

TIME OF COMPLETION _____ NAME _____

DEPARTMENT OF NATURAL SCIENCES

PHYS 1112, Exam 2
Version 1
Total Weight: 100 points

Section 1
October 30, 2001

1. Check your examination for completeness prior to starting. There are a total of ten (10) problems on seven (7) pages.
2. Authorized references include your calculator with calculator handbook, and the Reference Data Pamphlet (provided by your instructor).
3. You will have 80 minutes to complete the examination.
4. The total weight of the examination is 100 points.
5. There are six (6) multiple choice and four (4) calculation problems. Work all problems. Show all work; partial credit will be given for correct work shown.
6. If you have any questions during the examination, see your instructor who will be located in the classroom.
7. Start: 10:30 a.m.
Stop: 11:50 a.m

PROBLEM	POINTS	CREDIT
1-6	30	
7	20	
8	15	
9	20	
10	15	
TOTAL	100	
	PERCENTAGE	

CIRCLE THE SINGLE BEST ANSWER FOR ALL MULTIPLE CHOICE QUESTIONS. IN MULTIPLE CHOICE QUESTIONS WHICH REQUIRE A CALCULATION SHOW WORK FOR PARTIAL CREDIT.

1. A proton moving with a speed of 3.00×10^5 m/s perpendicular to a uniform magnetic field of 0.200 T will follow which of the paths described below ($q_p = 1.6 \times 10^{-19}$ C and $m_p = 1.67 \times 10^{-27}$ kg)
 - a. A straight line path.
 - b. A circular path of 1.50 cm radius.
 - c. A circular path of 3.00 cm radius.
 - d. A circular path of 0.750 cm radius.

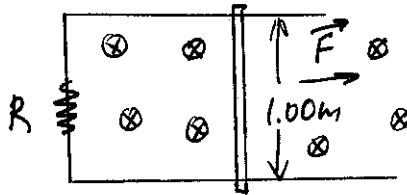
2. A current in a long, straight wire produces a magnetic field. The magnetic field lines:
 - a. Go out from the wire to infinity.
 - b. Come in from infinity to the wire.
 - c. Form circles which pass through the wire.
 - d. Form circles which go around the wires.

3. The current in a coil with self-inductance of 1.50 mH increases from 0 to 1.00 A in a tenth of a second. What is the induced emf in the coil?
 - a. 15.0 mA.
 - b. 30.0 mA.
 - c. 0.100 A.
 - d. 0.300 A.

4. The principle or law that says “ an induced emf in a circuit loop produces a current whose magnetic field opposes further change of magnetic flux” is credited to:
- a. Faraday.
 - b. Lenz.
 - c. Ampere.
 - d. Volta.
5. In an ac series circuit, the voltage in the inductor differs in phase with the voltage in the capacitor by what angle?
- a. Zero.
 - b. 45° .
 - c. 90° .
 - d. 180° .
6. In order to keep its food hot, a restaurant will place it under which type of lamp?
- a. Infrared.
 - b. Visible light.
 - c. Ultraviolet.
 - d. X-ray.

7. A wire of length 1.00 m is moved at a constant speed 5.00 m/s across a perpendicular uniform magnetic field of 0.110 T by a force F as shown in the Figure. The resistor has a resistance of 30.0 Ohms, the resistance of all the wires is negligible. Assuming zero friction, what is the magnitude of the force F ?

Indicate, on the Figure above, the direction of the current in the resistor and explain your reasoning here.



8. A series L-C-R circuit contains a $1.00 \mu\text{F}$ capacitor, a 5.00 mH coil, a 100 Ohms resistor, and a generator producing a maximum voltage of 100 V at a frequency of 5000 Hz .

a. Calculate the maximum current in the circuit.

b. Calculate the maximum voltage drop across the resistor, the capacitor, and the inductor.

c. Does the current in this circuit lead the voltage or does the voltage lead the current? EXPLAIN your answer.

9. Peak values for a neodymium-glass laser are 600 Joules for 1 nanosecond. If the cross-sectional area of the laser beam is 1 cm^2 , what are the maximum values of E and B?
 $\mu_0 = 4 \times 10^{-7} \text{ T-m/A}$.

10. Two parallel wires 50.0 m long are 25.0 cm apart and each carries a current of 10.0 A in the same direction.

a. Calculate the magnitude of the magnetic field produced by the current in the left wire at the position of the right wire. Indicate the direction of the magnetic field.

b. What is the force (magnitude and direction) between the wires?