



Class 10th

SHORT NOTE

CONTROL AND COORDINATION

- All the living organisms respond and react to changes in the environment around them.
- The changes in the environment to which the organisms respond and react are called stimuli such as light, heat, cold, sound, smell, touch etc.

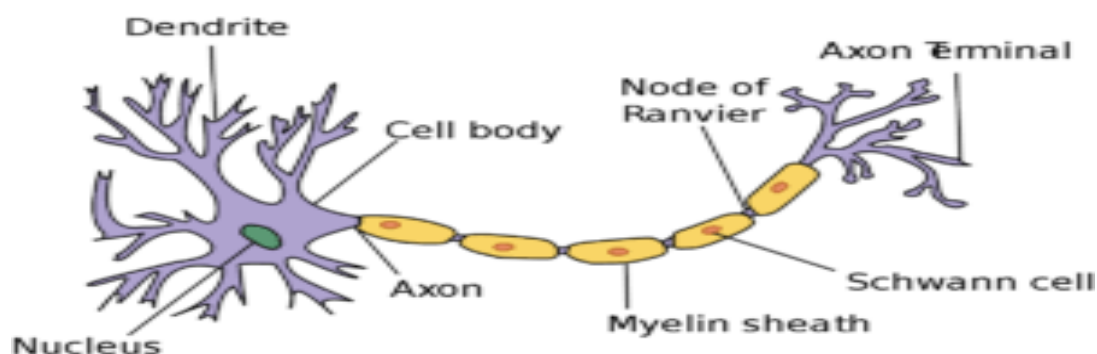
Control and Coordination in Animals:

- In animals, the nervous system and hormonal system are jointly responsible for control and coordination.

NERVOUS SYSTEM: The nervous system is composed of specialized tissues, called nervous tissue.

- The nerve cell or neuron is the functional unit of the nervous system.
- It is the nervous system which is mainly responsible for control and coordination in complex animals.

STRUCTURE OF NEURON:



A neuron is the structural and functional unit of the nervous system.

Neuron: Neuron is a highly specialized cell which is responsible for the transmission of nerve impulses. The neuron consists of the following parts:

- (i) Cyton or cell body: The cell body or cyton is somewhat star-shaped, with many hair-like structures protruding out of the margin. These hair-like structures are called dendrites. Dendrites receive the nerve impulses.
- (ii) Axon: It ends in several hair-like structures, called axon terminals. The axon terminals relay nerve impulses.
- (iii) Myelin sheath: There is an insulator cover around the axon. This is called myelin sheath.

TYPES OF NEURON:

Sensory neuron	Motor neuron	Association or relay neuron
These neurons receive signals from a sense organ.	These neurons send signals to a muscle or a gland.	These neurons relay the signals between the sensory neuron and motor neuron.



IMPORTANT TERMINOLOGIES:

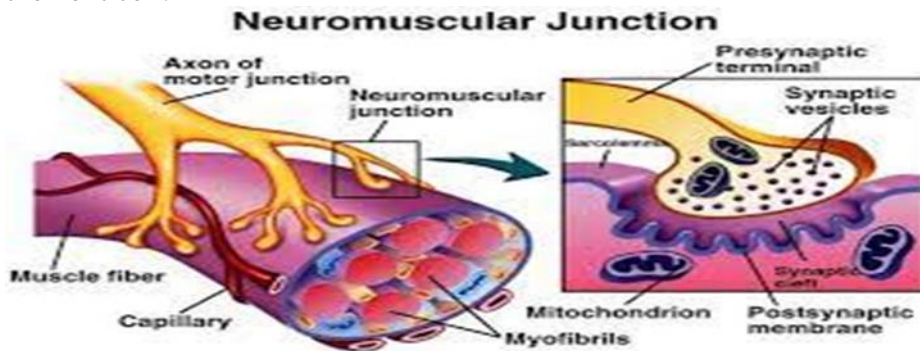
Synapse: The point contact between the terminal branches of the axon of one neuron with the dendrite of another neuron is called synapse.

Neuromuscular Junction (NMJ): NMJ is the point where a muscle fibre comes in contact with a motor neuron carrying nerve impulse from the control nervous system.

