Physics

1.1 Kinematics

Mechanical movement. Displacement, path, trajectory. Speed. Acceleration. Circular dimension motion. Angular velocity. Frequency period.

1.2 Dynamics

Newton’s laws. The mass. The force. Universal Law of Gravitation. The weight. The friction force of rest and slip.

1.3 Conservation laws in mechanics

Impulse of force. The law of momentum conservation. Mechanical work. Power. Energy. Kinetic and potential energies.

1.4 Fluids and gases statics and dynamics

Pressure. Pascal's law. Archimedean force. Bernoulli's equation.

1.5 Mechanical oscillations and waves

Oscillatory motion. Free oscillations.

Amplitude. Period. Frequency.

Sound waves. Wave length.

2 Molecular Physics and Thermodynamics

2.1 The molecular-kinetic theory

Thermal motion and thermal phenomena.

Diffusion and Brownian motion. Ideal gas. The basic equation of molecular kinetic theory.

Temperature and its measurement.. Mendeleev-Clapeyron equation. Isoprocesses in gases.

2.2 Thermodynamics

The internal energy of substance. The amount of heat. Specific heat capacity. Gas operation. The First Law of Thermodynamics. Adiabatic process.

3 Electrodynamics

3.1 Electrostatics

Interaction of charged bodies. Coulomb's law.

Electric field. Tension. Electric field operation during charge movement. Potential. Electric power. Energy of electric field.

3.2 Electric current

Current strength. Current source. Ohm's law for the full circle.

Operation and current power. Joule-Lenz law.

3.3 Magnetic field

Magnetic field. Magnetic induction. Magnetic flux. The power of Ampere. The Lorentz Force. The law of electromagnetic induction. Induction. Self-induction. Energy of the magnetic field.

3.4 Electromagnetic oscillations and waves.

Oscillatory circuit. Free and forced electromagnetic oscillations.

Electromagnetic field. Electromagnetic waves and their velocity. Blast of electromagnetic waves.

Light as an electromagnetic wave. Geometric optics. Laws of geometric optics. Lens. The formula of a thin lens. Luminous flux. The power of light. Coherence of light waves. Interference of light. Dispersion of light.

4. Quantum Physics

4.1. Introduction to Quantum Physics.

Radiation of the heated body. Planck's hypothesis. Quantum of radiation.

4.2. Light quanta.

Photoelectric effect. Einstein's equation. Corpuscular-wave dualism. Photon. Pressure of light.

4.3. Atom and atomic nucleus

Planetary model of the atom. Bohr's quantum postulates. The phenomenon of radioactivity. Alpha, beta, gamma rays. Nuclear reactions.. Chain reaction.