Control Systems:

- Endocrine system: secretes hormones, act slowly, prolonged action.
- Nervous System: rapid regulation, divided into CNS and PNS.

Nervous System Functions:

Controls all body functions. Sensation, thinking, memory, emotions. Maintain homeostasis.

Divisions:

- CNS: Brain and spinal cord.
- PNS: Somatic (voluntary) and Autonomic (involuntary).
- Autonomic: Sympathetic (Fight or flight) and Parasympathetic (Rest and digest).

Brain:

- Cerebrum: Thinking, memory, emotions, vision, speech, behavior.
- Cerebellum: Balance and movement.
- Diencephalon: Hypothalamus (temperature, heart rate, appetite), Thalamus (relay station).
- Brain stem: Breathing, heart beats, sleep.

Spinal Cord: Gray matter (H central zone) and White matter (peripheral part).

Neuron:

- Basic unit: nerve cell (neuron).
- Dendrites: carry impulses towards cell body. Axon: carry impulses from cell body.
- Myelinated (myelin sheath) vs Non-myelinated.

Types of Neurons:

- Sensory neurons: senses to CNS.
- Interneurons: CNS, connect sensory to motor.
- Motor neurons: CNS to body parts.

Neurotransmission:

- Neurotransmitters: chemicals that transfer signals.
- Synapse: small gap at end of neuron.

Neurotransmitters & Receptors:

- Acetylcholine: nicotinic (N) or muscarinic (M).
- Dopamine: dopamine receptors (D).
- Serotonin: serotonin receptors.
- GABA: inhibitory. Glutamate: excitatory.
- Epinephrine and Norepinephrine: adrenergic receptors (α and β).

Reflex Arc: Receptor -> Sensory neuron -> Interneuron -> Motor neuron -> Effector.

Autonomic vs Somatic:

- Autonomic: Involuntary, 2 types, 2 efferent nerve, Smooth-cardiac muscle, Ach/NE, Autonomic ganglia present.
- Somatic: Voluntary, One type, One efferent, Skeletal muscle, Ach, Autonomic ganglia absent.

ANS:

- Supplies internal organs, regulates involuntary actions.
- Preganglionic neuron: brain/spinal cord to ganglion. Postganglionic neuron: ganglion to target tissue.

Parasympathetic vs Sympathetic:

- Parasympathetic: Rest and digest. Craniosacral Outflow. Presynaptic: long, Postsynaptic: short. Ach (Nicotinic) then Ach (Muscarinic).
- Sympathetic: Fight or flight. Thoracolumbar Outflow. Presynaptic: short, Postsynaptic: long. Ach (Nicotinic) then Norepinephrine (Adrenergic α, β).

Pathophysiology:

- Alzheimer's: Amyloid plaques, Tau protein.
- Parkinson's: Low dopamine, degradation of dopaminergic neurons.
- Epilepsy: Abnormal electric activity.
- Depression: Depletion of serotonin, norepinephrine, dopamine.
- Schizophrenia: Imbalance of dopamine, serotonin, glutamate, GABA.
- Stroke: Ischemic (block) or Hemorrhagic (rupture).
- Meningitis: Infection of meninges.
- Shingles: Varicella zoster virus.
- Peripheral Neuropathy: Damage in peripheral nerves.
- Myasthenia Gravis: Autoantibodies attack nicotinic receptors.