

RAJASTHAN PUBLIC SERVICE COMMISSION, AJMER
SYLLABUS FOR SCREENING TEST FOR THE POST OF
ASSISTANT PROFESSOR (Broad Speciality)
PHYSIOLOGY
MEDICAL EDUCATION DEPARTMENT

Unit-I- General Physiological Principles:

Principles of homeostasis, Positive & Negative Feedback Mechanisms, Structure of Cell, Structure of Cell Membrane, Intercellular communications, Transport across Cell Membrane, Gibbs-Donnan equilibrium, Nernst Equation, Fluid compartments of the body. Measurement of Fluid Volumes, Osmotic Equilibrium between ECF & ICF. Basic principles of Genetics and its Applied aspects, Genetic code- its expression, and regulation of gene expression, Cell cycle and its regulation and Apoptosis. Applied aspects of General Physiology.

Unit-II - Blood:

Composition and functions of blood, types & functions of Plasma proteins, Immunoglobulins, RBC: formation & functions, Blood Indices: PCV, MCV, MCH, MCHC. Anemias with Classification & Description, Polycythemias, Fate of Red Blood Cells, Hemoglobin- synthesis and functions, Chemistry of Bilirubin Formation & Jaundice, Blood Groups: basis of blood grouping, & its clinical importance, blood banking and transfusion, Principles of transfusion medicine, WBC: formation, functions and Leucopenia & Leukemias, Macrophages, Inflammation- Patho Physiology, Platelets: formation & functions. Haemophilia, DIC, Thrombocytopenic Purpura, Haemostasis and its applications inclusive of anticoagulants and Bleeding Disorders, Mechanism of Coagulation, Coagulation tests. Thymus and Immunity, Innate immunity, Acquired immunity, Allergy, Hypersensitivity and Immunodeficiency, Auto Immune Disorders. Tissue & Organ Transplant. Lymphoid Tissues & Lymph Abnormal clotting and bleeding (coagulation factors and anticoagulants), Fibrinolysis, Congenital Abnormalities.

Immune Disorders. The physiological basis of the treatment of such conditions and side effects of drugs used. Applied aspects of Hematology.

Unit-III - Muscle and Nerve Physiology:

Structure, functions and properties of Neuron and Neuroglia, Classification, functions and properties of Nerve Fibers, Molecular basis of resting membrane and action potential, Transmission of Nerve Impulse, Nerve Injuries, Wallerian Degeneration, Regeneration of Nerve Fibre after Injury, Structure, types and properties of Muscle Fibers, Action potential in different muscle types, Excitation-Contraction coupling, Mechanisms of muscle contraction, Structure and transmission across Neuro-Muscular Junction, Neuro-muscular blocking agents, Pathophysiology of Myasthenia gravis and Eaton-Lambert Syndrome, Muscular changes during exercise. Visceral smooth muscle, Multi unit smooth muscle, Process of excitation contraction coupling in smooth muscle, Characteristics – Plasticity, Latch Phenomenon. Applied aspects of Nerve Muscle Physiology.

Unit-IV - Renal System:

Structure and functions of nephron, Structure and functions of Juxta glomerular apparatus inclusive of Renin-Angiotensin-Aldosterone system (RAAS), Physiology of urine formation, Transport maximum and Renal threshold, GFR and factors affecting GFR, Mechanism of concentration and dilution of urine inclusive of counter current mechanism, Acidification of Urine, Fluid, Body fluid compartments, Water balance: regulation of fluid balance, electrolyte, Regulation of extracellular sodium and osmolarity, Concept of Renal Clearance, Acid base balance and its regulation, Innervations of bladder, micturition, cystometrogram, Bladder Dysfunction, Diuretics, Artificial kidney, Dialysis, Radiology & Renal imaging, Renal Failure & Renal Function Test, Renal Transplant. Applied aspects of Renal Physiology.

Unit-V - Digestive System:

General organization of GIT muscles, Innervation and Nerve Plexuses. Functions and composition of Salivary secretion, Gastric secretion, Pancreatic secretion, Intestinal secretion and Bile. Liver – structure and functions, liver function tests. Jaundice – types & laboratory investigations. Gastro-intestinal hormones-source, regulation and functions, Gastro-intestinal movements, G.I.T. reflexes. Vomiting and Diarrhea, Constipation. Dietary fibres. Digestion and absorption of carbohydrates, proteins, fats, vitamins, minerals and trace elements. Pathophysiology of peptic ulcer and diarrheal disease, Patho – Physiology Cause & Clinical Features of Acute Pancreatitis. Gall stones, Constipation, Steatorrhoea, Malabsorption Syndrome. Applied aspects of G.I.T.

Unit-VI - Endocrinology:

Types of hormones, mechanism of hormone action, Estimation and assessment of hormones. Physiological actions and effect of altered secretions of Pituitary Gland, Thyroid Gland, Parathyroid Gland, Adrenal Gland, Pancreas, Pineal and Hypothalamus. Disorders of Anterior & Posterior Pituitary, Thyroid Disorders, Thyroid function Tests, Anti-Thyroid drugs. Disorders of Parathyroid Gland, Calcium homeostasis, Bone Physiology, Applied-Metabolic Bone Diseases. Disorders of Adreno Cortical & medullary hormones. Applied aspects of Endocrine System.

