Dr. Sasha

It is the information about the task N23

1) I agree with the solution.

1. The potential inside (maybe, also outside) the cylinder is given by

$$\phi(\rho,\varphi)=\frac{4}{\pi}\sum_{m=0}^{\infty}\frac{1}{2m+1}\rho^{2m+1}\sin(2m+1)\varphi=\frac{2i}{\pi}\left(\operatorname{arcth}\rho e^{-i\varphi}-\operatorname{arcth}\rho e^{i\varphi}\right),$$

You are right.

3) I agree with the solution.

The solution of this equation is

$$\omega(t)=\frac{4V}{BR^2}\sin^2\left(\frac{BR^2}{4J}\sqrt{\frac{J}{L}}t\right)=\frac{2V}{BR^2}\left(1-\cos\left(\frac{BR^2}{2J}\sqrt{\frac{J}{L}}t\right)\right).$$

4) I agree with the solution.

which yields

$$p=K\ln\frac{V_0}{V}=2\cdot10^8\ \text{Pa}.$$

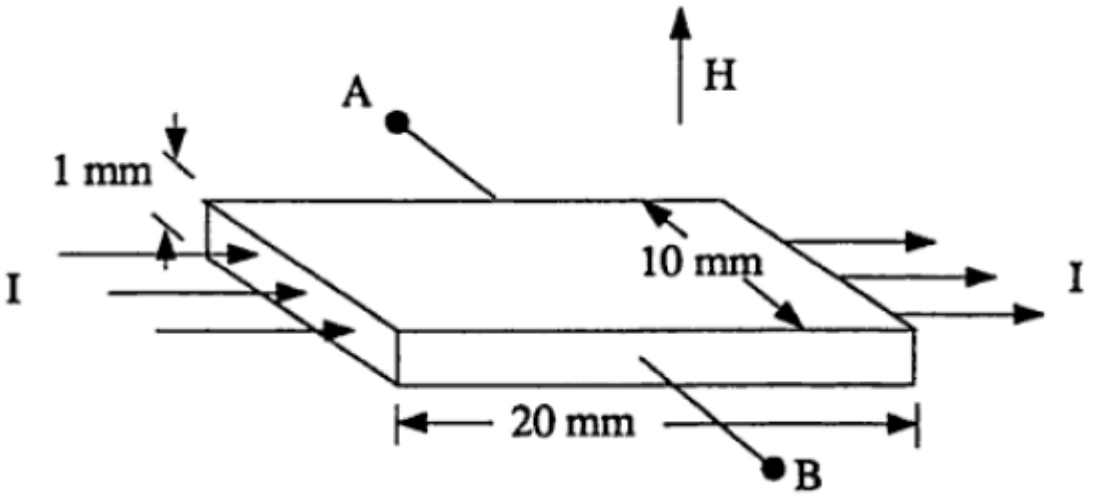
Please, solve this problem and also show the steps to solve it.

26.06.2015 – N24

1) Explain how to construct a refrigerator from strips of Cu and Sn.

Hint: Use the Peltier effect.

2) A magnetic field, H = 10 T, is perpendicular to a stripe of Cu as shown below.



A uniform current of I = 0.1 A flows steadily through the strip, and the voltage across points A and B is measured to be V = $8.1 \cdot 10^{-8}$ volts. Use this data to estimate the density of charge carriers n in Cu.

3) The radioisotope used in agriculture is:

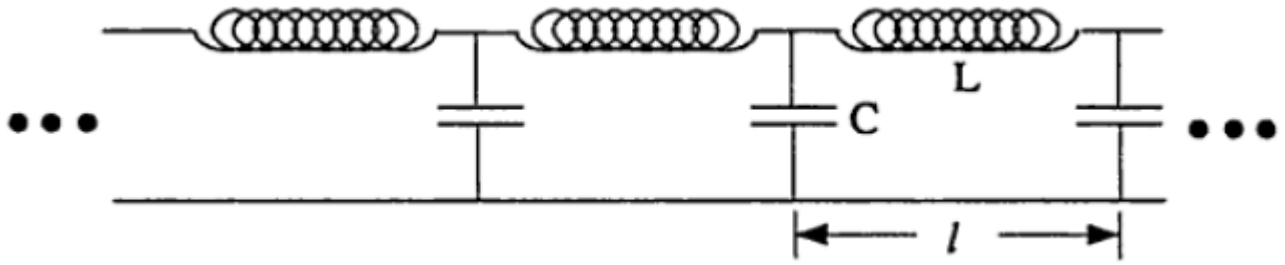
a) ${}_{15}P^{32}$ b) ${}_{11}Na^{23}$

c) ${}_{15}P^{31}$ d) ${}_{11}Na^{24}$

4) The solar wind is mostly ionized hydrogen, and has a mean velocity $v_w \sim 500$ km s^{-1} and a mean proton density at distance a from the sun of $n_p \sim 10$ cm^{-3} $(1AU/a)^2$. Calculate the ram pressure of the solar plasma wind on the solar sail. The solar sail is a circular sail composed of aluminum foil.

5) What stops the Sun from collapsing under the force of its own gravity?

6) Consider an infinitely long transmission line, which consists of lumped circuit elements as shown in figure below.



Find the dispersion relation $\left(\omega\left(\lambda\right)\right)$ for periodic waves traveling down this line. What is the cut-off frequency?