

Examination like tasks workshop 5 (Lecture 9 and 10)

A/

Derive a general expression like the one for the potential from electric dipoles for B from double conductor (Two wires close together with antiparallel currents).

B/

Find the magnetic field from a circular current loop at a point in the plane of the loop and one diameter to the side of the center of the loop. Compare with the electric dipole at the corresponding place.

C/

Moving a square current loop into a magnetic field (as the book does in chapter 7.1.3) is a very common way to derive

$$EMF = \frac{d\Phi}{dt}$$

Do the same for a square loop rotating in an homogenous field, using the fact mechanical power can be expressed as momentum times angular velocity. (Instead of force times velocity as the books does)

D/

On the old type of electrical stove hotplate heating is done by leading the current in spirals from the center and out.

Find a typical value of the magnetic field just above a 1000W hotplate where the spiral covers the area from radius 15 mm to radius 85 mm and has 200 turns (equally distributed).

The hotplate is not ferromagnetic (Some are and some are not) and you can disregard the fact that alternating current is normally used.

E/

Suggest the geometry of a coil that can produce 100 V just by rotating in the earth magnetic field. Number of turns per minute is maximized to 3000.