Unit-VII - Reproductive System:

Sex differentiation & development functions of Testis & Ovary, Spermatogenesis & factors influencing it, Cryptorchidism, Chromosomal Abnormalities. Menstrual cycle-hormonal, uterine and ovarian changes, Menstrual Disorders, Physiological changes during pregnancy, foetoplacental Unit, Placental Hormones, parturition and lactation, Physiological basis for pubertal changes and menopause, Pubertal Disorders, Physiological effect of sex hormones, Tests of Pregnancy, Foetal and Neonatal Physiology, Physiology of Contraception and Contraceptive methods (male and female methods). Applied aspects of Reproductive System.

Unit-VIII - Cardiovascular System:

Structure and properties of cardiac muscle, Resting membrane & action potential, Excitation – contraction coupling phenomenon, Process of cardiac muscle contraction, Pacemaker potential, Conducting system of Heart, Mechanical events & pressure Volume changes during Cardiac

Cycle, Heart Sounds, Murmures, Valvular lesions. Frank Starling Law, Juglar Venouse Pulse Regulation of heart rate and blood pressure and cardiac output, Electrocardiogram-physiological basis and applications, Abnormal ECG, Abnormal ECG pattern in myocardial infarction, cardiac arrhythmias (briefly), Effect of changes in ECF K⁺, Ca⁺⁺ and Na⁺ Conduction defects - define 1^o, 2^o and 3^o block (mention), electrical axis of heart. Heartblocks and Patho-Physiology of Heart-failure. Haemodynamics of circulatory system, Regional circulation-coronary, Splanchnic, cerebral, capillary, foetal and pulmonary circulation. Physiology of shock, coronary artery disease, hypertension, Cardio-pulmonary resuscitation, Lymphatic circulation. Cardiovascular responses to exercise. Applied aspect of CVS.

Unit-IX - Respiratory System:

Functional anatomy of respiratory system, physical principles of gaseous exchange, Surfactants, Transport of respiratory gases, Mechanics of normal respiration, Pulmonary Volumes & Capacities, Pulmonary Ventilation, Ventilation-Perfusion Ratio, Regulation of respiration, Lung function test-clinical significance, Principles of artificial respiration, Oxygen Therapy, acclimatization at high altitude and decompression sickness. Hypoxia, Carbon monoxide poisoning, Oxygen Toxicity, cyanosis and asphyxia. Cardio-respiratory changes during exercise and Yoga, Pulmonary Abnormalities-Chronic Pulmonary Emphysema, Pneumonia, Atelectasis, Asthma, Blood Gas Analysis, Artificial Respiration, Effects of acceleratory forces on the body in Aviation & Space Physiology, Artificial Climate in the sealed Spacecraft, Weightlessness in Space, Physiological changes at High Altitude, Acute & Chronic Mountain Sickness, Pulmonary Oedema, Artificial ventilation & Cardiopulmonary Resuscitation, Hazards of Deep sea diving. Applied aspects of Respiratory System.

Unit-X - Central Nervous System:

Organization of nervous system. Functions, types and properties of synapse, Neurotransmitters, Spinal Cord Anatomy & Its Functions, Stretch reflexes & Tendon Jerks, Muscle spindle & Golgi Tendon Organ, Physiology of Brain Stem, Sensory receptors. Motor and sensory system and its applied aspects. Neurophysiology of Cortex, Basal Ganglia, Thalamus, Hypothalamus, Cerebellum, Limbic system and Reticular activating system. Parkinsonism. Mechanism of maintenance of tone, posture and equilibrium, Regulation of Posture & Movement, Vestibular apparatus, Higher functions - Memory, Learning inclusive of conditioned reflexes, Speech & its disorders, Sections of spinal cord, EEG and Sleep. Epilepsy Alzheimer's disease, Sleep Disorders, Neuro-physiology of Pain. C.S.F. Autonomic nervous system. Autonomic Function Test, Drugs Acting on ANS. Applied aspect of CNS.

Unit-XI - Special Senses:

Functional anatomy of eye - Physiology of image formation, photo transduction, colour vision, refractive errors, Visual reflexes-pupillary and light reflex, Visual pathways and Visual field defects. Phototransduction of Light, Functional anatomy of ear, Functions of External ear, Middle ear & Cochlea, properties of sound, mechanism of hearing and deafness, Hearing Test. Hearing Aids, Role of Inner ear in Balance & Equilibrium. Perception of smell and taste sensation, pathways and its applied aspects. Auditory & visual evoked potential. Applied aspect of Ear and Eye Physiology.

Unit-XII – Environmental Physiology:

Mechanism of temperature regulation, Adaptation to altered temperature (heat and cold), Mechanism of fever, cold injuries and heat stroke. Physiological Changes to Adaptations in various environments.

Unit-XIII - Physiology of Sports, Exercise, Yoga and Meditation:

Cardio-respiratory and metabolic adjustments, Physiological effects of yoga and meditation.

Unit-XIV - Physiology of Ageing:

Physiological and Psychological changes of ageing, theories of ageing and Prevention of ageing.

Unit XV- History and Recent Advances in Physiology:

Contribution of Physiologist in development and evolution of newer techniques and progress in field of Physiology.

Pattern of Question Papers:

1. Objective Type Paper
2. Maximum Marks: 180
3. Number of Questions: 180
4. Duration of Paper: Three Hours
5. All Questions carry equal marks
6. Medium of Screening Test: English
7. There will be Negative Marking
(1/3 part of the mark(s) of each question will be deducted for each wrong answer)