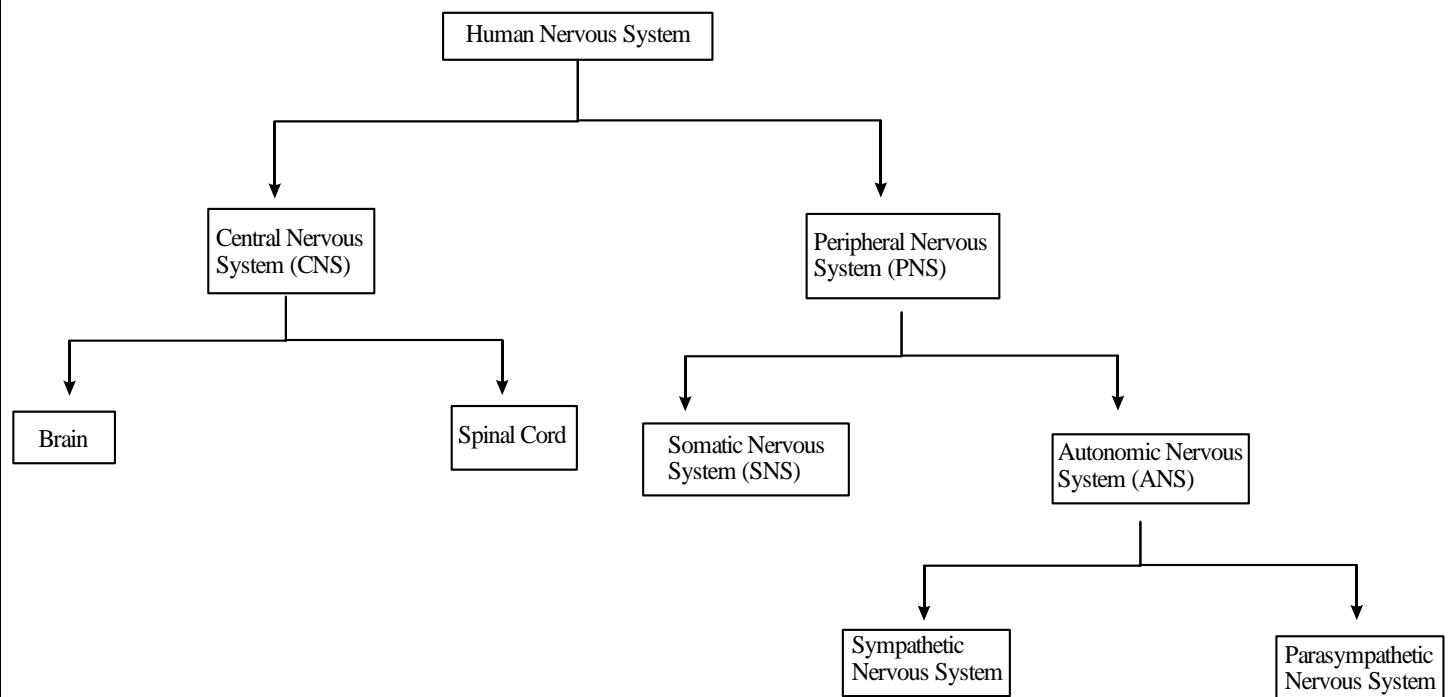
TRANSMISSION OF NERVE IMPULSE:

Dendrites → cell body → axon → nerve endings at the tip of axon → synapse → dendrite of the next neuron.

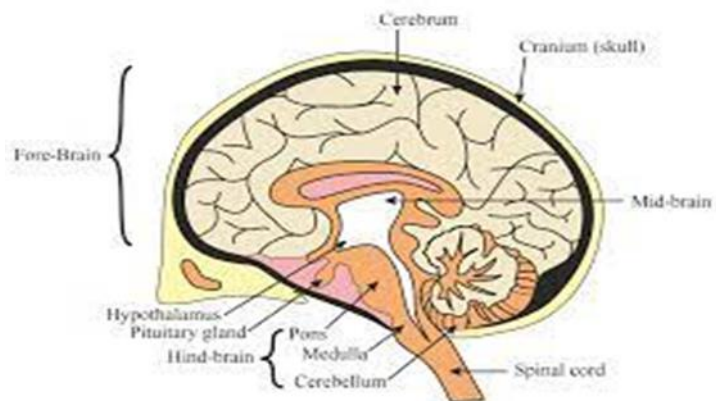
Chemicals released from the axon tip of one neuron, cross the synapse or neuromuscular junction to reach the next cell.



HUMAN NERVOUS SYSTEM:



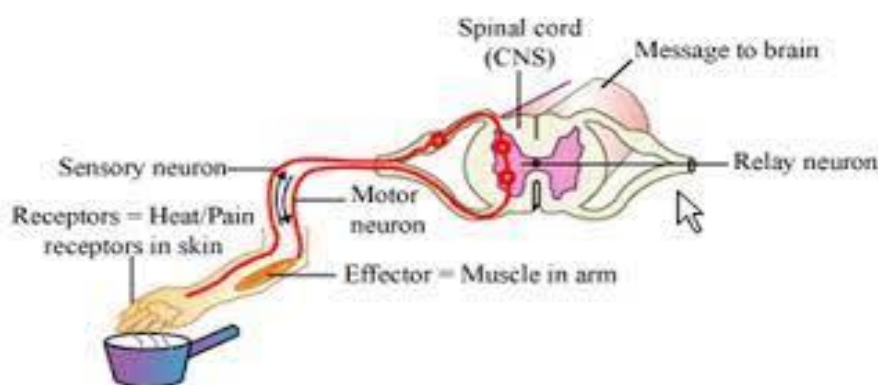
HUMAN BRAIN:



