

# Written qualification exam on physical sciences (information)

Duration: 3.5 hours.

Maximum number of points: 40.

During the exam the candidate

- should have a photo ID,
- may use a scientific calculator.

The exam sheet contains:

- 7 easier problems - 6 points can be obtained for each
- 5 more difficult problems - each for 8 points

The candidate should correctly solve **4 easier problems and 2 more difficult problems of her/his own choice** to get the maximum number of points. The candidate indicates solutions of problems to be assessed.

Scope of the exam:

1. Classical mechanics of a material point and a rigid body.
2. Basics of fluid mechanics (buoyancy, pressure, incompressible fluid flow).
3. Special relativity. Lorentz transformation, collisions of particles.
4. Classical electrodynamics. Electric circuits.
5. Vibrations and waves.
6. Interaction of electromagnetic waves with matter.
7. Non-relativistic quantum mechanics. Photon.
8. Thermodynamics with elements of classical and quantum statistical physics.
9. Radioactivity, nuclear processes, ionizing radiation.
10. Basic experimental methods. Data analysis and statistical inference.

The exam sheet contains a list of the most important constants. Candidates may not use aids other than a scientific calculator during the exam.

On behalf of the selection team for the discipline *Physical Sciences*  
prof. A. Majhofer – chairperson