

"Gheorghe Asachi" Technical University of Iasi

Faculty of Machine Manufacturing and Industrial Management

Department of Physics

Contest for the position of **ASSOCIATE PROFESSOR**, position no. 5 from the Didactical positions list of the **Department of Physics**

Position Structure: **PHYSICS**

TOPICS OF THE PUBLIC LECTURE

for the position of ASSOCIATE PROFESSOR, position no. 5 from the Didactical positions list of the Department of Physics, 2021-2022

Mechanics

1. Physical quantities in classical mechanics: speed, acceleration, mechanical work, kinetic and potential energy of a material point. Conservation laws for a material point.
2. Undamped harmonic oscillatory motion. Damped oscillatory motion.
3. The fundamental law of the fluid statics. Hydrostatic pressure. Archimedes' law.
4. The equation of continuity. Euler's equation of motion. Bernoulli's equation.

Electricity and magnetism

5. Gauss's law for the electric field. Dielectrics in electric field.
6. Biot-Savart law and applications (magnetic induction for a linear conductor, for spire, of a coil). The law of the magnetic circuit.
7. Gauss's law for the magnetic field. Maxwell-Ampere law of the magnetic circuit.

Undulating phenomena

8. Waves propagation (in one direction, surface, spherical). The equation of the plane wave. The differential equation of waves.
9. The waves speed propagating in solids, liquids and gases. The energy carried by the waves. Wave intensity.
10. Waves Interference. Standing waves.
11. The interference of light (Young experiment, interference fringes of equal inclination, interference fringes of equal thickness).

Quantification and dual nature of the matter

12. Characteristic quantities of the thermal radiation. Radiation laws of the black body.
13. External photoelectric effect. The Compton effect.
14. The Bohr model of the atom. The spectrum of the hydrogen atom.

Solid state physics

15. The structure of the crystals. Crystallographic planes. The study of the solid structure using the radiation. Classification of crystals by type of bond.
16. The model of electronic gas. The theory of energy bands. Classification of solids through the occupying the energy bands.
17. Intrinsic semiconductors. Electrical properties. Extrinsic semiconductors.

Thermodynamics and statistical physics

18. Principle I of the thermodynamics. The molar heat of the ideal gas. Polytropic transformations.
19. Principle II of the thermodynamics. The relationship between the entropy and heat in reversible and irreversible processes.
20. Maxwell-Boltzmann distribution law. Application of the Maxwell-Boltzmann distribution law for the ideal gas. The distribution function of the molecules of an ideal gas by energy and velocities.

Bibliography

1. Fizică generală, E. Luca, C. Ciubotariu, Gh. Zet, A. Păduraru, Ed. Didactică și Pedagogică București, 1981
2. Fizica, P. Sterian, M. Stan, Ed. Didactică și Pedagogică, București
3. Fizica vol. I-II, I. Popescu, Ed. Didactică și Pedagogică, București
4. Fizica, vol. I-II, Gh. Zet, Irina Jemna, curs litografiat, Univ. Tehnică Iași

DEAN,

Prof. dr. ing. Cătălin Gabriel DUMITRAȘ



HEAD OF DEPARTMENT,

Prof. dr. fiz. Petru-Edward NICA