Z-3507 & Z-3508 **PHYSIOLOGY-I** **Cr. 4(3+1)**

Theory

Central themes in Physiology: Structure-Function Relationship, Adaptations, Homeostasis, Conformity and Regulation.

Physiological basis of Neuronal Function: ***Mechanisms in Resting Membrane Potentials***: Electrogenic ion pump, Donnan equilibrium, diffusional potentials, ion channels, ***Ionic mechanisms in action potentials***: Roles of ion channels, Properties of action potential. ***Propagation of Action Potential***; ***Synaptic transmission***; Structure and function of electrical synapse, Structure and function of chemical synapse; Neurotransmitters; Synaptic receptors; Excitatory postsynaptic potential; Inhibitory postsynaptic potential; Presynaptic inhibition; Integration at synapses: Facilitation, Posttetanic Potentiation.

Receptors Physiology: Transduction; Sensory coding; Mechanoreception: Hair cell mechanism particularly in acoustico-lateralis system of vertebrates; Cellular and molecular mechanisms in taste and olfactory reception; Photoreception: Ultrasttructure of photoreceptors, Photochemistry, Phototransduction and physiological basis of color vision.

Chemical Messenger and Regulators/Endocrine Physiology: Types and functions of secretions. An overview of hormones, their chemistry and physiological roles of Hypthalamus, Pituitary, Thyriod, Parathyroid and associated structures, Endocrine pancreas, Gastroenteropancreatic system, Adrenal medulla, Adrenal cortex, Ovary, Testis and placenta. A generalized model account of hormone synthesis, storage and secretion (a peptide hormone model and steroid hormones); Hormonal interactions in metabolic and developmental function; Water and electrolyte balance; reproduction; glycemia and calcium hormostasis. Mechanisms of action in hormones involving membrane receptors and nuclear modulated gene expression

Movements and Muscles: Structural basis of muscle contraction: molecular structures of contractile components and their interaction, sarcoplasmic reticulum, Role of calcium, calcium pump and membrane mechanisms in regulation of contraction, Types of muscle fibers, Types of muscle contractions

Books Recommended:

1. Guyton, A.C. and Hall, J.E., 2016. Textbook of Medical Physiology, 13th Ed.. W.B. Saunders Company, Philadelphia.

2. Withers, P.C., 1992. Comparative Animal Physiology. Saunders College Publishing, Philadelphia.
3. Randall, D., Burggren, W., French, K. and Fernald, R., 2002. Eckert Animal Physiology: Mechanisms and Adaptations, 5th ed. W.H. Freeman and Company, New York

Practicals

Muscle and Neuromuscular Activity: Nerve muscle preparation, Muscle twitch, Comparison of muscle and nerve irritability, effect of stimulus strength, effect of stimulus frequency (tetany), effect of load or stretch, effect of prolonged activity (fatigue), neuromuscular fatigue, stimulation of motor points in human.

Excitability, Sensation and Behaviour: Recording of action potential by oscilloscope and demonstration of its various features. Experiments to demonstrate characteristic of reflex arc. Experiment in human (students themselves) to demonstrate some aspect of sensory physiology.

Books Recommended:

1. Tharp, G. and Woodman, D., 2011. Experiments in Physiology, 10th Ed.. Prentice Hall, London.