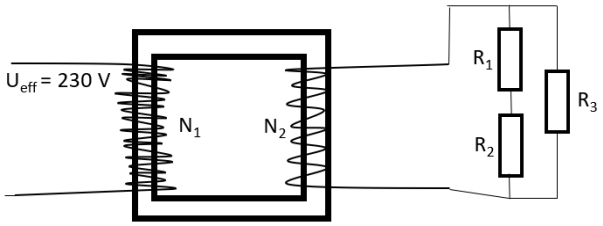
3. izpit iz fizike

17. 8. 2021, 11:30 - 13:00 (konec pisanja, oddaja do **13:20**)

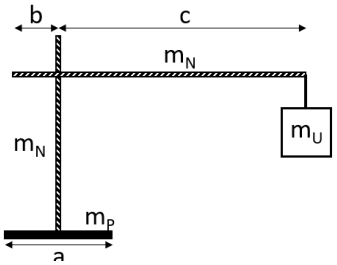
(ŠsPP konec pisanja 13:45, oddaja do 14:05)

1.) Delec z maso m = 2,5 g in nabojem e = 1 mAs postavimo med plošči ploščatega kondenzatorja. Ob času 0 s priklopimo na kondenzator napetost U = 10 V (razmak med ploščama d = 10 m). Izračunaj silo električnega polja, ki deluje na delec. Nariši graf pospeška, hitrosti, poti in kinetične energije delca v odvisnosti od časa do 5 sekund. Ne pozabi na oznake na oseh.

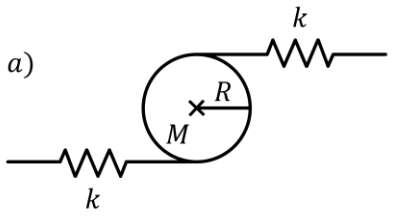
2.) Na omrežno napetost ($U_{eff} = 230\ V$, $\nu = 50\ Hz$) imamo priključen transformator, ki ima na primarni strani (levo) $N_1 = 85$ navojev in sekundarni strani (desno) $N_2 = 10$ navojev. Kolikšen mora biti R_3, da tok (amplituda toka) skozi celotno vezje nikoli ne preseže $1\ A$? $R_1 = 100\Omega, R_2 = 10\Omega$.



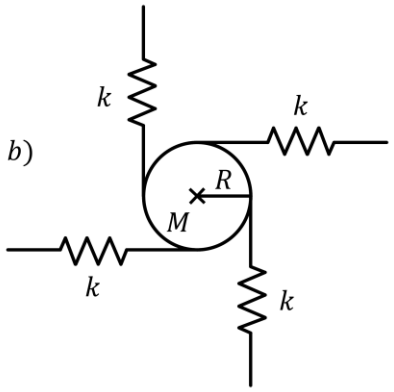
3.) Izračunaj največjo maso uteži (m_U), ki jo lahko gradbeno dvigalo dvigne, ne da bi se zvrnilo. Masa podloge je m_p = 12,3 T, masa vodoravnega in navpičnega nosilca je m_N = 100 kg. Širina podloge je a = 4,2 m, dolžini leve in desne strani vodoravnega nosilca sta b = 2 m in c = 35 m.



4.) Disk z maso $M = 200\ g$ in radijem $R = 15\ cm$ je vpet na vrtljivo os, ki poteka skozi njegovo središče in je pravokotna na ravnino diska. a) Na disk sta pripeti dve vzmeti s koeficientom $k = 100\ N/m$ kot kaže slika. Izračunaj nihajni čas diska. b) Na disk so pripete štiri vzmeti s koeficientom $k = 100\ N/m$ kot kaže slika. Izračunaj nihajni čas diska.



5.) Izračunaj splošni izraz za nihajni čas diska iz prejšnje naloge, če nanj tangentno pripnemo N enakih vzmeti s koeficientom k. Kaj se zgodi z nihajnim časom v primeru neskončno veliko pripetih vzmeti ($N \to \infty$)?



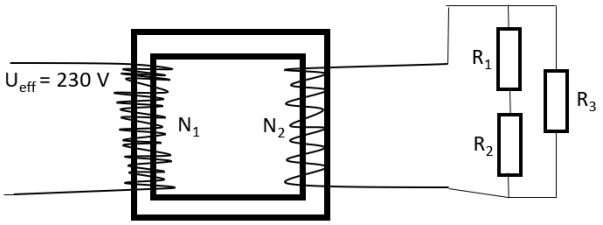
3rd Physics exam

17. 8. 2021, 11:30 - 13:00 (end of writing, submissions until **13:20)**

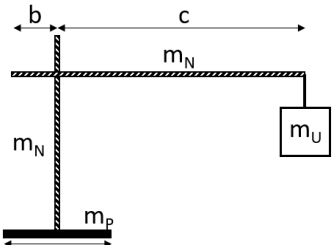
(ŠsPP end of writing 13:45, submissions until 14:05)

1.) A particle with mass m = 2.5 g and charge e = 1 mAs is placed between the plates of a flat capacitor. At time 0 s, a voltage U = 10 V is connected to the capacitor (distance between plates d = 10 m). Calculate the force of the electric field acting on the particle. Draw a graph of the acceleration, velocity, travelled distance, and kinetic energy of the particle as a function of time up to 5 seconds. Don't forget the labels of the axes.

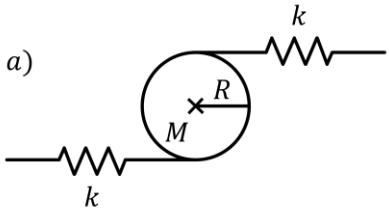
2.) A transformer is attached to the mains voltage ($U_{eff} = 230\,V,\ \nu = 50\,Hz$). The transformer has $N_1 = 85$ turns on the primary side (left) and $N_2 = 10$ on the secondary side (right). What must be the value of resistor R_3, so that the current (amplitude of the current) through the circuit never exceeds 1 A? $R_1 = 100\,\Omega, R_2 = 10\Omega$.



3.) Calculate the maximum mass of the weight (m_U) that the construction crane can lift without tipping over. The mass of the base is m_P = 12.3 T, the mass of the horizontal and vertical beam is m_N = 100 kg. The width of the base is a = 4.2 m, the lengths of the left and right sides of the horizontal beam are b = 2 m and c = 35 m.



4.) A disk with mass $M = 200\ g$ and radius $R = 15\ cm$ is mounted on a rotatable axis which goes through its centre and is perpendicular to the plane of the disk. a) There are two springs with coefficient $k = 100\ N/m$ attached to the disk as shown on the figure. Calculate the oscillation time of the disk. b) There are four



springs with coefficient $k = 100\,N/m$ attached to the disk as shown on the figure. Calculate the oscillation time of the disk.

5.) Calculate the general expression for the oscillation time of the disk form the previous exercise if we tangentially attach N equal springs with coefficient k. What happens with the oscillation time in the case of infinitely many attached springs ($N \to \infty$)?