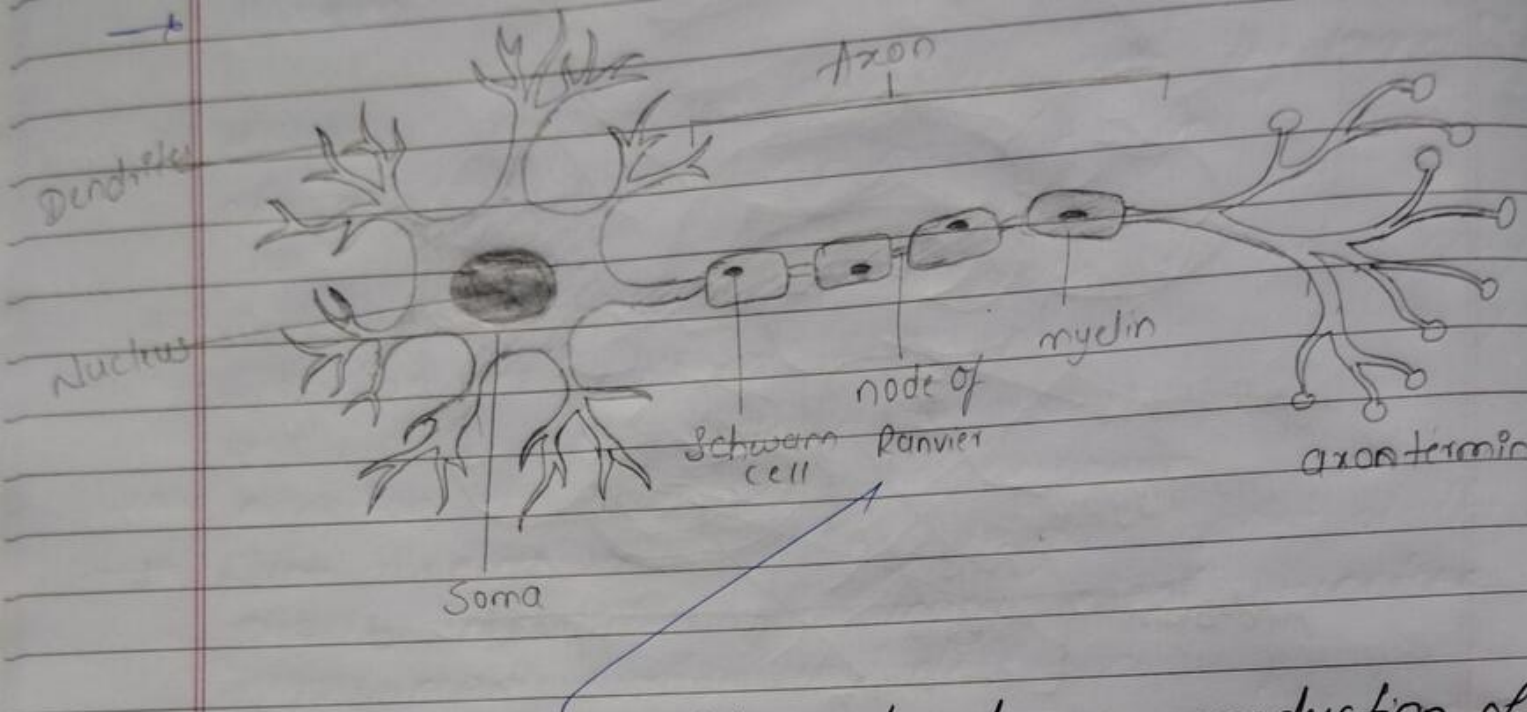
4) Conduction velocity
Thicker fibers - faster signals
Myelinated fibers - faster signals.

5) Saltatory conduction → In myelinated fibers, signals "jump" between gaps (Nodes of Ranvier), speeding up the process.

6) Refractory period → Short time after a signal when the fiber can't send another one right away.

