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| **Topic** | |  | | --- | | **Must know** | | |  | | --- | | **Desirable to know** | | |  | | --- | | **Nice to know** | |
| **General Physiology** | 1. Describe the structure and  functions of a mammalian cell | 1. Describe apoptosis –  programmed cell death | 1.Enumerate the causes  of positive and negative  water balance in the  body |
| 2. Describe and discuss the  principles of homeostasis |  |  |
| 3. Describe the concept of  pH & Buffer systems in  the body |  |  |
| 4. Describe intercellular  communication |  |  |
| 5. Describe and discuss transport  mechanisms across cell  membranes |  |  |
| 6. Describe the fluid compartments  of the body, their ionic  composition & measurements |  |  |
| 7. Describe and discuss the  molecular basis of resting  membrane potential and action  potential in excitable tissue |  |  |
| **Haematology** | 1.Describe the composition and  functions of blood components | 1. Describe the indications and hazards of blood transfusion | 1. Describe Blood banking |
| 2.Discuss the  origin, forms, variations  and functions of  plasma proteins | 2. Describe the development of immunity and its regulation |  |
| 3.Describe and discuss the synthesis, functions and fate of Haemoglobin. Describe the variants of Haemoglobin. |  |  |
| 4. Describe Erythropoiesis: stages, events and its regulation |  |  |
| 5. Describe different types of anaemias & Jaundice |  |  |
| 6. Describe WBC formation (granulopoiesis) and its regulation |  |  |
| 7. Describe the formation of platelets, functions and variations. |  |  |
| 8. Describe the physiological basis of hemostasis and anticoagulants. |  |  |
| 9.Describe bleeding & clotting disorders (Hemophilia, purpura) |  |  |
| 10.Describe different blood groups and discuss the clinical importance of blood grouping, |  |  |
| 11.Define and classify  different types of  immunity. |  |  |
| 12.Describe the types of hypersensitivity reactions with examples |  |  |
| **Topic** | |  | | --- | | **Must know** | | |  | | --- | | **Desirable to know** | | |  | | --- | | **Nice to know** | |
| **Nerve muscle Physiology** | 1. Describe the structure and  functions of a neuron and  neuroglia | 1. Discuss Nerve Growth  factor & other growth  factors/cytokines | 1.Describe the Neuro-muscular junction in smooth muscles |
| 2. Describe action potential and its  properties | 2. Describe Henneman ‘s  Size principle |  |
| 3. Describe Strength-duration curve | 3. Describe Myopathies  and Muscular  dsytrophies |  |
| 4. Describe the types, functions &  properties of nerve fibers,  Mixed nerves and  Compound action potential | 4. Needle and Surface  EMG |  |
| 5. Describe the degeneration and  regeneration in peripheral nerves |  |  |
| 6. Describe the structure of neuro-  muscular junction and  transmission of impulses.  Describe the pathophysiology of  Myasthenia gravis |  |  |
| 7. Discuss the action of neuro-  muscular blocking agents |  |  |
| 8. Describe the structure of  different types of muscle fibers |  |  |
| 9. Describe the molecular basis of  muscle contraction in skeletal  and in smooth muscles |  |  |
| 10. Describe the mode of muscle  contraction (isometric and  isotonic). Explain energy  source and muscle metabolism.  Explain Mechanical properties of  skeletal muscle. |  |  |
| 11. Explain the gradation of  muscular activity, slow  oxidative and fast glycolytic  muscle fibers, Motor units and  their properties. |  |  |
| 12. Compare and contrast the  characteristic features of  skeletal, cardiac and smooth  muscle fibers |  |  |
| 13. Describe Electromyography,  Concept of recruitment of  motor units (size principle) |  |  |
| **Gastro-intestinal Physiology** | 1.Describe the structure and  functions of digestive system | 1.Describe Gastric  function tests | 1. Describe Gut-Brain  Axis |
| 2. Describe the physiology of  salivary secretions: composition,  mechanism of secretion,  functions, and regulation,  Explain Deglutition reflex and  the applied aspects. | 2. Describe Physiology of  vomiting |  |
| 3. Describe the physiology of  gastric secretions: composition,  mechanism of secretion,  functions, and regulation. | 3. Describe Pancreatic  function tests |  |
| 4. Physiology of gastric motility  and the applied aspects | 4. Dietary fibers |  |
| 5. Discuss the physiological  aspects of peptic ulcer. | 5. Describe the source of  GIT hormones, their  regulation and  functions |  |
