Portal:Questions for Final Examination in Physiology (1LF, GM)

The cell

1. The cell (cell membrane, nucleus, organelles, function)
2. Cell membrane
3. Transport across cell membranes
4. Ion channels
5. The ionic basis of the resting potential
6. Ionic currents underlying the action potential
7. Neuromuscular transmission
8. Excitation-contraction coupling in skeletal muscle
9. Contraction in skeletal muscle
10. Contraction in smooth muscle
11. Cytoskeleton
12. Sensory transduction
13. Tissue maintenance

Body fluids

1. Body fluids
2. Homeostasis
3. Composition and functions of blood
4. Blood plasma
5. Organic and inorganic components of blood plasma
6. Plasmatic proteins
7. White blood cells
8. Granulocytes
9. Lymphocytes, lymphatic tissue
10. Monocyte-macrophage system
11. Thrombocytes
12. Red Blood Cells
13. Blood cell formation
14. Hemoglobin
15. Hemostasis
16. Hemocoagulation
17. Coagulation factors; fibrinolysis
18. Blood Groups
19. Buffer systems in blood
20. Mechanisms of innate immunity
21. Systems of acquired immunity
22. The cell mediated immunity
23. Defensive properties of neutrophils and monocyte-macrophages
24. Formation and function of antibodies

Blood circulation

1. Electrical activity of the heart
2. Conducting myocardial system
3. The ionic basis of the resting potential in the heart
4. Ionic currents underlying the cardiac action potential and pacemaker potential
5. The role of calcium in the cardiac muscle
6. Sequence of depolarization and repolarization of atria and ventricles
7. Origin of the electrocardiogram
8. Electrocardiographic recording
9. The normal electrocardiogram
10. Excitation-contraction coupling in cardiac muscle
11. Mechanical properties of the cardiac muscle
12. Events of the cardiac cycle
13. Myocardial work
14. Function of cardiac valves, heart sounds
15. Pressure, volume, and flow during the cardiac cycle
16. Cardiac output, regulation
17. Blood pressure in the heart, arteries, capillaries and veins
18. Blood pressure in the right heart and in pulmonary circulation

19. Arterial pressure pulse
20. Determinants of the arterial blood pressure
21. Control of vascular resistance
22. Arteriolar tone and range of vascular control
23. Function of the microvascular network
24. Exchange of materials in capillaries
25. Interstitial fluid and lymph
26. Venous return and its relation to cardiac output
27. Receptors in cardiovascular system
28. The baroreceptor regulation of the cardiovascular system
29. Cardiopulmonary receptors
30. Neural control of the cardiovascular functions
31. Control of the cardiac output
32. Control of the blood pressure
33. Control of the blood volume
34. Control of the regional blood flow
35. Intrinsic regulation of the cardiovascular system
36. Stroke volume - the length-tension relationship
37. Arterial pressure and stroke volume
38. Heart rate, stroke volume, cardiac output
39. Hormonal regulation of the cardiovascular system
40. Fetal and neonatal circulation
41. The coronary circulation
42. The circulation of the lungs
43. Cerebral circulation
44. Splanchnic circulation

The Respiratory System

1. Movements of the thoracic cage
2. Ventilation
3. Airways, the anatomical dead space, airway resistance
4. Lung volumes and capacities
5. Pleural and alveolar pressures
6. Lung compliance and elastance, surface tension
7. Work of breathing
8. Alveolar ventilation
9. Ventilation and perfusion in lungs
10. Alveolar and atmospheric air - composition
11. Exchange of gases in lungs and tissues
12. Diffusion and transport of respiratory gases
13. Transport of oxygen in blood
14. Transport of carbon dioxide in blood
15. Respiratory rhythmogenesis
16. Chemoreceptor control of respiration
17. Respiration in high altitudes
18. Respiratory reflexes
19. pH regulation in body fluids

The Digestive System

1. Motility of the gastrointestinal system
2. Chewing and swallowing, esophageal motility
3. Gastric motility
4. Intestinal motility, defecation
5. Cellular mechanism of secretion
6. Function of salivary glands
7. Gastric secretion
8. Pancreatic secretion
9. Secretory function of the liver
10. Intestinal secretion
11. Gastric digestion
12. Digestion in the small intestine
13. Digestion in the colon
14. Digestion and absorption of proteins
15. Digestion and absorption of carbohydrates
16. Digestion and absorption of lipids
17. Basic mechanisms of the intestinal transport
18. Water and electrolyte absorption
19. Absorption of vitamins

