

Electrodynamics,
Program for exam 2007

1. Lorentz invariance
 - i. Transformation of time
 - ii. Transformation of length
 - iii. Interval
 - iv. Lorentz transformations
 - v. 4-vectors:
 1. Velocity
 2. Current
 3. Potential *etc*

2. Fields
 - i. Definition of fields, their properties
 - ii. First pair of Maxwell's equations
 - iii. Second pair of Maxwell's equations
 - iv. Potentials
 - v. Gauge invariance, gauge conditions, different gauges
 - vi. Differential equations for potentials
 - vii. Equations of motion for charged particles in EM field

3. Action and Lagrangian
 - i. Lagrange equations in for general Lagrangians
 - ii. Lagrangian of electromagnetic field
 - iii. Derivation of Maxwell's equations from Lagrangian of electromagnetic field

4. Retarding potentials
 - i. Integral representation of potentials via currents
 - ii. Lienard-Wiechert potentials
 - iii. Fields created by a moving charge, role of its acceleration

5. Radiation processes
 - i. Dipole radiation
 - ii. Radiation for high energy particle
 1. Total radiated energy
 2. Spectrum
 3. Angular distribution
 4. Radiation in Coulomb field
 5. Radiation in magnetic field