| 6. Describe the physiology of  pancreatic secretions:  composition, mechanism of  secretion, functions, and  regulation and Applied aspects. | 6. Describe the nutritional  principles &  energy metabolism |  |
| 7. Describe & discuss the structure  and functions of liver and gall  bladder and the applied aspects |  |  |
| 8. Describe the physiology of  intestinal secretions:  composition, mechanism of  secretion, functions, and  regulation and Applied aspects |  |  |
| 9. Describe Intestinal movements,  Applied aspects and Defaecation  reflex |  |  |
| 10. Describe the physiology of  digestion and absorption of  nutrients |  |  |
| **Cardio-vascular Physiology** | 1. Describe the functional anatomy of heart including chambers, pacemaker tissue, conducting system and Heart sounds | 1. Describe abnormal ECG,  arrythmias, heart block  and myocardial infarction | 1. Describe Heart murmurs |
| 2. Describe the properties of cardiac  muscle including morphology,  electrical, mechanical and  metabolic functions | 2. Describe cerebral,  capillary, skin,  pulmonary, splanchnic  and lymphatic circulation. | 2. Describe and foetal and  neonatal circulation. |
| 3. Describe origin and conduction of  cardiac impulse | 3. Describe the cardio-  vascular adjustments to  exercise. | 3. Describe Valvular heart  diseases |
| 4. Describe the physiology of  Electrocardiogram (E.C.G), its  applications and the cardiac axis. | 4. Describe the  pathophysiology of  syncope and heart failure |  |
| 5. Discuss cardiac cycle : phases and  the pressure-volume changes. |  |  |
| 6. Describe and discuss general  principles of Haemodynamics of  circulatory system |  |  |
| 7. Describe and discuss local and  systemic cardiovascular regulatory  mechanisms |  |  |
| 8. Describe the factors affecting heart rate and its regulation. |  |  |
| 9. Describe Cardiac-output, factors  affecting cardiac-output, methods  of measurement and its  regulation. |  |  |
| 10. Describe arterial blood pressure  and its regulation |  |  |
| 11. Describe coronary circulation |  |  |
| 12. Describe Circulatory shock:  types and pathophysiology. |  |  |
| **Respiratory Physiology** | 1. Describe the functional anatomy  of respiratory tract | 1. Compare and contrast  Obstructive and  Restrictive Respiratory  diseases | 1.Discuss the Principle of  whole-body  Plethysmography |
| 2. Describe the mechanics of normal  respiration, pressure changes  during ventilation, lung volume  and capacities, alveolar surface  tension, compliance, airway  resistance, ventilation,  ventilation-perfusion (V/P) ratio,  diffusion capacity of lungs. | 2.Describe regional  ventilation and perfusion  in the Lungs | 2.Describe Dynamic lung  volume and capacities |
| 3. Describe Dead space and its  estimation | 3.Describe Diffusion and  Perfusion limitation of  gas transport | 3.Describe the methods of  measurement of  Functional residual  capacity |
| 4. Describe the functions and  importance of Pulmonary  circulation | 4.Describe Respiratory  abnormalities (Asphyxia,  Drowning, Periodic  breathing) | 4.Discuss the concept of  V/Q mismatch |
| 5. Describe and discuss the transport  of respiratory gases: Oxygen and  Carbon dioxide, Oxygen-Hb  dissociation curve | 5.Discuss the concept of  Work of Breathing |
| 6. Describe and discuss the  physiology of high altitude and  deep-sea diving | 6.Describe Carbon mono-  oxide poisoning | 6.Describe and discuss  Pulmonary function tests:  significance, indications  and classification. |
| 7. Describe Neural and Chemical  Regulation of Respiration,  Central and Peripheral  chemoreceptors | 7.Describe the physiology  of Breaking point |  |
| 8. Describe different types of  hypoxia | 8.Discuss the effects of  exercise on Respiration |  |
| 9.Describe and discuss the  principles of artificial  respiration, oxygen  therapy. |  |
| 10.Describe Non-  Respiratory functions of  lung |  |
| 11.Discuss Pulmonary  stretch receptors |  |
| **Renal Physiology** | 1.Describe structure and  function of kidney | 1. Tubular maximum for  glucose and renal splay, | 1.Describe artificial kidney |
| 2.Describe the structure and functions of juxta-glomerular apparatus and role of renin-angiotensin system | 2. Aquaporins in kidneys | 2. Glycosuria, Bartter’s syndrome, Liddle’s syndrome, Gitelman syndrome |