9) Draw a neat labelled diagram of Neuron.

→



10) List the nerve fibers based on conduction of nerve impulses & properties

→ Nerve fibres based on conduction of nerve impu

A fibers
B fibers
C fibers

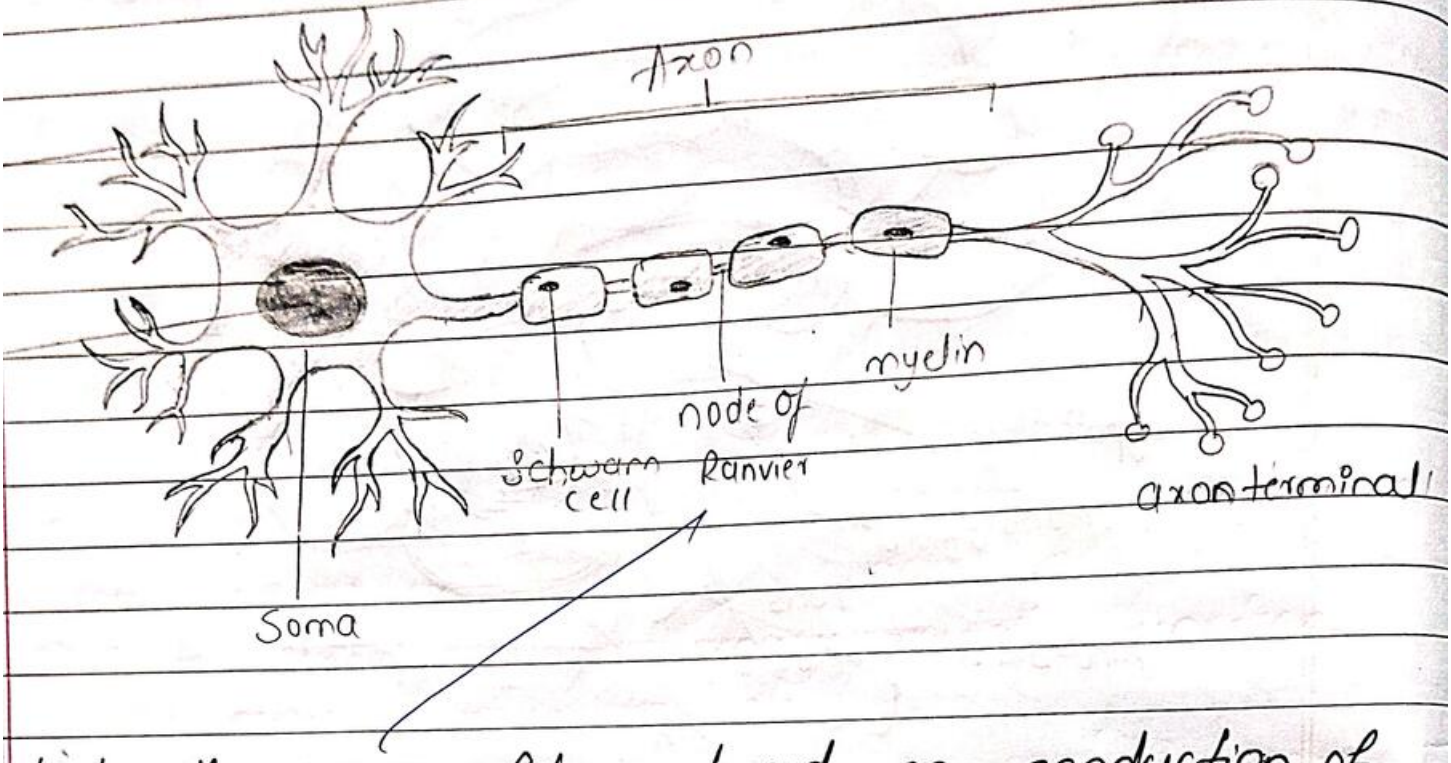
A fibers →

* These are heavily myelinated
* Large diameter (5-20 mm)
* High conduction velocity (97-280 mile/hr)
* Conducts from sensory receptors (skin, muscles) or motor neurons to the central nervous system.

