

PHY 167, SPRING 2020, TEST 2 (Practice)

(3 points maximum for each problem, 15 points maximum for the whole)

1. Three thin infinite wires carrying currents  $I$  in the same direction go perpendicularly to the paper sheet that they intersect at the points forming an equilateral triangle of side  $L$ . Calculate the force acting on each wire per unit length. What is the direction of the forces?

2. A flat circular loop of wire of radius  $R$  carrying a current  $I$  is placed in uniform magnetic field  $B$  that is directed in the plane of the current loop. What is the magnetic moment  $M$  of the loop? What is the magnitude of the torque acting on the loop? In which direction the loop will rotate under the influence of this torque?

3. A doubly charged helium atom whose mass is  $6.6 \times 10^{-27}$  kg is accelerated by a voltage of 1700 V. What will be the radius of curvature if it moves in a plane perpendicular to a uniform 0.5 T magnetic field?

4. A 13.2-cm wire coil is initially oriented so that its plane is perpendicular to a magnetic field of 0.65 T pointing up. During the course of 0.17 s, the field is changed to one of 0.27 T pointing down. What is the average EMF induced in the coil?

5. An electric circuit consists of a capacitor  $C$ , coil of inductance  $L$ , and a switch. In the initial state the capacitor is charged with the voltage  $V$  and the switch is off. Then the circuit is switched on. What is the rate of change of the current  $\Delta I / \Delta t$  at the initial moment? What physical phenomenon will take place then? What is the maximal current in the circuit?