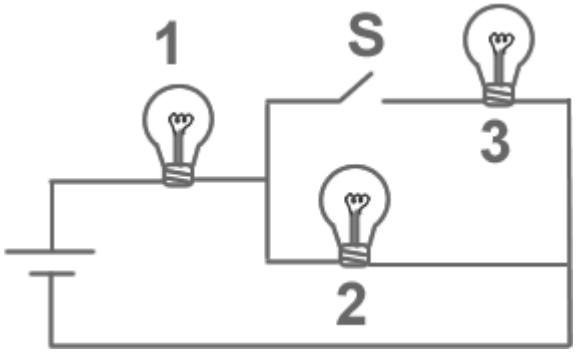
PHYSICS 102 EXAM #2 --- MULTIPLE CHOICE

Name_____

March 31, 2005

Choose the one alternative that best completes the statement or answers the question.

1) The figure below shows 3 identical lightbulbs connected to a battery. What happens to the brightness of lightbulb 1 when the switch S is closed?



A) The brightness increases

B) The brightness remains the same as before the switch is closed

C) The brightness will decrease momentarily then return to its previous level

D) The brightness will increase momentarily then return to its previous level

E) The brightness decreases

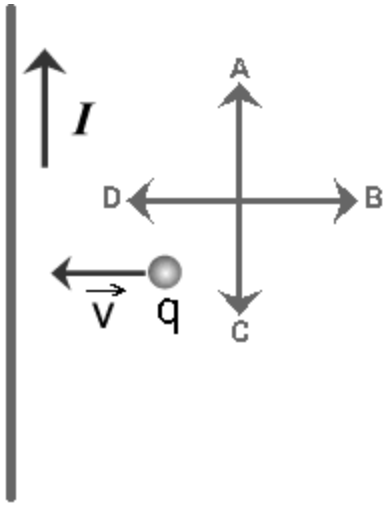
2) A capacitor of capacitance C is made of two cylinders of radii a, and b ($b > a$) carrying a linear charge density λ. What is the capacitance of a cylindrical capacitor with the same charge density λ, and cylinders of radii 2b and 2a?

A) 2C B) C/4 C) C/2 D) 4C E) C

3) A charged particle is moving with speed v perpendicular to a uniform magnetic field. A second identical charged particle is moving with speed 2v perpendicular to the same magnetic field. The frequency of revolution of the first particle is f. The frequency of revolution of the second particle is

A) f/4. B) 2f. C) f/2. D) f. E) 4f.

4) The figure below shows a small positive charge q moving toward a long current–carrying wire. Which of the arrows labeled A to D correctly represents the direction of the magnetic force applied on the charge?



A) D

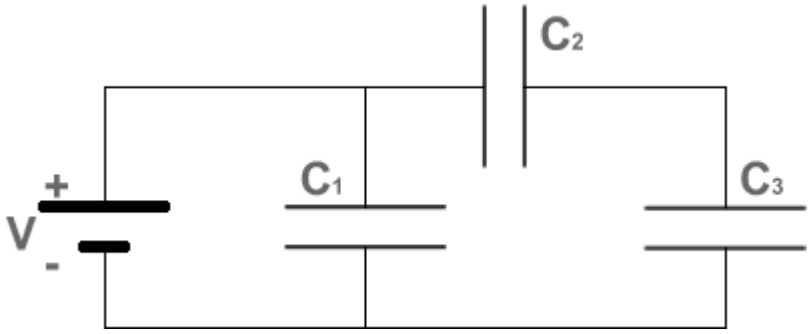
B) B

C) The force points in a direction perpendicular to the plane of the figure

D) A

E) C

5) Three capacitors C_1, C_2, and C_3 are connected to a battery as shown in the figure below. The three capacitors have equal capcitances. Which capacitor stores the most energy?



A) C_2 or C_3. They store the same amount of energy

B) C_2

C) C_1

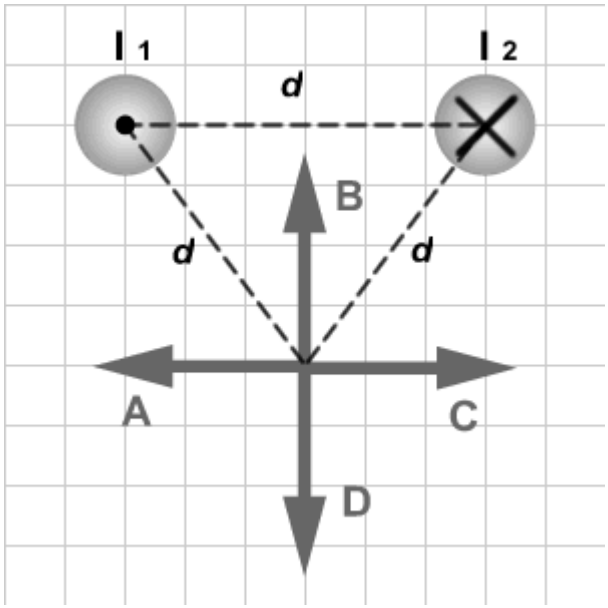
D) All three capacitors store the same amount of energy