B fibers →

* These are lightly myelinated
* Small diameter than A fibers (2-3mm)
* Slow conduction than A fibers (3-15 m/s)

Draw a neat labelled diagram of Neuron



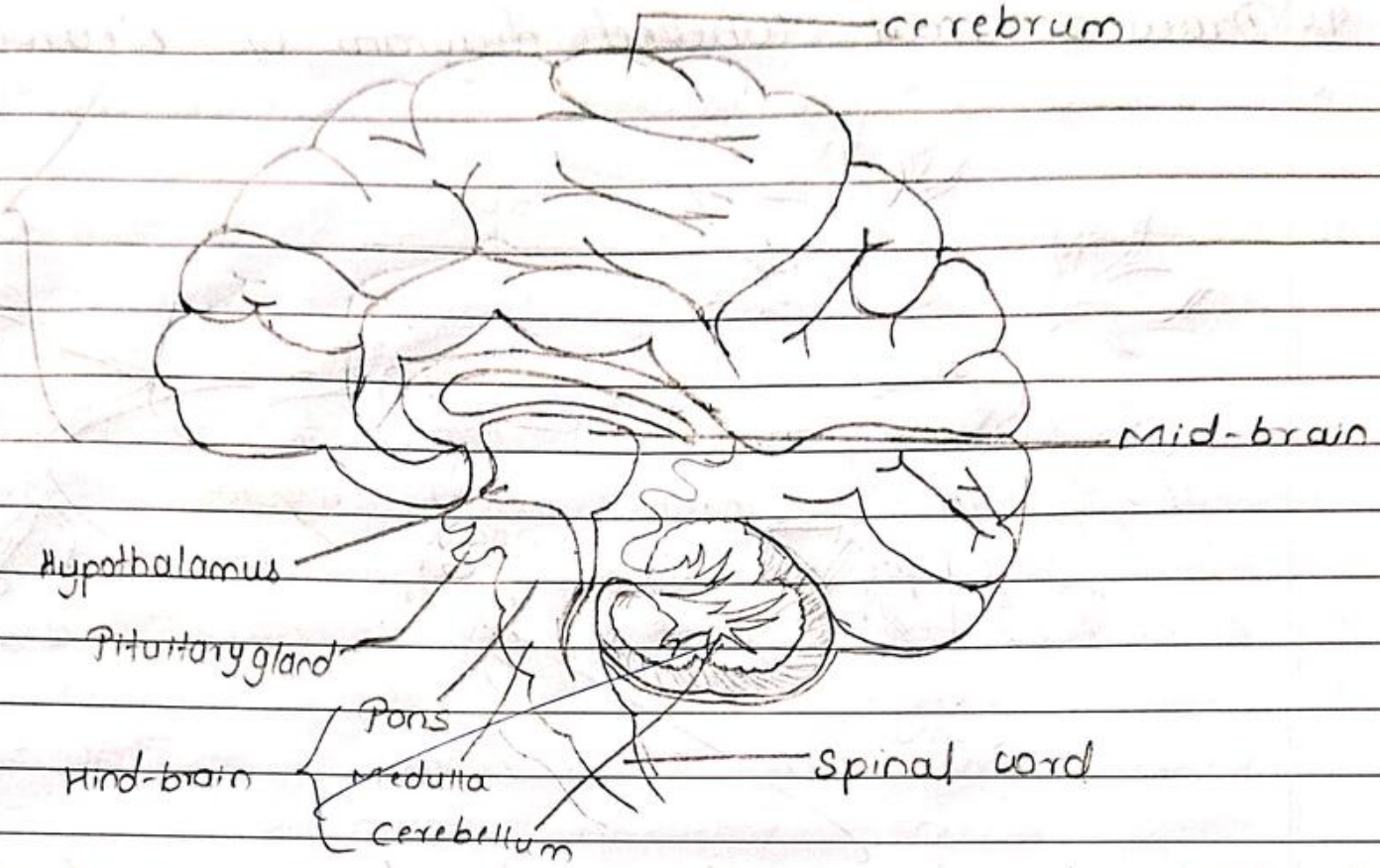
List the nerve fibers based on conduction of nerve impulses & properties