| 3.Describe the mechanism of urine formation involving processes of filtration, tubular reabsorption & secretion; concentration and diluting mechanism (counter current mechanism), | 3.Role of urea in counter  current mechanism |  |
| 4. Describe the mechanism  of water reabsorption in  collecting tubules | 4.Measurement of renal  blood flow | 4.Fanconi syndrome, Renal tubular acidosis |
| 5. Discuss GFR : factors affecting GFR, its regulation and measurement (renal clearance) | 5.Hormonal factors regulating NaCl and water reabsorption | 5.Dialysis, Renal transplantation |
| 6.Describe Regulation of renal blood flow |  |
| 6.Describe & discuss the  significance & implication  of Renal clearance | 7.Urinary buffer systems |  |
| 7. Describe the renal  regulation of fluid and  electrolytes  (Tubuloglomerular  feedback mechanism,  Glomerulotubular balance) | 8. Bladder dysfunctions  (atonic bladder,  automatic  bladder) |  |
| 8. Describe Acidification of  urine | 9. Definition, causes and  features of acute and  chronic renal failure |  |
| 9.Describe the innervations  of urinary bladder,  physiology of micturition  and its abnormalities |  |  |
| 10. Describe & discuss Renal  Function Tests |  |  |
| 11. Describe cystometry and  discuss the normal  cystometrogram |  |  |
| **Endocrine Physiology** | 1.General principles of Endocrine  system: receptors, mechanism of  action and regulation of hormone  secretion | 1.Describe function tests: Thyroid gland; Adrenal cortex, Adrenal medulla and pancreas | 1. New advances in Endocrine physiology |
| 2. Describe the endocrine functions  of Hypothalamus | 2.Describe the metabolic and endocrine consequences of obesity & metabolic syndrome. |  |
| 3.Describe the synthesis, secretion,  transport, physiological actions,  regulation and effect of altered  (hypo and hyper) secretion of  pituitary gland, thyroid gland,  parathyroid gland, adrenal gland,  pancreas and hypothalamus | 3. Describe & differentiate the mechanism of action of steroid, protein and amine hormones |  |
| 4.Describe the physiology of bone and calcium metabolism |  |  |
| 5.Describe the physiology of Thymus & Pineal Gland |  |  |
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| **Topic** | |  | | --- | | **Must know** | | |  | | --- | | **Desirable to know** | | |  | | --- | | **Nice to know** | |
| **Reproductive Physiology** | 1.Describe and discuss sex determination; sex differentiation | 1. Describe Testicular abnormalities (cryptorchidism) | 1.Abnormities  of sex  differentiation |
| 2.Describe puberty: onset, progression, stages; early and delayed puberty | 2.Discuss causes of male hypogonadism | 2.Treatment modalities of pre- menopausal and post-menopausal syndrome |
| 3.Describe male reproductive system: functions of testis and control of spermatogenesis & factors affecting it | 3.Indicator of ovulation  Definition of menstrual cycle Disorders (Amenorrhea, hypomenorrhea, oligomenorrhea, dysmenorrhea, menorrhagia, metrorrhagia, polymenorrhea) | 3.McCune- Albright syndrome, Kallmann’s syndrome |
| 4 Describe hormonal  regulation of  testicular functions | 4.Describe and discuss the effects of removal of gonads on physiological functions. | 4.Describe and discuss the physiology of parturition |
| 5. Describe female reproductive system:  (a) functions of ovary (oogenesis) and its regulation;  (b) menstrual cycle - hormonal, uterine and ovarian changes |  | 5.Role of IVF in managing a case of infertility. |
| 6.Discuss the hormonal changes and their effects during perimenopause and menopause |  |  |
| 7.Describe and discuss the physiological effects of sex hormones |  |  |
| 8.Enumerate the contraceptive methods for male and female. | 5.Discuss advantages & disadvantages of different types of contraceptive methods |  |
|  | 9.Describe and discuss the physiological changes associated with pregnancy | 6.Control of lactogenesis and lactation |  |
|  | 10.Discuss the physiological basis of various pregnancy tests |  |  |
|  | 11.Discuss the common causes of infertility in male and female |  |  |
| **Nervous system** | 1. Describe and discuss the organization of nervous system | 1.Describe Blood brain  barrier | 1. Describe Physiology of  addiction |
| 2. Describe and discuss the functions and properties of synapse and transmitter substances | 2. Describe Endogenous  regulatory mechanisms  for Pain control | 2. Discuss causes, stages  and features of  Hemiplegia |
