**Department of Physiology**

**Synopsis for the Final Exam in Physiology for Students in Pharmacy**
**Academic year 2019/2020**

1. Transport across the cellular membrane.
2. Mechanisms for intercellular communication.
3. Excitable membranes. Resting membrane potential.
4. Action potential. Refractory periods. Propagation of action potentials along the nerve fibres. Classification of nerve fibres.
5. Synaptic transmission in the chemical synapse. Postsynaptic potentials.
6. Postsynaptic membrane receptors (ionotropic and metabotropic). Neurotransmitters: classification and mechanism of action.
7. Physiology of skeletal muscle. Mechanism of muscle contraction. Types of muscle contraction.
8. Muscle energetics. Types of muscle fibres. Neuromuscular junction. Motor unit.
9. Physiology of smooth muscle. Electromechanical and pharmacomechanical coupling.
10. Blood: composition and functions. Blood plasma. Hemopoiesis.
11. White blood cells. Functions of leukocytes. Immunity.
12. Red blood cells. Functions of hemoglobin. Blood types.
13. Hemostasis. Blood coagulation. Fibrinolytic system. Anticoagulants and fibrinolytic substances.
14. Physiology of cardiac muscle. Conduction system. Electrocardiogram.
15. Cardiac cycle. Stroke volume and cardiac output. Regulation of cardiac function.
16. Circulation. Principles of hemodynamics. Factors, which determine arterial blood pressure.
17. Microcirculation. Blood flow in veins. Regulation of vascular tone.
18. Control of arterial pressure: short-term and long-term regulation.
19. Respiratory system: general overview. Mechanics of breathing. Lung volumes and capacities. Airway resistance. Control of bronchial tone.
20. Oxygen and carbon dioxide diffusion in the lungs and tissues. Oxygen and carbon dioxide transport in blood.
21. Regulation of respiration. Central and peripheral chemoreceptors.
22. Gastrointestinal system: general overview. Neural and hormonal regulation of gastrointestinal functions.
23. Motor activity in the various organs of the gastrointestinal tract. Neural and hormonal control of motor function.
24. Secretory activity of the gastrointestinal system: composition and functions of the various gastrointestinal juices. Neural and hormonal control of the gastrointestinal secretions.
25. Digestion and absorption of carbohydrates, proteins and lipids in the gastrointestinal system. Absorption of minerals, water and vitamins.
26. Liver functions.
27. Carbohydrate metabolism. Control of blood glucose level.
28. Protein and lipid metabolism. Regulation.
29. Energy metabolism. Basal metabolic rate.
30. General principles of nutrition. Essential nutrients. Physiological role of vitamins and minerals.

31. Body temperature: normal values. Body temperature regulation. Hyperthermia, hypothermia and fever.
32. The kidney: urine formation. Glomerular filtration. Renal clearance.
33. Renal tubular function. Excretion of exogenous substances. Regulation of tubular function. Concentration and dilution of urine. Urine composition.
34. Body fluids: volume and composition. Regulation of fluid-electrolyte homeostasis.
35. Acid-base balance in the body. Buffer systems. Respiratory and renal regulation of pH.
36. Endocrine system. Mechanism of action of hormones. Regulation of hormonal secretion.
37. Pituitary gland: adenohypophyseal hormones and posterior pituitary hormones.
38. Thyroid hormones: physiological effects and control of their secretion.
39. Adrenal cortical hormones: physiological effects and control of their secretion.
40. Hormones of the endocrine pancreas: physiological effects and control of their secretion.
41. Control of calcium-phosphate balance: parathormone, calcitonin and vitamin $D_3$.
42. Reproductive and hormonal functions of the male gonads.
43. Reproductive and hormonal functions of the female gonads. Pregnancy, childbirth and lactation.
44. General functions of the nervous system. Physiology of the neuron. Amplitude and frequency encoding of information.
45. Reflex activity of the nervous system. Neural networks. Types of inhibition in the central nervous system. Glia.
46. Sensory systems. General principles of information processing in the sensory systems.
47. Somatosensory system: tactile, proprioceptive, and thermal sensation.
48. Nociception. Types of pain. Antinociceptive system and pharmacological modulation of pain.
49. Physiology of the visual sensory system.
50. Physiology of the auditory sensory system.
51. Physiology of the olfactory and gustatory sensory system.
52. General overview of the regulation of movement. Spinal mechanisms for regulation of movement.
53. Regulation of posture and equilibrium: the role of the vestibulary apparatus.
54. Regulation of voluntary movement: role of the motor cortex, basal ganglia and the cerebellum.
55. Brain bioelectrical activity: electroencephalogram. Reticular activating system and maintenance of the awake state.
56. Physiology of sleep. Control of the sleep-wake cycle. Biological rhythms.
57. Autonomic nervous system. Sympathetic and parasympathetic division. Neurotransmitters and receptors in the autonomic synapses.
58. Autonomic control of the visceral organs. Autonomic reflexes. Adrenal medulla. Autonomic integrative centers: hypothalamus and limbic system.
59. Higher functions of the nervous system. Neurophysiological basis of learning, memory and language.

Signed by the Head of the Department of Physiology,
Prof. R. Girchev, MD, PhD, DSc