

## Physiotherapy: spring semester 2015

### Part A

1. Structure and function of cell membranes and cell organelles
2. Active and passive transport across membranes. Co-transport
3. Compartmentalization of body fluids; differences between intra- and extracellular fluids
4. Ion channels; Intercellular communication
5. Functions of the nerve cell
6. Functional morphology of synapses
7. Generation of resting membrane potential
8. Action potential
9. Molecular mechanism of muscle contraction
10. Electrical and mechanical behaviour of muscle (skeletal, smooth and heart muscle)
11. Neuromuscular junction
12. Blood composition
13. Red blood cell. Haemolysis.
14. Haemoglobin and its derivatives
15. Suspension stability of RBC (sedimentation rate)
16. Immune system
17. Blood groups antigens (ABO group, Rh group)
18. Function of platelets
19. Hemocoagulation, anticlotting mechanism
20. Second messengers

### Part B

1. Hypoxia
2. Lung ventilation, volumes, measurement. Dead space.
3. Intrapulmonary and pleural pressure. Pneumothorax.
4. Composition of atmospheric and alveolar air.
5. Transport of O<sub>2</sub>. Oxygen – haemoglobin dissociation curve. Transport of CO<sub>2</sub>
6. Regulation of ventilation
7. Functional morphology of nephron
8. Clearance; Glomerular filtration
9. Function of renal tubules
10. Transport of glucose in kidney
11. Counter-current system.
12. Acid-base balance
13. Formation, composition and functions of saliva
14. Gastric production of HCl, its regulation
15. Functions of the stomach
16. Motility of gastrointestinal tract
17. Composition, function and regulation of pancreatic juice secretion
18. Liver functions
19. Digestion and resorption in the small intestine
20. Functions of colon
21. Conduction system of the heart
22. Non-invasive assessment of blood pressure
23. ECG, Estimation of electric axis of the heart
24. Heart as a pump - cardiac cycle - pressure-volume loop; stroke volume and cardiac output
25. Local regulation of blood flow. Special regions of circulation (skeletal, lung, coronary, skin, cerebral)
26. Regulation of cardiac output – Starling principle
27. Periphery resistance
28. Blood pressure. Hypertension.
29. Blood pressure regulation (e.g. orthostatic reaction)
30. Micro-circulation. Lymphatic system

### Part C

1. Caloric content of food. Direct calorimetry. Indirect calorimetry.
2. Vitamins – overview
3. Energy balance. Basal metabolism
4. Cardiopulmonary response to exercise
5. Physiological significance of positive and negative feed-back
6. Physiological regulations (overview)
7. Homeostasis
8. Metabolism of iron
9. Thermoregulation
10. Sympathetic nervous system (overview)
11. Parasympathetic nervous system (overview)
12. Placental and foetal circulation. Circulatory adjustments at birth
13. Autocrine, paracrine, endocrine regulation
14. General principles of endocrine regulation
15. Hypothalamo-pituitary system
16. Hormones of anterior pituitary gland
17. Formation and secretion of posterior pituitary hormones
18. Effects of thyroid hormones
19. Endocrine pancreas
20. Hyper- and hypoglycaemia. Diabetes mellitus.
21. Regulation of glycemia
22. Adrenal cortex. Functions, malfunctions.
23. Adrenal medulla. Synthesis of catecholamines.
24. Parathormone, vitamin D and calcitonin
25. Antidiuretic hormone. Natriuretic peptides
26. Physiology of reproductive system.
27. Physiology of pregnancy
28. Proprioceptive reflex – reflex arch, examples
29. Exteroceptive reflex – reflex arch, examples
30. Physiology of the sensor systems (eg. vision, hearing)