

Exam 3

**P202 Spring 2007,
Instructor: Prof. Abanov**

03/29/07

Name _____

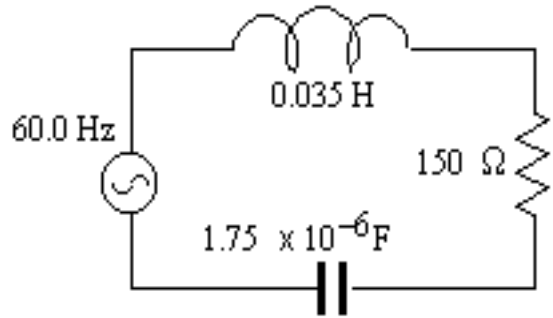
Section _____

(print)

Your grade:

Problem 1.

The series RCL circuit is given on the figure.
The source supplies 2V .



What is the current in the circuit?_____

What is the phase angle between the current and the voltage?_____

What is the voltage drop on the Inductor?_____

What is the the voltage drop on the capacitor?_____

What is the voltage drop on the resistor?_____

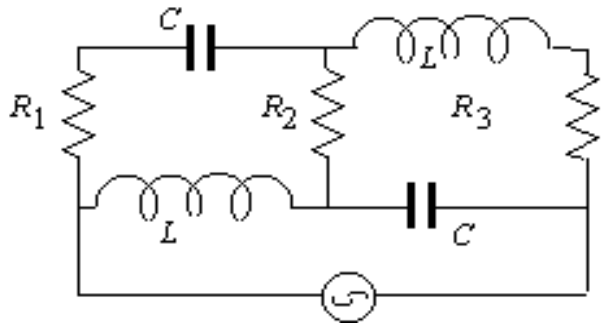
What is the resonance frequency of the circuit?_____

Problem 2.

In the circuit shown in the drawing, the generator supplies the same amount of rms voltage

$V_{rms} = 2V$ at either very small or very large frequencies.

The resistance of the resistors are $R_1 = 5k\Omega$,
 $R_2 = 3k\Omega$, $R_3 = 1k\Omega$.



What is the current through the capacitors at very small frequency? _____

What current is supplied by the source at very small frequency? _____

What is the current through the inductors at very large frequency? _____

What current is supplied by the source at very large frequency? _____

Problem 3.

A radio station broadcasts at a frequency $830kHz$. At some point the magnetic field amplitude of the electromagnetic wave is $4.82 \times 10^{-11} T$.

What is the wavelength of the electromagnetic wave? _____

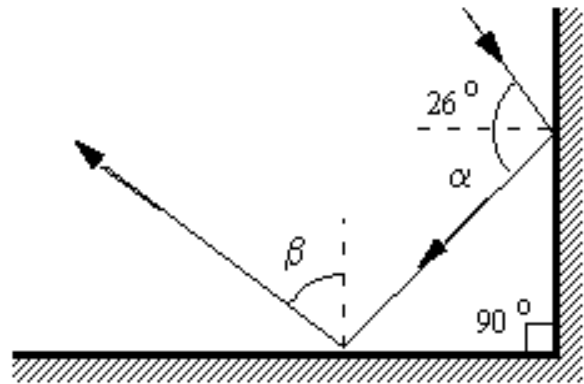
What is the angular frequency of the electromagnetic wave? _____

What is the electric field magnitude of the electromagnetic wave? _____

What is the energy density of the electromagnetic wave at this point? _____

Problem 4.

A ray of light is reflected from two plane mirror surfaces as shown in the figure.

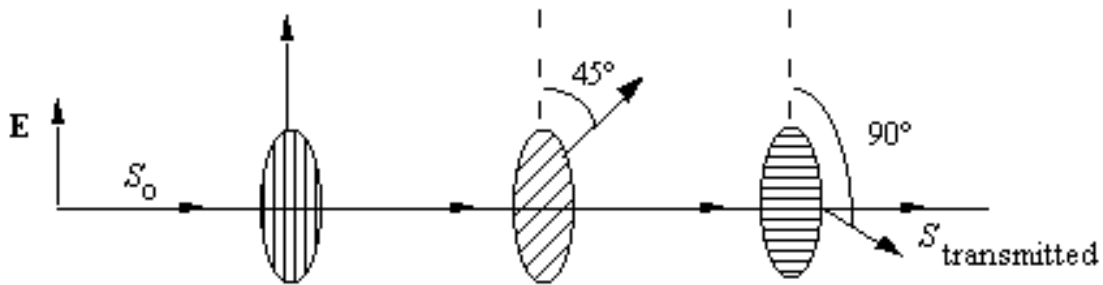


What is angle α ? _____

What is the angle β ? _____

Problem 5.

An unpolarized beam of light is incident upon a group of three polarizing sheets which are arranged so that the transmission axis of each sheet is rotated by 45° with respect to the preceding sheet as shown.



What fraction of the incident intensity passes through the first polarizer? _____

What fraction of the incident intensity passes through the second polarizer? _____

What fraction of the incident intensity is transmitted? _____

Problem 6.

An object is placed 30.0 cm from a concave spherical mirror with radius of curvature 40.0 cm.

Is the image virtual or real?_____

Is the image inverted?_____

What is the focal length of the mirror?_____

What is the distance from the image to the mirror?_____

What is the magnification?_____

Problem 7.

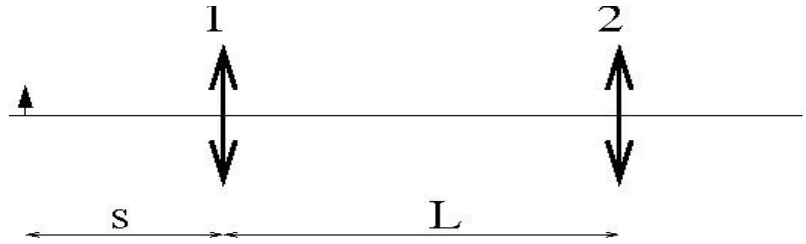
A diver is 2m under water ($n=1.33$) in a sunny day.

What is the angle of internal reflection?_____

What is the radius of the bright spot he will see if he looks up?_____

Problem 8.

The object is $s=30\text{cm}$ from the first lens. The distance between lenses is $L=50\text{cm}$. The focal length of the first lens is $f_1=10\text{cm}$ and of the second lens it is $f_2=20\text{cm}$.



What is the distance between the first lens and the first image?_____

What is the distance between the second lens and the final image?_____

What is the magnification of the first length?_____

What is the magnification of the second lens?_____

What is the final magnification?_____

Is the final image virtual?_____

Is the final image inverted?_____

Problem 9.

A telescope with the angular magnification 100 has an objective lens with focal length 50cm.

What is the focal length of the eyepiece?_____

What is the the distance between objective lens and the eyepiece?_____

Problem 10.

A far sighted person has a near point at 80cm.

Does he need convergent or divergent lenses for his glasses?_____

What should be the focal length of his glasses?_____

What is the power of that lenses?_____