MEDICAL UNIVERSITY - PLEVEN
FACULTY OF MEDICINE

DISTANCE LEARNING CENTRE

DEVISION OF PHYSICS AND BIOPHYSICS

PRACTICAL EXERCISE – THESES

FOR DISTANCE LEARNING IN BIOPHYSICS

ENGLISH MEDIUM COURSE OF TRAINING

SPECIALTY OF MEDICINE

ACADEMIC DEGREE MASTER PROFESSIONAL QUALIFICATION

DOCTOR OF MEDICINE

FOR MEDICAL STUDENTS

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PLEVEN, 2015

PRACTICAL EXERSICES – THESES

1. Model membranes: preparation of hemosomes.

To explain differences among plane and spherical artificial membranes, to know how to entrap different substances into liposomes, to state model membrane applications.

2. Thin-layer chromatography: qualitative analysis of membrane lipids.

To describe the molecular structure of phospholipids and sphingolipids, to know the principle of the method of thin-layer chromatographty, to define R_f value and to know how to find it, to explain the procedure of thin layer chromatography.

3. Molecular (size exclusion) chromatography: determination of molecular masses.

To know the principle of separation of substances by gel-chromatography, to explain the main components of a gel chromatography system, to explain how to determine the molecular weights of separated fractions.

4. Biophysics of hemodialysis: transport of urea across a semipermeable membrane

To know factors the velocity of hemodialysis depend on, to know the meaning of the time constant $t_{0.5}$, to know how to find the value of the constant experimentally

5. Transport across membranes: osmosis.

To define osmosis, to know factors the osmotic pressure depend on, to define oncotic pressure and explain the role of osmosis for supporting water exchange between blood and lymph.

6. A kinetic study of acid-catalysed sucrose hydrolysis.

To know how to determine the angle of rotation of an optically active substance by a polarimeter of Loran, to can express the rate

constant of reaction of hydrolysis of sucrose by the angle of rotation, to explain usage of polarimetry for studying structural conformation of biomolecules

7. Test - part I.

It includes experiment performance, theory test and interview.

8. Diffusion of electrolytes: measuring diffusion potential.

To define diffusion potential, to explain the change in diffusion potential with time, to derive Henderson's equation, to know how to measure diffusion potential.

9. Microelectrophoresis: determination of electrokinetic (zeta) potential.

To know the processes participating in the formation of surface electrical charge, to define "potential-forming" ions, to define double electric layer, sliding plane, thickness of double electric layer and ς-potential.

10. Paper electrophoresis: separation of proteins.

To define electrophoresis and electrophoretic mobility, to explain how to evaluate quantitatively the electrophoregram, to know what is the diagnostic significance of the method of electrophoretic division of proteins.

11. Absorption spectrophotometry: determination of concentration of solutions.

To state the law of Lambert-Bouguer; to know the meaning of extinction, to can describe the block-diagram of one and two-beam spectrophotometers, to know how to determine the unknown concentration of solutions. **Studying acid haemolysis of erythrocytes.** To draw acid erythrogram of human erythrocytes.

12. Copper-induced superoxide production in erythrocytes.

To demonstrate the generation of superoxide during copper ions-erythrocyte membranes interaction, to describe the method for measuring superoxide, to know the mechanism of copper ions toxicity.

13. Lipid peroxidation: measuring malonedialdehyde concentration.

To explain the process of initiation of lipid peroxidation, to know the main stages of lipid peroxidation, to know what is MDA, to describe the method for quantitative evaluation of MDA.

14. Test –II part.

It includes experiment performance, theory test and interview.

15. Seminar