PHYS 202 Final Exam (Preview) Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

***Do NOT cheat!!!*** Do NOT copy from someone sitting next to you … they have a different test.

Before starting the test, make sure there isn’t a page missing or misprinted.

* Each multiple choice question is worth 2 points (unless you select “k”).
* Use your “Blue Book” to solve the problems.
* Circle only ***ONE*** choice for each multiple-choice question.
* Circling more than ONE choice will score ZERO out of 2 points (even if one of the circled choices is “k”).

1. Three identical particles are located at the following positions along the x-axis: x1 = \_\_\_\_ mm, x2 = \_\_\_\_ mm, and x3 = \_\_\_\_ mm. The particle at x1 has a charge of \_\_\_\_e, the other two particles each have an electric charge of \_\_\_\_e. What \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ this arrangement of particles?
2. An infinitely large sheet of charge lies in the yz-plane such that x = 0 everywhere on the sheet. The sheet of charge has an area charge density of \_\_\_\_ x \_\_\_\_ C/m2. Location “A” is at (x, y) = (\_\_\_\_ cm, \_\_\_\_ cm). Location “B” is at (x, y) = (\_\_\_\_ cm, \_\_\_\_ cm). If location “A” has an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, what is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of location “B”?
3. A hollow conducting sphere has an inner radius of \_\_\_\_ cm and an outer radius of \_\_\_\_ cm. The sphere has a net electric charge of \_\_\_\_ nC. The sphere is centered at the origin. At the center of the sphere is an unknown electric charge.
4. Two infinitely long lines of charge are parallel to the y-axis. Line #1 crosses the x-axis at x = \_\_\_\_ cm and has a linear charge density of \_\_\_\_ x \_\_\_\_ C/m. Line #2 crosses the x-axis at x = \_\_\_\_ cm.
5. The combination of resistors show above is connected to a voltage source. If the potential difference across the \_\_\_\_  resistor is measured to be \_\_\_\_ V, …
6. An RC series circuit consists of an unknown capacitor and a \_\_\_\_ k resistor. The combination is connected to a switch and a \_\_\_\_ V ideal battery. The capacitor is initially uncharged. The current through the resistor is measured to be \_\_\_\_ mA exactly \_\_\_\_ seconds after the switch is closed.
7. In the nasty circuit shown above, each of the emf’s is 12.0 V and each resistor is 48.0 . What is the value of the indicated current?
8. A non-ideal battery has an emf of \_\_\_\_ V. When the battery is connected to a \_\_\_\_  external resistance it is measured to have a terminal voltage of \_\_\_\_ V.

A picture containing object

Description automatically generated

1. In the circuit shown above the emf is \_\_\_\_ V and the inductor initially has no current flowing through it. When the switch is first closed the ammeter reading is \_\_\_\_ A. The two resistors are identical to each other.
2. An LRC series circuit consists of a \_\_\_\_  resistor, a \_\_\_\_ H inductor, and a \_\_\_\_ F capacitor. The AC voltage source has a peak voltage of \_\_\_\_ V and an angular frequency of \_\_\_\_ rad/s. What is the …
3. A \_\_\_\_ nF capacitor initially stores \_\_\_\_ x \_\_\_\_ J of potential energy. The capacitor in then connected across a \_\_\_\_ mH inductor. If the inductor is ideal (has no resistance), which of the following functions best describes the current through the inductor as a function of time?
4. An LRC series circuit consists of a \_\_\_\_ H inductor, an unknown resistor, and an unknown capacitor. The AC voltage source has an RMS voltage of \_\_\_\_ V and a variable angular frequency. A student experiments with the circuit and discovers \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The student also discovers that when the angular frequency is \_\_\_\_ rad/s the source voltage lags the current by \_\_\_\_°. What is the resistance of this circuit?
5. A long straight current carrying wire lies along the x-axis. The current in the wire is \_\_\_\_ A and flows in the positive x-direction. A second wire lies parallel to the x-axis but intersects the y-axis at y = \_\_\_\_ cm.
6. A transformer consists of two coils. One of the coils is known to have \_\_\_\_ loops. The number of loops on the other coil is not known. A certain voltage is connected to the transformer and the output voltage is measured. When connected one way the output voltage is measured to be \_\_\_\_ V. When the transformer is connected the reverse way the output voltage is measured to be \_\_\_\_ V.
7. A \_\_\_\_ cm tall real object is placed \_\_\_\_ cm to the left of a lens. The lens forms an image located …

Set-up problems:

Each of the requested loops and junctions is worth 1 point.

A close up of a logo

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Junction “**a**”

Loop “**1**”