

ENTRANCE EXAMINATION IN PHYSICS FOR APPLICANTS ENTERING MASTER'S
PROGRAMS OF PHYSTECH SCHOOL OF AEROSPACE TECHNOLOGY

BEAM-PLASMA SYSTEMS AND TECHNOLOGIES

Form: oral assignment

Duration: 1 hour

Exam rules: During preparation of writing assignment it is allowed to use printed textbooks, papers, printed and online handbooks. During oral answer all sources, except of self written, are prohibited. All interactive sources are strongly prohibited including searching systems, chats and others.

Theoretical questions.

Please describe and explain:

1. Newton's laws
2. Laws of conservation in mechanics: momentum, torque, energy.
3. Kepler's laws. Celestial mechanics.
4. Flows of inviscid fluid. Continuity equation. Bernoulli equation.
5. Flows of viscous flows. Poiseuille formula. Reynolds number.
6. Perfect gas equation of state. Van-der-Vaals equation
7. Quasistatic processes. First law of thermodynamics. Heat, work, energy. Heat capacity.
8. Second law of thermodynamics. Carnot cycle. Entropy.
9. Maxwell's and Boltzman's distributions.
10. Diffusion, viscosity, thermal conductivity.
11. Coulomb's law. Gauss theorem. Poisson equation. Electrostatic field.
12. Magnetic field. Main equations.
13. Maxwell's system of equations. Energy of electromagnetic field. Electromagnetic waves.

Recommended literature

Berkeley Physics Course Frank S. Crawford jr. Waves Berkeley Physics course Vol 3 McGraw-Hill 1968, Any edition