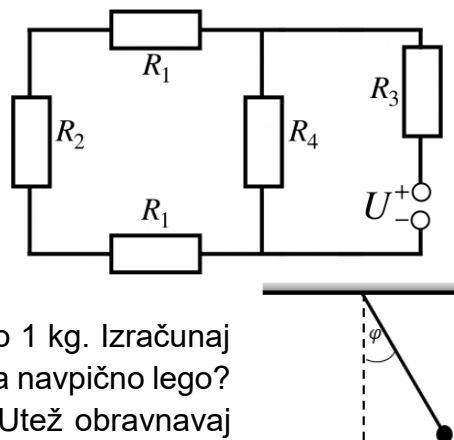


## 2. KOLOKVIJ IZ FIZIKE - 13. 1. 2023

Čas pisanja: 15:15-16:45, podaljšan čas pisanja do 17:30

1.) Podano je vezje na skici, kjer so upor  $R_1 = 1\ \Omega$ ,  $R_2 = 2\ \Omega$ ,  $R_3 = 3\ \Omega$ ,  $R_4 = 4\ \Omega$  in  $U = 7\ V$ .

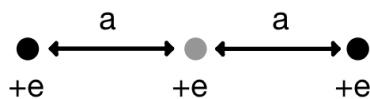
- Kolikšen je nadomestni upor vezja?
- Kolikšna moč se troši na  $R_3$ ?
- Kolikšen tok teče čez  $R_4$ ?



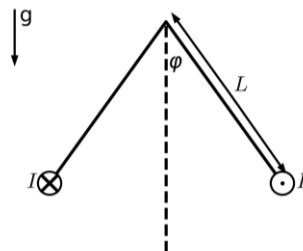
2.) Palico dolžine 4 m z maso 6 kg za en konec obesimo na strop. Na prosti konec palice pa pritrdimo utež z maso 1 kg. Izračunaj potreben navor, da predmet držimo pod kotom  $5^\circ$  glede na navpično lego? S kakšno frekvenco zaniha predmet, če ga izpustimo? Utež obravnavaj kot točko.

3.) Na medsebojni razdalji  $2a$ , kjer je  $a = 1\ m$ , držimo na mestu dve majhni kroglici z maso  $m = 10\ g$  in nabojem  $e = 10^{-5}\ As$ . V sistemu ni gravitacije.

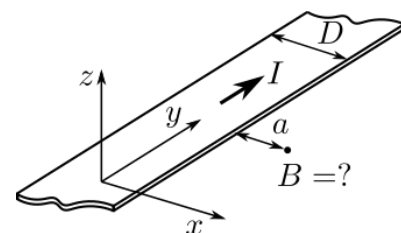
- Koliko dela moramo opraviti, da postavimo na sredino njune zveznice še eno enako majhno kroglico?
- Kroglice sedaj spustimo, da se lahko prosto gibajo. Nakaži smer gibanja leve in desne kroglice in izračunaj njuni hitrosti, ko opravita en meter poti.



4.) Dva tanka dolga vodoravna vodnika obesimo z vrvico, da visi "kot gugalnica". Po vodnikih teče električen tok  $I = 20\ A$ . Kolikšen je kot  $\varphi$  v ravnovesju? Linearna gostota vodnikov je  $\lambda = 0.3\ g/m$ , dolžina vrvice pa  $L = 50\ cm$ .



5.) Po tankem prevodnem traku z debelino  $D = 50\ cm$  teče električni tok velikosti  $I = 10\ A$ . Kolikšna je gostota magnetnega polja v ravnini traku na oddaljenosti  $a = 10\ cm$ ? Predpostavi enakomerno površinsko porazdelitev toka.

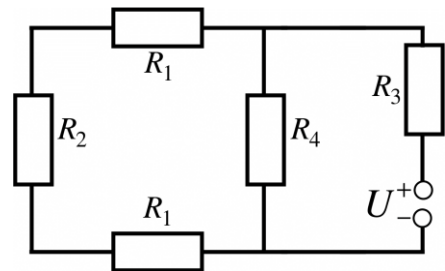


## 2. MIDTERM EXAM IN PHYSICS - 13. 1. 2023

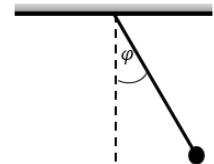
**Time: 15:15-16:45, extra time - 17:30**

1.) The circuit is given in the sketch, where the resistance  $R_1 = 1\ \Omega$ ,  $R_2 = 2\ \Omega$ ,  $R_3 = 3\ \Omega$ ,  $R_4 = 4\ \Omega$  and  $U = 7\text{ V}$ .

- What is the equivalent resistance of the circuit?
- How much power is consumed by  $R_3$ ?
- How much current flows through  $R_4$ ?

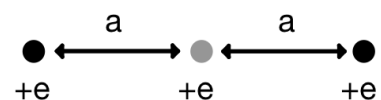


2.) A stick with length 4 m and weight of 6 kg is attached on the ceiling with one end. We put a weight with a point mass of 1 kg on the other end. What is the torque required to keep the stick tilted by  $5^\circ$  to the vertical position? What is the frequency of oscillation, when we let go?

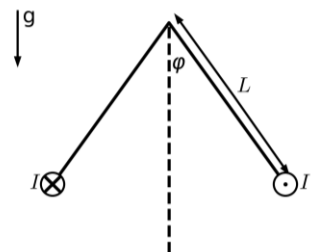


3.) At a distance of  $2a$ , where  $a = 1\text{ m}$ , there are two fixed small particles with mass  $m = 10\text{ g}$  and electric charge  $e = 10^{-5}\text{ As}$ . Assume there is no gravitation.

- How much work is required to introduce a new small particle of equal mass and charge in the middle?
- The particles are now no longer fixed. Sketch the direction of motion of the left and right particle and calculate their speed when they travel a distance of one meter.



4.) Two thin long wires are hung by strings as a swing. A current of  $I = 20\text{ A}$  flows in the wires in opposite directions. What is the angle  $\varphi$  in equilibrium position? Linear density of the wires is  $\lambda = 0.3\text{ g/m}$ , and the length of the string  $L = 50\text{ cm}$ .



5.) A long thin conducting strip with the thickness of  $D = 50\text{ cm}$  carries a current of  $I = 10\text{ A}$ . Find the magnitude of the magnetic field in the plane of the strip at the distance  $a = 10\text{ cm}$  from the strip! Assume uniform surface current distribution.

