Swami Rama Himalayan University,
Swami Ram Nagar, Jolly Grant, Dehradun-248016

Subject Code: PHDPY110

Subject Name: Advances in Physiology **100 Marks**

TIME: 3 HRS

Unit 1:

Cell, Nerve-Muscle and Central Nervous System

Overview of different cell organelles including structure & functions of cell membrane. Concept of basic physics in generation of membrane potential (RMP). Experimental basis of action potential (AP) recording in nerve & ionic basis of its generation. Understanding neuromuscular transmission & mechanisms of contraction of muscles.

Understanding the organization of the nervous system. Basic functions of synapses & neurotransmitters. Concept of various sensory receptors, ascending & descending tracts of spinal cord. Mechanisms of posture control including various postural reflexes. Functional aspects of autonomic nervous system, hypothalamus, cerebellum & basal ganglia. Overview of various special senses of nervous system. Recent advances in neurophysiology.

Unit 2:

Endocrinology & Reproduction

General principles of endocrinology including classification. Mechanism of actions and feedback control of hormones. Hormonal aspects of growth & development. Concept of insulin & pathophysiology of Diabetes Mellitus. Understanding hormonal regulation of calcium balance. Physiological anatomy of male & female reproductive systems. Hormonal control of Spermatogenesis. Endocrine regulation of menstrual cycle. Hormonal basis of onset of puberty. Physiological principles of contraception & recent advances in this field.

Unit 3:

Cardiovascular System, Blood and Exercise Physiology

Physiological anatomy of cardiac muscle including excitation contraction coupling. Specialized conductive system of the heart. Control of excitation by autonomic system. Concept of ECG & cardiac vector. Basic concept of cardiac cycle and heart sound. Understanding of cardiac output & principle of cardiac output measurement. Biophysical aspect in circulatory system. Concept of blood pressure, its measurement & various mechanisms that control blood pressure. Understanding hypertension & its classification. Recent advances in the field of cardiovascular research. Concept of blood as a circulatory

fluid. Basic understanding of hematopoiesis & blood group. Various cardiorespiratory changes that occurs during exercise.

Unit 4:

Respiratory Physiology

Understanding the mechanics of respiration including concept of compliance & ventilation-perfusion of lungs. Understanding pulmonary volumes-capacities & their measurement by spirometer & flow meter. Concept of gaseous exchange in lungs & how transport of gases occur in blood. Basic understanding of chemical & neuronal control of respiration. Applied aspect in respiratory physiology-High altitude pulmonary physiology, respiratory alteration in deep-sea diving & space physiology.

Unit 5:

Renal and Gastrointestinal physiology:

Concept of body fluid & its regulation. Functional anatomy of urinary system & functions of kidney including micturition. Basic understanding of glomerular filtration & its control. Concept of various functions of renal tubules. Urinary concentration mechanisms including countercurrent system. Concepts of acid base balance.

Functional anatomy of gastrointestinal tract (GIT). Concept of various types of motility in GIT. Overview of various secretions in GIT. Basic concepts of digestion & absorption of various nutrients in GIT. Recent advances in gastrointestinal physiology.

Reference Books:

1. Ganong's Review of Medical Physiology (25th Edition) by Kim E. Barrett, Susan M. Barman, Scott Boitano, Heddwen L. Brooks. *McGraw Hill Education.*

2. Guyton and Hall Textbook of Medical Physiology (13th Edition) by John E Hall & C Guyton. *Saunders/Elsevier.*

3. Samson Wright's Applied Physiology (13th edition) by Keele A. Cyril. *Oxford University Press.*

4. Best & Taylor's Physiological Basis of Medical Practice (12th edition) by Charles Herbert Best, Norman Burke Taylor, John R. Brobeck. *Williams & Wilkins Co.*

5. Berne & Levy Physiology (6th edition) by Bruce M. Koeppen, Bruce A. Stanton. *Mosby.*