



PÁZMÁNY

Pázmány Péter Catholic University
Faculty of Information Technology and Bionics

Master's program

Entrance examination topics

Physics

1. Inductive way to Maxwell equation and the Maxwell equations.
2. Kirchhoff equations.
3. Transmission lines.
4. Linear antennas and antenna arrays.
5. Motion of charge carriers in electromagnetic.
6. Basics of quantum mechanics.
7. Quantum statistics.
8. Elements of solid state physics.
9. Basics of semiconductor physics.
10. Quantum optics and quantum electronics.

Recommended literature:

N. Gershenfeld, *The Physics of Information Technology*. Cambridge University Press, 2000.
J. D. Jackson, *Classical Electrodynamics*. J. Wiley, 1998.

Further references for Hungarian speakers:

Simonyi – Zombory, *Elméleti Villamosságtan*. Műszaki Könyvkiadó, 2000.
Csurgay – Simonyi, *Az információtechnológia fizikai alapjai*. Mérnöktovábbképző Intézet, 1997.

Electronics

1. Concentrated parameter circuits, building block of an electrical circuits: linear and non-linear building blocks. Kirchhoff equations; network specification by graphs and by incidence matrix, Tellegen theorem.
2. Generation of circuit equations, the solution of the DC equation. Thévenin and Norton theorems.
3. Solution of the circuit equations in time domain, circuit simulator programs.
4. Application of Laplace transformation in time domain. Impulse response calculation of linear circuits.

5. Analysis of linear circuits in frequency domain, Bode diagrams.
6. Basics of nonlinear circuits, Boolean circuit, amplifiers and chaotic circuits.
7. Some problems of Boolean circuit design, speed, power, area, low power systems, DeMorgan-theorem, disjoint normal form.

Recommended literature:

Leon O. Chua – Pen-Min Lin, *Computer-aided Analysis of Electronic Circuits*. Prentice Hall, Englewood Cliffs, 1975.

Daniel Menge, *Analysis and Synthesis of Logic Systems*. Artech House, 1986, p. 1-48