

# **PACIFIC MEDICAL UNIVERSITY, UDAIPUR**

## **Ph.D. Entrance Syllabus – Medical Physiology**

### **1. General Physiology**

- Homeostasis and physiological control systems
- Cell physiology: membrane transport, ion channels
- Body fluid compartments and regulation
- Acid–base balance (buffer systems, compensation mechanisms)
- Autonomic nervous system (sympathetic & parasympathetic)
- Adaptation to stress, exercise, and environmental changes

### **2. Blood & Immune Physiology**

- Composition and functions of blood
- RBC physiology, hemoglobin structure, anemia types
- WBC functions and immunity
- Platelets and coagulation mechanisms
- Blood groups and transfusion reactions
- Immunity basics: innate and adaptive immunity
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### **3. Nerve & Muscle Physiology**

- Neuron structure and function
- Resting membrane potential and action potential
- Synaptic transmission
- Neuromuscular junction physiology
- Skeletal, smooth, and cardiac muscle contraction mechanisms

### **4. Cardiovascular Physiology**

- Cardiac cycle, heart sounds
- Cardiac output and its regulation
- Heart rate and blood pressure control
- Hemodynamics
- ECG and clinical interpretation
- Coronary circulation and myocardial physiology

## **5. Respiratory Physiology**

- Mechanics of respiration
- Lung volumes and capacities
- Gas exchange and transport
- Regulation of respiration
- Hypoxia and cyanosis
- Pulmonary function tests (PFTs)

## **6. Renal Physiology**

- Structure and function of nephron
- Glomerular filtration rate (GFR)
- Tubular reabsorption and secretion
- Concentration & dilution of urine
- Acid–base regulation by kidney
- Micturition reflex

## **7. Gastrointestinal Physiology**

- Functions of GIT
- Salivary, gastric, pancreatic secretions
- Bile secretion and its functions
- Intestinal absorption
- GI hormones
- GI motility

## **8. Endocrine Physiology**

- Mechanism of hormone action
- Hypothalamic–pituitary axis
- Thyroid, adrenal, pancreatic hormones
- Calcium and bone metabolism
- Reproductive hormones
- Endocrine feedback mechanisms

## **9. Reproductive Physiology**

- Male reproductive physiology
- Female reproductive physiology
- Menstrual cycle
- Pregnancy and lactation physiology
- Contraception and fertility regulation

## **10. Neurophysiology & Special Senses**

- CNS functions
- EEG and sleep physiology
- Reflexes and neural pathways
- Learning and memory
- Vision, hearing, taste, smell
- Pain physiology

## **11. Environmental & Exercise Physiology**

- High altitude physiology
- Deep-sea diving physiology
- Heat and cold exposure
- Exercise physiology (cardio-respiratory changes)

## **12. Applied & Clinical Physiology**

- Physiological basis of diseases
- Clinical tests and interpretation
- Aging and physiological changes
- Physiology of common clinical conditions