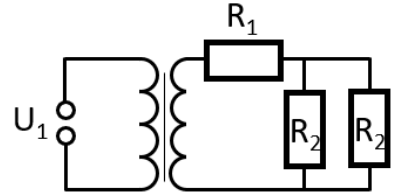


2. izpit iz fizike - 27. 1. 2022

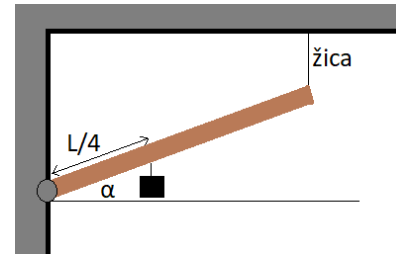
10:15-11:45, oddaja do 12:05. Podaljšan čas pisanja do 12:30, oddaja 12:50

English version below.

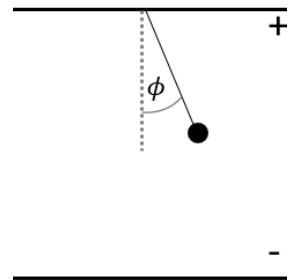
1.) Na primarni strani transformatorja je priključena efektivna napetost 230 V. Izračunaj število obojev primarnega navitja N_1 , če je na sekundarni strani napetost $U_2 = 12$ V in število obojev $N_2 = 21$. Izračunaj nadomestno upornost vezja na sekundarni strani. Kolikšno moč troši omenjeno vezje? Kolikšen tok teče skozi primarno navitje transformatorja? ($R_1 = 1 \Omega$, $R_2 = 2 \Omega$)



2.) Lesena palica z maso 10 kg je na levem koncu vrtljivo vpeta v steno, na desnem pa je nanjo navpično privezana žica, tako da je palica pod kotom $\alpha = 20^\circ$ (skica). Na četrtini dolžine palice, gledano z leve strani, je obešena utež z maso 40 kg. S kolikšno silo je napeta žica?



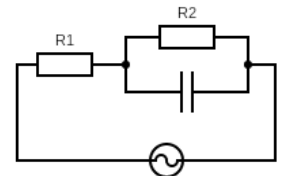
3.) Med dvema ravnima prevodnima ploščama, ki sta na medsebojni razdalji 0,2 m, je priključena napetost 20 kV. Kroglica z maso 10 g visi z zgornje plošče. Na ploščo je priterjena preko 0,1 m dolge vrvi, tako da prosto niha. S kolikšno silo je vrv napeta, ko je kroglica v ravnovesju, če je naboj na kroglici $+3 \mu\text{As}$ in je spodnja plošča negativno nabita? Kolikšen je nihajni čas? Pri izračunih maso vrvi zanemari.



4.) Avto z maso 1200 kg se pelje po krožnem križišču z radijem 10 m. Začetna hitrost avta je 0. Izračunaj obodno hitrost po 10 s in izračunaj koliko časa potrebuje da opravi 3 obrate po krožnem križišču, če se

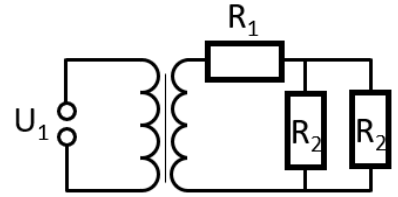
- pelje s konstantnim kotnim pospeškom $\alpha = 0.2 \text{ s}^{-2}$.
- pelje s konstantno močjo 2000 W. Avto obravnavaj kot točkasto telo.

5.) Vezje sestavimo iz dveh enakih uporov $R_1 = R_2 = 1 \Omega$ in kondenzatorja $\tau = RC = 10 \text{ ms}$, kot to prikazuje skica. Vezje priključimo na izmenično napetost z amplitudo $U_0 = 1 \text{ V}$ in frekvenco $\omega = 100 \text{ Hz}$. Kolikšna je absolutna vrednost impedance vezja z_0 ? Kolikšen je fazni zamik napetosti na kondenzatorju glede na gonilno napetost? Kolikšna moč se troši na upor R_2 ?

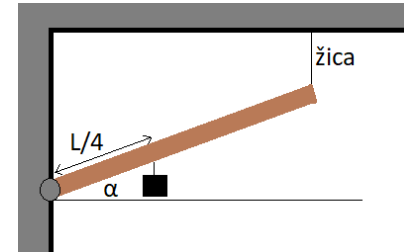


2. exam in physics - 27. 1. 2022

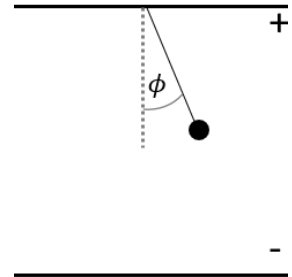
1.) An effective voltage of 230 V is applied on the primary side of the transformer. Calculate the number of turns of the primary winding N_1 if the voltage and number of turns on the secondary side are $U_2 = 12$ V and $N_2 = 21$. Calculate the equivalent resistance on the secondary side. How much power does the secondary circuit consume? How much electrical current flows through the primary winding of the transformer? ($R_1 = 1 \Omega$, $R_2 = 2 \Omega$)



2.) A wooden stick with a mass of 10 kg is attached to the wall (see sketch, left side). The stick can rotate around this attachment point. On the other side, it is vertically connected to the ceiling with a rope ('žica' on sketch). The stick is at an angle $\alpha = 20^\circ$. On one quarter distance from the left edge, there is a weight attached with a mass of 40 kg. What is the force in the rope?



3.) A voltage of 20 kV is connected between two straight conductor plates spaced 0,2 m apart. A ball of mass 10 g hangs from the upper plate. It is attached to the plate via a 0.1 m long rope so that it swings freely. How much force is exerted on the rope when the ball is in equilibrium if the charge on the ball is $+3 \mu\text{As}$ and the bottom plate is negatively charged? What is the oscillation time? Ignore the mass of the rope in the calculations.



4.) A car with a mass of 1200 kg is traveling through a roundabout with a radius of 10 m. The initial velocity of the car is 0. Calculate the tangential velocity after 10 s and calculate how long it takes to complete 3 turns through the roundabout if

- it travels with a constant angular acceleration $\alpha = 0.2 \text{ s}^{-2}$.
- it travels at a constant power of 2000 W. Treat the car as a point-like body.

5.) The circuit consists of two equal resistors $R_1 = R_2 = 1 \Omega$ and a capacitor, as shown in the sketch ($\tau = RC = 10 \text{ ms}$). The circuit is connected to an AC voltage of amplitude $U_0 = 1 \text{ V}$ with frequency $\omega = 100 \text{ Hz}$. What is the absolute value of the impedance z_0 ? What is the phase shift of the voltage on the capacitor with respect to the driving voltage? What is the power dissipated at resistor R_2 ?

