

2023/2024 Medical Physiology end semester exam topics

1. Principles of control theory.
2. Passive transport mechanisms of the cell membrane.
3. Active transport mechanisms of the cell membrane.
4. The resting membrane potential.
5. The electric properties of neuronal membranes.
6. The axonal propagation of the action potential. Axon classification.
7. Receptors, signal transduction mechanisms.
8. Fluid compartments of the body. The blood plasma.
9. The general features of red blood cells.
10. Erythropoiesis.
11. Hemoglobin degradation, bilirubin metabolism.
12. The physiology of white blood cells.
13. The ABO and Rh blood groups.
14. Primary hemostasis.
15. Secondary hemostasis: blood clotting (coagulation).
16. Fibrinolysis. Inhibition of clotting in vitro and in vivo.
17. Neurotransmission.
18. The peripheral nervous system: primary sensory neurons.
19. The parasympathetic division of the autonomic nervous system.
20. The sympathetic division of the autonomic nervous system. The adrenal medulla.
21. The peripheral nervous system: motor neurons, neuromuscular junction.
22. Skeletal muscle: structure, electromechanical coupling, the biochemistry of contraction.
23. Skeletal muscle: the mechanics and energetics of muscle contraction.
24. Smooth muscle physiology.
25. Respiratory mechanics 1: Static mechanics of the lung and the chest.
26. Respiratory mechanics 2: Ventilation.
27. Pulmonary gas exchange.
28. Oxygen transport in blood.
29. Carbon-dioxide transport in blood.
30. The rhythmogenesis of breathing, ventilatory reflexes elicited from the lung.
31. The chemical control of ventilation.
32. Biology of the airways. Metabolic and endocrine functions of the lung.
33. Hemodynamics: basic biophysical principles.
34. Hemorheology.
35. Cardiac muscle: structural and functional characterization, regulation of contractile force.
36. Cardiac cycle. The jugular pulse.
37. Preload and afterload, the Frank-Starling law of the heart.
38. Cardiac muscle: cellular electrophysiology.
39. Electrocardiography, other methods for the assessment of cardiac function.
40. Cardiac work and metabolism. The coronary circulation.
41. Hemodynamics: The functional categorization of blood vessels.
42. The function of the aorta and the arteries.
43. The microcirculation: capillary solute exchange and fluid dynamics.
44. The microcirculation: lymphatic circulation and edema formation.
45. The characteristics of the venous circulation.
46. The regulation of local blood flow.
47. Factors determining cardiac output, the Guyton diagram.
48. Short-term control mechanisms of arterial blood pressure.
49. Long-term control of arterial blood pressure.
50. Pulmonary circulation.

51. Skeletal muscle blood flow, the cardiovascular adaptation to work and exercise.
52. Glomerular filtration: the factors determining the volume and composition of filtrate
53. Renal blood flow. The regulation of GFR and RBF.
54. The general features of epithelial transport mechanisms in the renal tubuli.
55. Tubular reabsorption and secretion. Renal clearance.
56. Renal tubular transport of organic solutes: glucose, amino acids, ketone bodies, proteins, uric acid, urea, UBG.
57. Renal tubular transport of NaCl and water, production of the medullary osmotic gradient.
58. The physiology of the urinary tract. Micturition.