Nerve fibres based on conduction of nerve impul

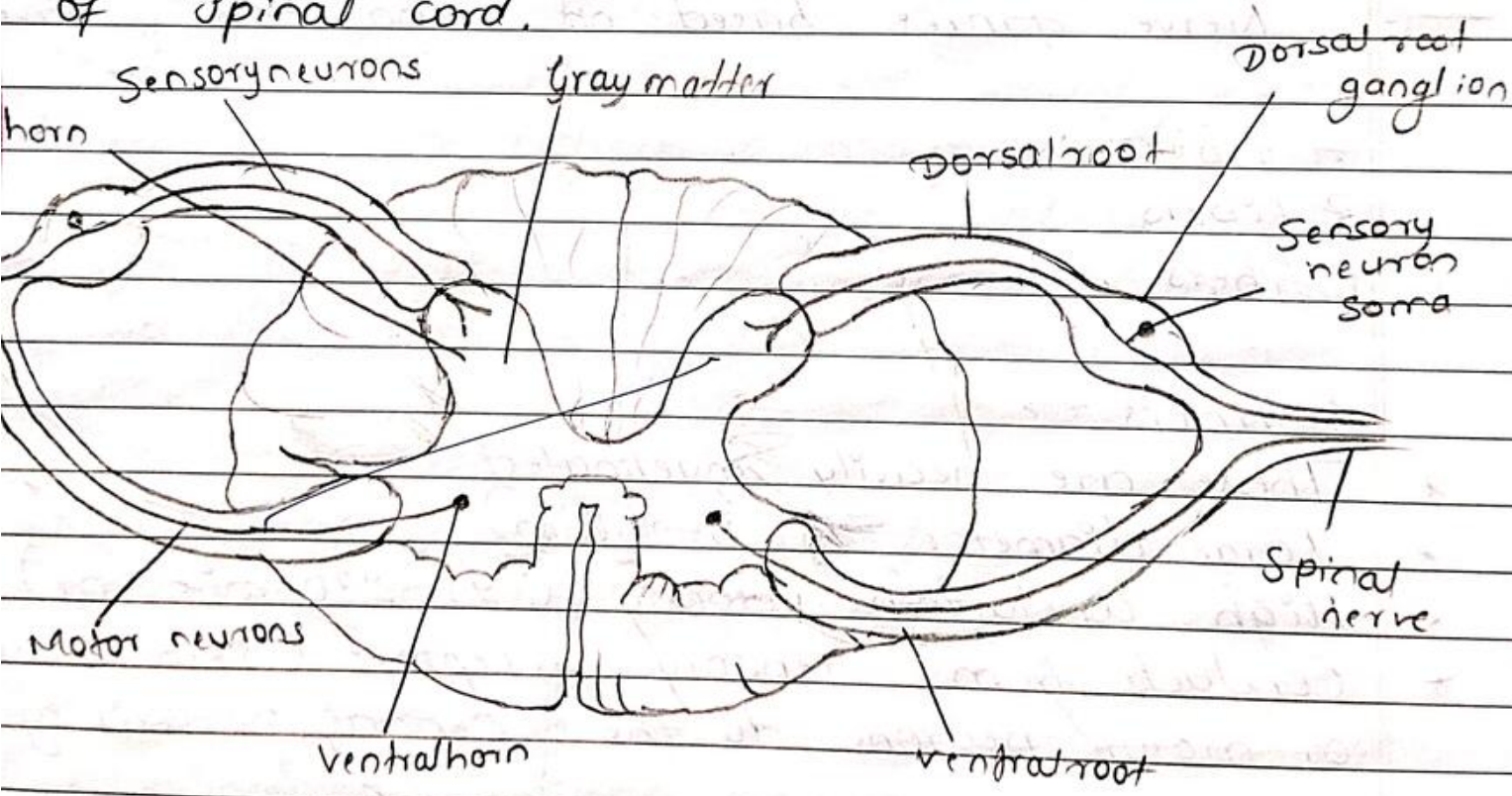
A fibers
B fibers
C fibers

A fibers →
These are heavily myelinated
Large diameter (5-20 mm)
High conduction velocity (27-280 mile/hr)
Conducts from sensory receptors (skin, muscles) or motor neurons to the central nervous system.

B fibers →
These are lightly myelinated
Small diameter than A fibers (2-3 mm)
Slow conduction than A fibers (3-15 m/s)



Draw a neat labelled diagram of cross section of of spinal cord.



Functions of CSF

Protection
Acts as a cushion for the brain and spinal cor
absorbing shocks and protecting from mechanical inj

Buoyancy
Reduces the effective weight of the brain, preventing
it from compressing against the skull base.

Waste removal
Clears metabolic waste, toxins, and excess
neurotransmitters from the CNS via the glymphatic sys

Homeostasis
Helps maintains a stable chemical environment
(ionic balance and pH) for neurons and glial cells.

Transport
Facilitates the circulation of hormones, nutrients,
and signalling molecules throughout the brain and
spinal cord.

Immunological function
Provides a barrier & surveillance system, contribut
to immune defense within the CNS.

Draw a neat labelled diagram of brain (5M)

apertures (foramina of Luschka). It also continues as the central canal of the spinal cord.

6. List the composition & functions of cerebrospinal fluid.

→ Composition:

volume → 150ml (Total CSF volume)

Rate of formation: 0.3ml per minute

It mainly contain lymphocytes

CSF

Water - 99.13 %

Solids - 0.87 %

Organic

proteins, sugar, cholesterol, Urea, uric acid, AA, lactic acid

Inorganic

