

**Physics 112**  
**Quiz #21**  
**November 12, 1999**

Name: \_\_\_\_\_

***IF YOU WANT A QUESTION GRADED OUT OF THREE POINTS (-1 [MINUS ONE] FOR WRONG ANSWER!!) WRITE "3" IN SPACE PROVIDED ON EACH QUESTION.***

$$c = 3 \times 10^8 \text{ m/s}$$

1. The electric field in an x-ray beam reverses direction approximately  $10^{18}$  times each second. In a microwave beam, this reversal occurs approximately  $10^{10}$  times per second. Then the distance between peaks in the magnetic field pattern (i.e., points where the magnetic field has maximum intensity) in the *microwave* beam is:
- A. more than a million times longer than in the x-ray beam.
  - B. about a thousand times longer than in the x-ray beam.
  - C. about the same as in the x-ray beam.
  - D. about a thousand times shorter than in the x-ray beam.
  - E. more than a million times shorter than in the x-ray beam.

***Grade out of 3? Write "3" here: \_\_\_\_\_***

2. A generator can produce an electric current as a result of mechanical action on a loop of wire in the presence of a magnetic field. ***Assuming that the magnetic field is uniform and constant in time, and that the shape of the loop does not change,*** which ***one*** of the following quantities (represented by their symbols) would ***have*** to be changing in order for current to be produced:
- A.  $B$
  - B.  $A$
  - C.  $I$
  - D.  $\theta$
  - E.  $R$
  - F.  $P$

***Grade out of 3? Write "3" here: \_\_\_\_\_***

3. Two parallel wires – wire “A” and wire “B” – carry currents in the same direction. The distance between the wires is called the “separation distance.” Initially, the current in both wires has the same magnitude. Which of these actions would result in the ***largest increase*** in the force exerted on one wire by the other wire?
- A. Double the current in wire “A.”
  - B. Double the current in wire “B.”
  - C. Double the separation distance.
  - D. Cut the separation distance in half.
  - E. Double the current in wire “A,” and double the separation distance.
  - F. Double the current in wire “A,” and cut the separation distance in half.
4. A magnetic field points in the positive z direction. Which one of the following orientations of a straight wire carrying current would result in ***no net force*** on the wire:
- A. along the x axis
  - B. along the y axis
  - C. along the z axis
  - D. in the xy plane but not parallel to any axis
  - E. along the yz plane but not parallel to any axis