

1. Deformation, types of deformation.
2. Hooke's law. Young's modulus. Poisson's ratio.
3. Elastic properties of biological tissues.
4. Surface tension. Coefficient of surface tension and methods of its determination. Gas embolism.
5. Capillary phenomena in biological systems.
6. Surface-active substances.
7. Internal friction. Fluid viscosity.
8. Newtonian and non-Newtonian fluids.
9. Blood viscosity.
10. Stationary flow. Equation of stream continuity.
11. Laminar and turbulent flow. Reynolds number.
12. Bernoulli equation. Poiseuille formula.
13. Hydrodynamic and hemodynamic resistance.
14. Mechanical waves. Wave equation.
15. Longitudinal and transverse waves. Wave energy flow.
16. Sound. Objective and subjective characteristics of sound.
17. Threshold of hearing. Biophysical mechanism of hearing.
18. Weber-Fechner law. Ultrasound. Infrasound.
19. Audiometry. Audiogram.
20. Structure and properties of biological membranes.
21. Passive and active transport through biological membrane.
22. Membrane potentials. Resting potential and action potential.
23. Electrostatics. Major characteristics of electric field.
24. Electric dipole. Heart as an electric dipole. Einthoven theory.

25. Dielectrics, dielectric polarization. Dielectric properties of biological tissues. Piezoelectric effect.
26. Electric current. Conductivity of biological tissues. Action of electric current on living organism.
27. Equation of electric oscillations. Forced electric oscillation, alternating current.
28. Total resistance of alternating current circuit (impedance).
29. Ohm's law for alternating current.
30. Impedance of biological tissues.
31. Electromagnetic waves. Biased current. EM spectrum.
32. Magnetic field in vacuum and its characteristics.

33. Action of magnetic field on movable electric charge. Ampere force, Lorentz force.
34. Magnetic properties of biological tissues.
35. Medical electronic equipment (classification and specification).
36. Interaction of electromagnetic field with biological tissues. Specific action of electromagnetic field on biological tissues.
37. Ideal centered optical system. Optical microscopy. Physics of vision.
38. Light polarization. Polarimetry. Optically active substances.
39. Light reflection and refraction law.
40. Total internal reflection. Refractometry.
41. Interaction of light with substance. Light absorption. Bouguer-Lambert-Beer law. Light scattering.
42. Thermal radiation. Kirchhoff's law of spectral radiation.
43. Planck's radiation law.
44. Stefan-Boltzmann law.
45. Wien displacement law. Ultraviolet radiation.
46. Principles of quantum mechanics. De Broglie's hypothesis.
47. Heisenberg principle of uncertainty. Schrodinger equation.
48. Atomic spectrum. Molecular spectra. Luminescence.
49. Structure and principle of Laser functioning.
50. Electron paramagnetic resonance, nuclear magnetic resonance and their medical and biological applications.

51. The nature and generation of X-rays. Primary physical mechanisms of interaction of X-rays radiation with substances.
52. Radioactivity, its properties. Principle law of radioactive decay, half-life time, activity.
53. Expose dose of radiation, its power and units. Absorbed dose. Equivalent dose.
54. Primary mechanisms of radioactive radiation and particle flux effect on substance. Detectors, dosimeters.
55. Types and characteristics of ionizing radiation. Characteristics of damping of ionizing radiation. Ionizing radiation protection.
56. Describe physical properties of biological membranes.
57. What are the key structural components of biological membranes?
58. What are the main functional properties of biological membranes?
59. What is semipermeability regarding biological membranes?
60. What makes biological membranes semipermeable?
61. What role do semipermeability play in cell functioning?

62. What types of membrane transport are known?
63. What is osmosis?
64. What role does osmosis play in cell functioning?
65. What does diffusivity depend on and why?
66. What are the key factors of diffusion processes and diffusivity regarding biological membranes?
67. What is Nernst-Planck equation?
68. What is transmembrane potential difference?
69. What is electro-diffusion regarding biological membranes?
70. What causes membrane potential to happen?
71. What is Goldman-Hodgkin-Katz equation?
72. What does Fick's Law state?
73. What is electro-mechanical equilibrium regarding biological membranes?
74. What is sound? What are the conditions for its propagation in medium?
75. Name objective and subjective characteristics of sound and their correspondence. Name the units of measurement.
76. What is the nature of psychophysical Weber-Fechner Law?
77. What is audiometry? What is audiogram?