Na^+ (sodium), calcium, potassium, Magnesium, Cl^- PO_4^{2-}, CO_3^{2-}, SO_4^{2-}.

Component	Concentration
Water	99 %
Electrolytes	Na^+, k^+, Cl^-, HCO_3^-, Ca^{2+}, Mg^{2+}
Proteins	Very low (15-45 mg/dL) compared to plasma
Glucose	~50-80 mg/dL (about 2/3 of blood glucose level)
Cells	very few (0-5 white blood cells/ uL, no red cells)
Amino Acids	Present in small amounts
Lactate	Low concentration
pH	Approximately 7.3.

The right lateral ventricle
The Left lateral ventricle
Third ventricle
Fourth ventricle

The right lateral ventricle is located in the right cerebral hemisphere. It extends through the frontal, parietal, occipital and temporal lobes. It communicates with the third ventricle through the right interventricular foramen also known as the foramen of Monro.

The left lateral ventricle is the mirror image of right lateral ventricle & is located in the left cerebral hemisphere. It also extends through the same lobes. The left lateral ventricles communicates with the third ventricle through the left interventricular foramen.

The third ventricle is a narrow, slit-like cavity located in the midline between the two halves of the thalamus. It receives cerebrospinal fluid from both lateral ventricles through the paired foramina of Monro. It continues posteriorly and connects to the fourth ventricle through a narrow channel called the cerebral aqueduct, or aqueduct of Sylvius.

The fourth ventricle lies between the brainstem & cerebellum. It receives CSF from the third ventricle through the cerebral aqueduct. It opens into the subarachnoid space through three openings: a single median aperture (foramen of Magendie)