20. Functions of the liver
21. Metabolism of carbohydrates
22. Metabolism of proteins
23. Metabolism of lipids
24. Dietary balance
25. Temperature regulation

The excretory system

1. The physiology of the skin
2. Functional morphology of the kidney
3. Blood flow in the kidney, its regulation
4. Nephron, structure and function of its individual parts
5. Glomerular filtration, its regulation
6. Processing of the filtrate in the proximal and distal tubules
7. Renal mechanisms of the ion transport
8. Renal transport mechanisms of the organic compounds
9. Examinations of the renal function, clearance
10. Control of the renal functions
11. Control of extracellular fluid osmolality
12. Control of extracellular fluid volume, sodium and potassium balance
13. Body acid-base state and its regulation
14. Renal regulation of the acid-base balance
15. Micturition

The endocrine system

1. Mechanisms of cell signaling
2. Synthesis, release, disposal, and regulation of hormone secretion
3. Hormone action
4. The adrenocortical hormones
5. Growth hormone, growth factors, and control of the body growth
6. Regulation of the carbohydrate metabolism
7. Insulin secretion, action, and regulation
8. Hypothalamo-hypophyseal relations
9. The thyroid hormones secretion and its regulation
10. Thyroid hormones action
11. The adrenal medulla
12. Stress and emergency reaction
13. Glucocorticoids
14. Mineralocorticoids
15. Control of the calcium and phosphate balance
16. Hormones of the anterior pituitary
17. Secretion and physiological effects of catecholamines
18. Neurohypophyseal hormones
19. Biogenic peptides, neuropeptides, local chemical mediators
20. Endocrine and Biological Rhythms
21. Sexual differentiation
22. Reproductive and hormonal functions of the male
23. Reproductive and hormonal functions of the female
24. The ovarial cycle
25. Physiology of pregnancy
26. Functions of the placenta
27. Lactation
28. Fetal and neonatal physiology

Principles of neurophysiology

1. Structure and function of nerve cells
2. Membrane Potentials
3. Transformation of Synaptic Input into Action Potential
4. Action potentials and its propagation
5. Structure and function of axons, dendrites and dendritic spines
6. Structure and function of synapses
7. Synaptic Transmission
8. Postsynaptic potentials
9. Transmitters in the nervous system

10. Integration activity of neurons
11. Functions of the Neuronal Circuits
12. Reflex arc, classification of reflexes
13. Organization of inhibitory circuits
14. Milieu of the central nervous system
15. Glial cells, brain barrier systems

The motor system

1. Excitation-contraction coupling in the skeletal muscle
2. Neuromuscular junction and ion changes during the muscle contraction
3. Physiology of the muscle contraction, energy requirements
4. The neural control of movements
5. The peripheral motor control
6. Spinal reflexes
7. Muscle tone and its control
8. Motor functions of the spinal cord
9. Motor functions of the brain stem
10. Motor functions of the basal ganglia
11. Function of the cerebellum
12. Cortical control of motor functions

The autonomic nervous system

1. Physiology of the smooth muscle contraction
2. Control of the smooth muscle contraction
3. Characteristics of sympathetic and parasympathetic action
4. Autonomic innervation of various structures
5. The hypothalamic functions
6. Control of the food intake

The sensory physiology

1. Classification of Receptors
2. Signal transformation in receptor cells
3. Signal coding
4. Somatic sensations
5. Cutaneous receptors
6. Perception of pain
7. Function of the external and middle ear
8. Function of the cochlea
9. Processing of the auditory signal
10. The vestibular apparatus
11. The optics of the eye
12. The accessory eye organs
13. Function of the retina
14. Transmission and processing of the visual signal
15. The sense of taste
16. The sense of smell

Integrative function of the CNS

1. Function of the spinal cord
2. Thalamic functions
3. Function of the reticular system
4. Function of the limbic system
5. Function of the cerebral cortex
6. The association areas of the cerebral cortex
7. The dominance and specialization of the cerebral hemispheres
8. Intellectual functions of the brain, language
9. Mechanisms of the control of behavior
10. Mechanism of learning and memory
11. Waking and sleeping
12. Bioelectrical activity of the CNS