

Examination like tasks workshop 4 (Lecture 7 and 8)

A/

Find the torque on a circular loop of current by direct integration.

B/

A lamp filament with known resistivity, ρ , has length L and radius given by

$$r = r_0 \sqrt{1 + \left(\frac{z}{L}\right)^2} \quad \text{for } -L < z < L$$

Find the power per length and the total power dissipated in the filament when the voltage U is put over it.

C/

In a magnetic lens for electron beams the magnetic field lines form circles around a symmetry axis. The magnitude of the field increases linearly with radius (constant = A). The thickness of the lens (along the symmetry axis) is d .

Find the focal length, f , and verify that a point source at distance $2f$ before the lens gives a point image at $2f$ after the lens

D/

An electron enters an area with a constant, homogenous magnetic field. The field is perpendicular to the velocity and the electron has an incident angle to the field = α . How much time does the electron spend in the field before it is re-ejected?

E/

Two current carrying wires with the same current pass each other at 90° angle at a smallest distance d . What is the net force and net torque on one of them?