**KEYPOINTS FOR MOLECULAR BASIS OF METABOLISM ENTRANCE TESTS**

**Laboratory 1. QUALITATIVE ANALYSIS OF AMINO ACIDS AND PROTEINS**

• Principle of chemical reaction performed exercises: reaction with ninhydrin, xanthoprotein, Adamkiewicz-Hopkins reaction, Sakaguchi reaction, cystine reaction, biuret reaction, denaturation of proteins, protein precipitation reactions, amphoteric properties of proteins

• Formulas, names and characteristics of amino acids included in proteins.

• Classification of amino acids according to the structure and properties of their side chains.

• Structure, significance and properties of peptide bond.

• Drawing short peptides, including glutathione.

• Examples of physiological peptides: glutathione, peptide hormones.

**Laboratory 2. QUANTITATIVE ANALYSIS OF PROTEINS**

• Principle of the performed exercises: determination of protein concentration using the biuret method and Lowry's method.

• The concept of calibration curve and calibration factor.

• Conversion of the protein concentration in the diluted solution.

• Proteins - classification, structure characteristics of I, II, III and IV.

• Characteristics of α-helix and β-harmonica.

• Features of the structure of I, II, III and IV collagen, myoglobin, hemoglobin, prions, immunoglobulin

**Laboratory 3. QUALITATIVE AND QUANTITATIVE ANALYSIS OF BLOOD COMPONENTS**

• Principle of the reaction of the performed exercises: benzidine reaction, quantitative determination of Hb by the cyano-methemoglobin method, detection of iron in hemoglobin, preparation of acid and alkaline hematin, detection of blood lipids, determination of chloride ions in blood serum

• The mechanism of combining oxygen with myoglobin and hemoglobin.

• Effect of various factors on oxygen binding of hemoglobin.

• Types and derivatives of hemoglobin.

• Bohr and Halden effect.

• Characteristics and functions of blood plasma proteins.

**Laboratory 4. ISOLATION OF PROTEIN FROM BIOLOGICAL MATERIAL**

• The principle of isolation and purification of yeast invertase.

• Isolation and purification of a protein preparation - basic methods.

• The concept of specific activity of an enzyme preparation.

• Enzyme - structure, features, methods of forming enzyme-substrate complexes.

• Units of enzymatic activity.

• Enzyme classification.

**Laboratory 5. ENZYMATIC KINETICS**

• Kinetics and enzymatic reaction mechanism.

• Determination of Km and Vmax from the Michaelis-Menten curve and Lineweaver-Burke chart.

• Regulation of enzyme activity.

• Types of inhibition and the effect of competitive and non-competitive inhibitors on Km and Vmax values ​​(Michaelis-Menten and Lineweaver-Burke graphs).

**Laboratory 6. QUALITATIVE AND QUANTITATIVE ANALYSIS OF SELECTED VITAMINS**

• Principle of chemical reaction performed exercises: Detection of vitamins A, D, C, colorimetric determination of vitamin C concentration, determination of vitamin C concentration in selected biological material.

• Patterns of vitamins soluble in water and fats, the role they play in the human body

• Hypo- and hypervitaminosis.

• Coenzyme names and formulas and functions of coenzymes in enzymatic reactions.

**Laboratory 7. SELECTED PROPERTIES OF DIGESTIVE JUICES**

• Principle of chemical reaction performed exercises: Detection of pancreatic amylase, trypsin, lipase. Detection of protein and mucin in saliva. Detection of sugar residue in mucin, determination of gastric acidity, detection of bile acids.

• Enzymes involved in the digestion of carbohydrates, lipids, proteins and nucleic acids.

• Composition and role of digestive juices.

• Synthesis and role of hydrochloric acid.

• The concept of gastric acidity: total, free, related.

• The role of bile acids in the digestion process.

• Primary and secondary bile acids.