QUESTIONS OF COLLOQIUM No.1

«PHYSICS, MATHEMATICS» Anglophone Students of the 1 Course Specialty «GENERAL MEDICINE» 1 term of 2024/2025

- 1. Mechanical deformation and its types. Examples of different deformation types in human body. Normal stress and strain. Hooke's Law for Elastic deformation. Elasticity modulus. Poisson's ratio and its importance in medicine.
- **2.** Stress-Strain diagram. Elasticity Limit. Tensile Strength. Features of mechanical properties of biological tissues. Stress Relaxation and Creep.
- **3.** Viscosity of fluids. Newton's equation. Newtonian and non-Newtonian fluids. Human blood as non-Newtonian fluid. Dynamic and kinematic viscosity.
- **4.** Types of fluid flow. Reynolds number. Poiseuille's formula. Hydraulic resistance. The role of viscosity parameters, hydraulic resistance and types of fluid flow in medicine.
- **5.** Fluid surface tension. Hydrophilic and hydrophobic fluids. Adhesion. Wetting. Edge (contact) wetting angle.
- 6. Capillary phenomena, their role in medicine. Droplet method for surface tension measurement.
- **7.** Statics. Equilibrium of a rigid body. Force arm, lever arm. Types of Levers: first class, second class and third class. Examples of levers in the human body.
- **8.** Mechanical oscillations. Fundamental characteristics of oscillatory processes. Oscillation kinds and examples in human body.
- **9.** Mechanical waves: types, fundamental characteristics, wave frequency ranges. Equation of a plane wave.
- **10.** Sound. Physical (objective) characteristics of sound: frequency, intensity, intensity level, sound pressure. Relationship between intensity and sound pressure. Acoustic spectrum.
- **11.** Characteristics of auditory sensation (subjective sound characteristics) and their relationship with the objective sound characteristics. Weber-Fechner law.
- **12.** Physical fundamentals of sonic diagnostic methods in medicine: auscultation, percussion, phonocardiography and audiometry.
- **13.** Acoustic impedance. Penetration coefficient. Rayleigh equation. Doppler effect and its application in medicine.
- 14. Ultrasound. Sources and detectors of ultrasound.
- **15.** Ultrasonic wave properties, ultrasound propagation features.
- **16.** Action of ultrasound on substance and biological tissues. Application of ultrasound in medicine for diagnostic and treatment of diseases.

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