E) C_3

6) A parallel–plate capacitor of capacitance C is connected to a battery of voltage V until it is fully charged. The energy density in the capacitor is then equal to u. If the same capacitor is then connected to a battery of voltage 2V its energy density becomes equal to

A) u/ 4. B) 4 u. C) 2 u. D) u. E) u /2.

7) The figure below shows two long wires carrying equal currents I_1 and I_2 flowing in opposite directions. Which of the arrows labeled A to D correctly represents the direction of the magnetic field due to the wires at a point located at an equal distance d from each wire?



A) B

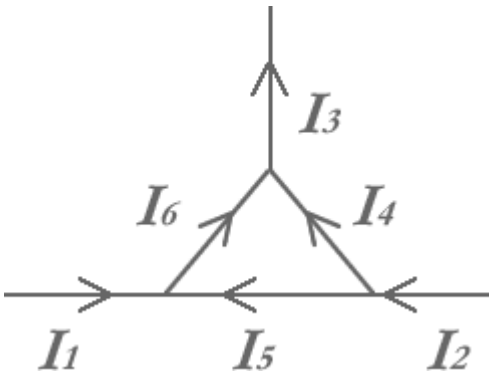
B) D

C) A

D) The magnetic field is equal to zero at that point

E) C

8) The figure below shows a junction with currents labeled I_1 to I_6. Which of the following statements is correct?



A) $I_6 + I_5 = I_1$

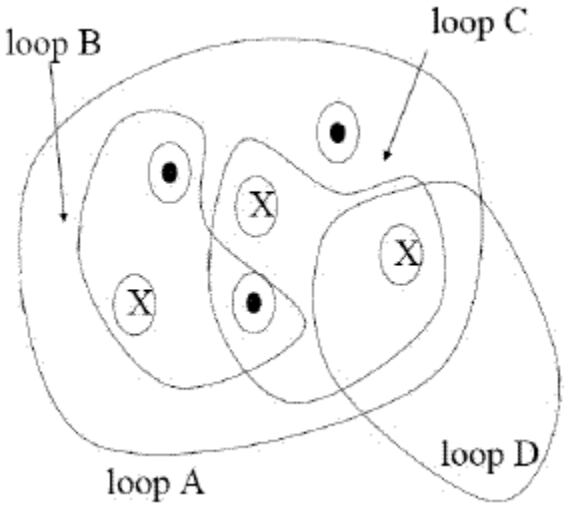
B) $I_1 + I_2 = I_6 + I_4$

C) $I_4 + I_3 = I_6$

D) $I_2 = I_6 + I_4$

E) $I_1 + I_3 = I_6 + I_4$

9) Consider six wires coming into or out of the page, all with the same current. Rank the line integral of the magnetic field (from greatest to least) taken counterclockwise around each loop shown.



A) B > C > D > A

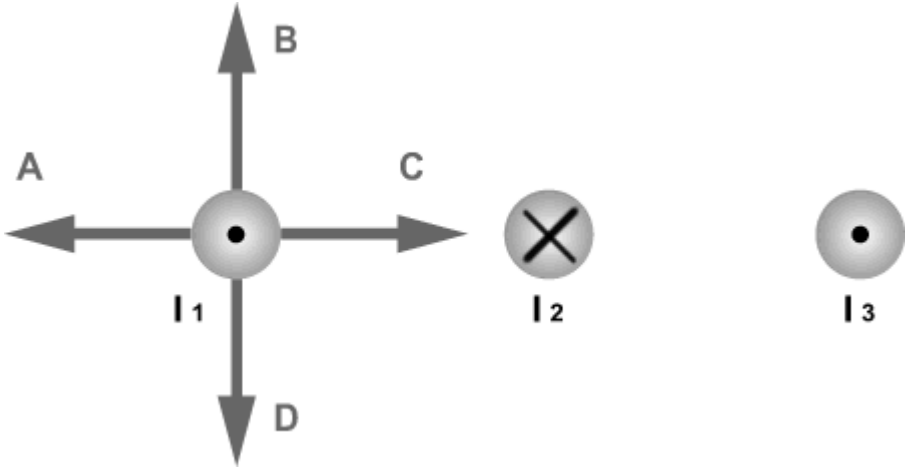
B) B > C = D > A

C) B > A > C = D

D) C > B = D > A

E) C > A > B = D

10) The figure below shows 3 long, parallel current–carrying wires. The magnitudes of the currents are equal and their directions are indicated in the figure. Which of the arrows drawn near the wire carrying current 1 correctly indicates the direction of the magnetic force acting on that wire?



