

## Homework 20.

1. A square metal wire frame with the side of 5cm is placed in uniform magnetic field of 5T so the direction of the magnetic induction vector is perpendicular to the frame plane. The frame is turned 90 degrees around the axis passing through the middle points of two opposite sides of the frame. The total resistance of the frame is 0.5Ohm. Find total charge which passed through the cross section of the frame wire.
2. We have same experimental arrangement as in the problem 1. Now we know total charge which passed through the cross section of the wire:  $Q=9.5 \times 10^{-3} \text{C}$ , but the “turning” angle is not 90 degrees anymore. Find the angle.
3. A cylindrical wire coil (solenoid) consisting of 1000 turns is placed in magnetic field directed along the coil axis. The two end of the coil wire are connected, so the current can flow through the coil. The solenoid cross section area (the “area of the turn”) is  $40 \text{ cm}^2$ , the coil resistance is 160 Ohm. Calculate the thermal power (Joule heat) generated in the coil if the magnetic field is changing at a rate  $10^{-3} \text{T/s}$ .