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MGM INSTITUTE OF HEALTH SCIENCES
(Deemed University u/s 3 of UGC Act, 1956)
Grade 'A' Accredited by NAAC

PhD CET Syllabus

Paper II - Subject Specific Test Physiology

Theory

Module I: General Physiology, Nerve and Muscle Physiology

Introduction to physiology: the cell and general physiology

1. Functional organization of the human body and control of the 'internal environment
2. The cell, cell organelles and its functions of Genetic control of protein synthesis, cell function, and cell reproduction
3. Transport across cell membrane

Nerve and Muscle Physiology

1. Membrane potentials and action potentials
2. Structure, functions, classification and properties of nerve fibres
3. Degeneration and regeneration of fibre
4. Excitation of skeletal muscle: neuromuscular transmission and excitation-contraction coupling
5. Contraction of skeletal muscle
6. Excitation and contraction of smooth muscle

Module II: Haematology

1. Composition and function of blood, Plasma proteins
2. Red blood cells, anaemia, and polycythemia
3. Leukocytes, granulocytes, the monocyte-macrophage system, and inflammation
4. Immunity and allergy
5. Blood types; transfusion; tissue and organ transplantation
6. Hemostasis and blood coagulation, anticoagulants, Bleeding disorders

Module III: Respiratory System

1. Physiological anatomy and functions of respiratory system
2. Pulmonary ventilation
3. Pulmonary circulation, pulmonary edema, pleural fluid
4. Physical principles of gas exchange; diffusion of oxygen and carbon dioxide through the respiratory membrane
5. Transport of oxygen and carbon dioxide in blood and tissue fluids
6. Regulation of respiration
7. Respiratory insufficiency - pathophysiology, diagnosis, oxygen therapy
8. High altitude, Aviation and Space Physiology
9. Physiology of deep sea diving and hyperbaric conditions

Module IV: Cardiovascular system

1. Physiological anatomy and functions of Cardiovascular system
2. Cardiac muscle: the heart as a pump and function & properties of the heart muscles
3. Cardiac cycle
4. Rhythmical excitatory and conductive system of the heart
5. The normal electrocardiogram
6. Cardiac arrhythmias and electrocardiographic findings in cardiac and systemic disease
7. Heart rate
8. Overview of the circulation; medical biophysics of pressure, flow, and resistance
9. Dynamics of blood and lymphatic flow: arterial and arteriolar circulation, capillary circulation, lymphatic circulation, venous circulation
10. Cardiac output
11. Blood pressure
12. Cardiovascular regulatory mechanism
13. Regional circulation: muscle blood flow, cutaneous circulation
14. Coronary circulation
15. Cardiovascular pathophysiology: Ischemic Heart Disease, Cardiac failure, Circulatory shock, valvular and congenital heart defects

Module V: Gastrointestinal physiology

1. General principles of gastrointestinal function - motility, nervous control, and splanchnic circulation
2. Propulsion and mixing of food in the alimentary canal- deglutition, gastric emptying, Peristalsis
3. Secretory functions of the alimentary tract - saliva gastric juice, pancreatic juice, bile, intestinal juice
4. Digestion and absorption in the gastrointestinal tract
5. Physiology of gastrointestinal disorders

Module VI: Exercise Physiology, Food & Nutrition

I. Exercise Physiology

1. Introduction: Exercise, Physical fitness, wellness
2. Types of exercise, Exercises grading, Exercise testing
3. Body response to exercise
4. Training adaptation
5. Sport Physiology

II. Food & Nutrition

1. Energy metabolism, BMR
2. Regulation of food intake
3. Essential dietary components
4. Concept of balance diet
5. Malnutrition: Obesity and its implication, protein energy malnutrition, vitamin and mineral deficiencies

Module VII: Endocrine I

1. Introduction to endocrinology
2. Mechanism of action of hormones
3. Pituitary hormones and their control by the hypothalamus
4. Thyroid metabolic hormones
5. Adrenal hormones
6. Insulin, glucagon, and diabetes mellitus
7. Parathyroid hormone, calcitonin, calcium and phosphate metabolism, vitamin D, bone, and teeth
8. Endocrine functions of kidney, heart, pineal gland and local hormones

Module VIII: Reproductive system

1. Sexual growth & development
2. Male Reproductive Physiology
3. Female Reproductive Physiology
4. Physiology of coitus, pregnancy and Parturition
5. Physiology of lactation
6. Physiology of contraception
7. **Module IX: Renal system**

1. The body fluids compartments: extracellular and intracellular fluids; interstitial fluid and edema
2. Urine formation by the kidneys: I. Glomerular filtration, renal blood flow, and their control
3. Urine formation by the kidneys: II. Tubular reabsorption and secretion
4. Urine concentration and dilution; regulation of extracellular fluid osmolarity and sodium concentration
5. Renal regulation of potassium, calcium, phosphate, and magnesium; integration of renal mechanisms for control of blood volume and extracellular fluid volume
6. Acid-base regulation
7. Diuretics and kidney diseases
8. Urinary bladder and micturition

Module X: The nervous system: A. General principles and sensory physiology

1. Organization of the nervous system, basic functions of synapses
2. Sensory receptors, neuronal circuits for processing information
3. Somatic sensations: I. General organization, the tactile and position senses and ascending tracts
4. Somatic sensations: II. Pain, headache, and thermal sensations

B. Motor and integrative neurophysiology

1. Motor functions of the spinal cord; the cord reflexes
2. Cortical and brain stem control of motor function, descending tracts

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3. Contributions of the cerebellum and basal ganglia to overall motor control
4. Muscle tone and posture
5. Vestibular apparatus and equilibrium

C. Higher structure and function

1. Cerebral cortex, intellectual functions of the brain, learning and memory
2. Behavioural and motivational mechanisms of the brain - the limbic system and the hypothalamus
3. States of brain activity - sleep, brain waves, epilepsy, psychoses
4. The autonomic nervous system and the adrenal medulla
5. Cerebral blood flow, cerebrospinal fluid, and brain metabolism

Module XI: The special senses

1. The eye: I. Optics of vision
 2. The eye: II. Receptor and neural function of the retina
 3. The eye: III. Central neurophysiology of vision
 4. The sense of hearing
 5. The chemical senses - taste and smell
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