| 3. Describe properties of reflexes, structure and functions of Muscle spindle | 3. Describe Lesions of  Spinal cord | 3. Describe Principles of Polysomnography, Sleep Disorders |
| 4. Describe Sensory receptors, Functional organization of sensory pathways | 4. Describe the Localization  of the level of lesion in  neurological diseases | 4. Describe Central mechanisms of vision and visual perception |
| 5.Describe and discuss somatic sensations, sensory tracts, somatosensory cortex | 5. Describe the features of  Cerebral blood flow | 5. Describe Theories of the emotion, Role of Amygdala |
| 6. Describe the Physiology of pain | 6. Describe neurophysiological basis of EEG and abnormal EEG waveforms |  |
| 7.Describe and discuss motor tracts, mechanism of maintenance of tone, control of body movements, posture and equilibrium & vestibular apparatus | 7. Describe layers of retina. |  |
| 8. Describe and discuss structure and functions of reticular activating system, autonomic nervous system (ANS) | 8. Describe Electroretinography |  |
| 9. Describe and discuss Spinal cord and its functions. | 9. Describe types of Eye movements |  |
| 10. Describe and discuss functions of cerebral cortex, basal ganglia, thalamus, hypothalamus, cerebellum and limbic system and their abnormalities | 10. Describe Vestibulo-ocular reflex |  |
| 11. Describe formation and functions of Cerebrospinal  fluid | 11. Describe Electrophysiology of Hearing |  |
| 12. Describe normal EEG (Electroencephalography) waves and their clinical importance | 12. Describe and discuss patho-physiology of altered smell and taste sensation |  |
| 13. Describe and discuss behavioural and EEG characteristics during sleep and mechanism responsible for its production | 13. Describe the formation and flow of intra-ocular fluid, intra-ocular pressure and Glaucoma |  |
| 14. Describe and discuss the physiological basis of memory, learning and speech, aphasias. | 14. Describe and discuss auditory & visual evoked potentials |  |
| 15.Describe Visual pathways, Visual field defects, Visual acuity Common defects of the optical system of the eye and its correction by types of lens |  |  |
| 16.Visual reflexes: Pupillary light reflex, accommodation reflex |  |  |
| 17.Functions of retina: Rods & Cones photoreceptors, Phototransduction, Retinal ganglion cells |  |  |
| 18. Describe Photochemistry of vision, Rhodopsin cycle, Dark and light adaptation. |  |  |
| 19. Describe Colour vision, Colour blindness |  |  |
| 20. Describe and discuss functional anatomy of ear |  |  |
| 21. Describe auditory pathways & physiology of hearing (role of middle and inner ear) |  |  |
| 22. Describe Organ of Corti |  |  |
| 23. Describe the theories for pitch discrimination |  |  |
| 24. Describe and discuss pathophysiology of deafness. Describe hearing tests |
| 25. Describe and discuss perception of smell |
| 26.Describe and discuss perception of taste sensation |
| 27. Describe Taste buds |
| **Environmental Physiology/Integrated Physiology** | 1.Describe Regulation of Body temperature, Basal metabolic rate, Concept of Energy balance | 1.Describe Fever, Heat stroke, exercise hyperthermia | 1.Pathophysiology of Fever, hyperthermia |
| 2.Describe adaptations to hot and cold environmental exposure | 2.Describe Acute and Chronic mountain Sickness | 2.Describe and discuss physiological consequences of sedentary lifestyle |
| 3.Describe Physiological responses to high attitude | 3.Describe Decompression sickness | 3.Describe and discuss physiology of aging; free radicals and antioxidants |
| 4.Diving Physiology: Physiological responses to high atmospheric pressure | 4.Describe and discuss cardio-respiratory and metabolic adjustments during exercise; physical training effects | 4.Describe physiology of Infancy |
|  |  | 5.Interpret growth charts |
|  |  | 6.Discuss the concept, criteria for diagnosis of Brain death and its implications |
|  |  | 7.Discuss the physiological effects of meditation |

\*Terms and conditions

**Eligibility criteria for students appearing in M.B.B.S. Professional Exams:**

1. The M.B.B.S. students must obtain 80% attendance in aggregate with a minimum of 70% in each of the subjects before they are permitted to appear in the 1st Professional Examination.
2. The M.B.B.S students must obtain 50 % marks in aggregate with a minimum of 50% in each subject before they are permitted to appear in the 1st Professional examinations