- Human brain is a highly complex organ, which is mainly composed of nervous tissue.
- The tissues are highly folded to accommodate a large surface area in less space.
- The brain is covered by a three-layered system of membranes, called meninges.
- Cerebrospinal fluid is filled between the meninges.
- The CSF provides a cushion to the brain against mechanical shocks. Furthermore, protection.
- The human brain can be divided into three regions parts:

1. **Forebrain:**involved in thinking
 - (i) cerebrum: largest part of the brain, responsible for intelligence, ,memory and consciousness.
 - (ii) thalamus: coordinates the sensory impulses from the various sense organs such as eyes,ears and relays it to the cerebrum.
 - (iii) hypothalamus: contains control centres for body temperature, heart rate,hunger, thirst, sleep and blood pressure.
2. **Midbrain:** It serves as a relay centre for sensory information from sense organs to cerebrum.
3. **Hindbrain:**(i) cerebellum: second largest part of brain and responsible for maintaining posture and balance of the body.
 - (ii) pons: consists of fibre tracts that interconnect different regions of the brain.
 - (iii) medulla oblongata: contains centres for various activities e.g., respiration, sneezing, coughing, cardio-vascular reflexes and gastric secretions.

REFLEX ACTION:



A reflex action is a sudden, involuntary and mechanical action in response to stimulus in the environment. Reflex actions are controlled by the spinal cord.

Reflex arc is defined as the route taken by the nerve impulses and responses in a reflex action.

Receptor → Sensory neuron → Relay neuron → Motor neuron → Effector (muscle)



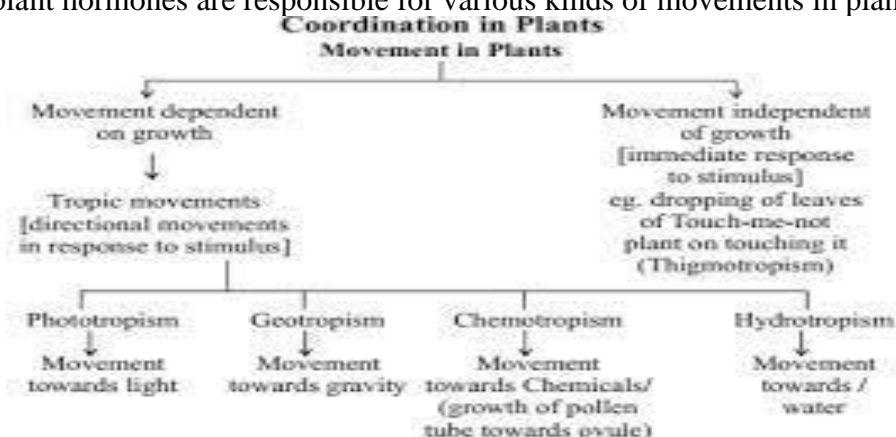
- The reflex arc passes at the level of the spinal cord and the signals involved in reflex action do not travel up to the brain.
- This is important because sending signals to the brain would involve more time.

ADVANTAGE OF REFLEX ACTION:

- Protects the body by enabling the body to give quick responses to harmful stimuli.

COORDINATION IN PLANTS:

- Unlike animals, plants do not have a nervous system. Plants use chemical means for control and coordination.
- Many plant hormones are responsible for various kinds of movements in plants.



Plant hormones: Plant hormones are chemicals which help to coordinate growth, development and responses to the environment. Type of plant hormones:

- **Auxin:** (Synthesized at shoot tip)
- **Gibberellin:** Helps in the growth of the stem
- **Cytokinins:** Promotes cell division.
- **Absciscic acid:** Inhibits growth, causes wilting of leaves. (Stress hormone)

HORMONES IN ANIMALS:

Hormones: These are the chemical messengers secreted in very small amounts by specialised tissues called ductless glands. They act on target tissues/organs usually away from their source. The Endocrine system helps in control and coordination through chemical compounds called hormones.

ENDOCRINE GLAND	LOCATION	HORMONE	FUNCTION
Pituitary gland (master gland)	base of the brain	Growth hormone (GH),Thyroid stimulating hormone (TSH),Follicle stimulating hormone (FSH)	<ul style="list-style-type: none"> • GH stimulates growth. • TSH stimulates the functioning of the thyroid gland. • FSH stimulates the follicles during ovulation.
Testis (male)	Scrotum	Testosterone	<ul style="list-style-type: none"> • Sperm production • development of secondary sexual characters during puberty.
Ovary (female)	Abdominal cavity	Oestrogen	<ul style="list-style-type: none"> • Egg production • development of secondary sexual characters during puberty.



Pancreas	Near stomach	Insulin	Controls blood sugar level
Adrenal gland	Above kidneys	Adrenalin	Prepares the body for emergency situations and hence is also called 'Fight and flight' hormone.
Thyroid Gland	Neck	Thyroxine	Controls general metabolism and growth in the body.