**Physics 202 Final Exam**

**Name**_____

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In problems 1-10, you will receive credit only for the correct answer (no partial credit).

For fill-in-the-blank questions and problems, please place your answer in the indicated space. Be sure to include the correct units.

For multiple choice questions and problems, circle the letter for the correct answer. If your calculated answer is not approximately equal to one of those given, then you should circle "none of the above".

In problems 11-17, you will be graded on your work (with appropriate partial credit).

**Last 2 pages are formula sheet, which also has physical constants.**

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1. (5) A 10.0 $\Omega$ resistor, a 16.0 $\mu$F capacitor, and a 40.0 mH inductor are connected in series with a 120 V generator. At what frequency f is the current a maximum?

Answer_____

2. (5) In a 200 watt light bulb, the rate at which electrical energy is dissipated in the resistor (and transformed into light and heat) is 200 watts. If the current flowing through this resistor is 0.1 A, what is the value of its resistance, in $\Omega$?

Answer_____

3. (5) The wingspan (tip-to-tip) of a particular jet airplane is 60 m. The plane is flying horizontally at a speed of 280 m/s. The vertical component of the earth's magnetic field is $5.0 \times 10^{-6}$ T. Find the emf induced between the wing tips.

Answer_____

4. (5) Circle the letters for all of the following statements that are true of electromagnetic waves.

(a) The magnetic field is parallel to the direction of propagation.

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(b) The magnetic field is perpendicular to the direction of propagation.

(c) The electric field is parallel to the direction of propagation.

(d) The electric field is perpendicular to the direction of propagation.

(e) The electric field is parallel to the magnetic field.

(f) The electric field is perpendicular to the magnetic field.

(g) The electric field and magnetic field vary in phase with each other.

(h) The electric field and magnetic field vary out of phase with each other by 90°.

5. (5) A cube is made of solid metal, and the length of each edge is 10.0 cm. A charge of 3.0 $\mu$ C is placed 5.0 cm directly above the center of one face. What is the value of the electric field at the center of the cube?

Answer_____

6. (5) An electric force moves a charge of $2.0 \times 10^{-4}$ C from point A to point B, and performs $12.0 \times 10^{-2}$ J of work on the charge. What is the magnitude of the potential difference between these two points?

Answer_____

7. (5) An electron moves vertically upward in a magnetic field that points vertically downward. The velocity of the electron is 20 000 m/s and the magnitude of the magnetic field is 4.5 T. What is the magnitude of the magnetic force on the electron?

Answer_____

8. (5) The principal quantum number for an electron in an atom is 7, while the magnetic quantum number is 3. What possible values for the orbital (angular momentum) quantum number $l$ could this electron have?

Answer_____