A) D

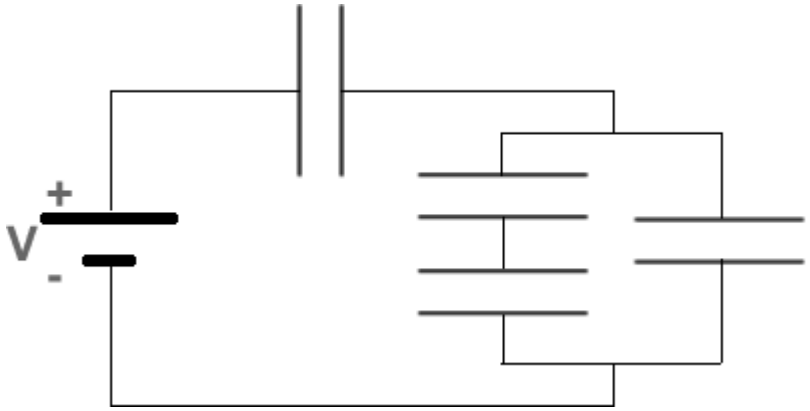
B) A

C) The magnetic force is equal to zero

D) B

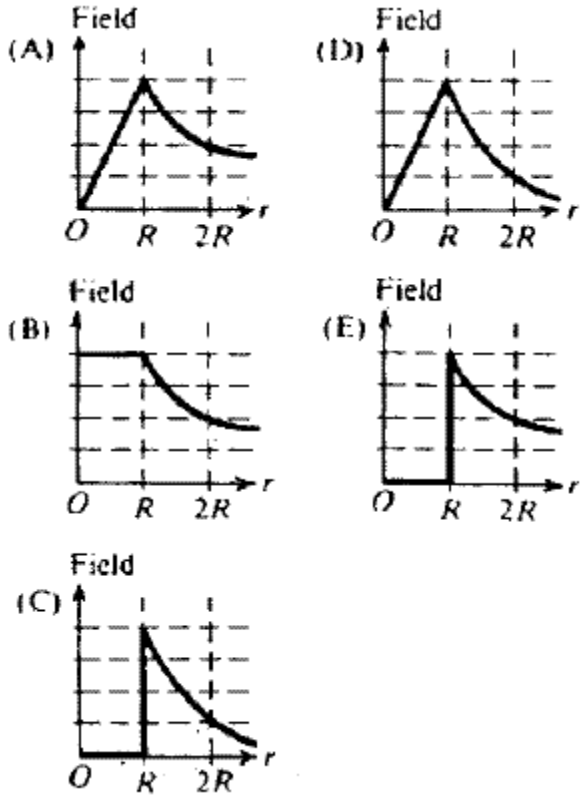
E) C

11) What is the equivalent capacitance of the capacitor network shown in the figure below? (All the capacitors have a capacitance C = 5 μF . The voltage of the battery is V = 6V.)



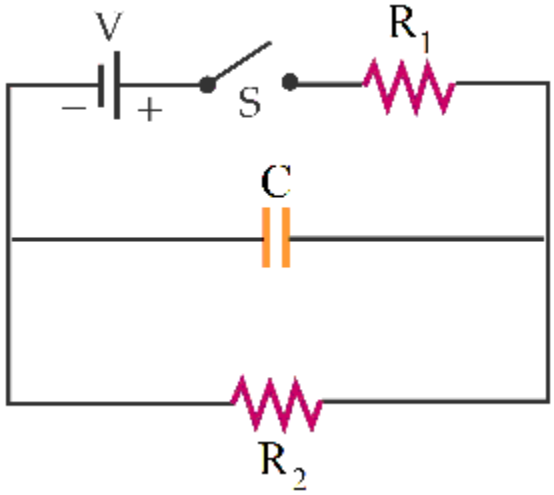
A) 1 μF B) 20 μF C) 3 μF D) 5 μF E) 10 μF

12) A wire of radius R carries a current I uniformly distributed throughout its interior.Which plot below best represents the magnitude of the magnetic field as a function of r, the distance from the center of the wire?



A) A B) B C) C D) D E) E

For questions 13 – 15, refer to the circuit below.



13) What is the current through R_2 as $t \to \infty$?

A) $\frac{V}{R_1+R_2}$ B) $\frac{V}{R_1}$ C) $\frac{V}{R_2}$ D) 0 E) ∞

14) What is the current through C at t = 0?

A) $\frac{V}{R_1+R_2}$ B) $\frac{V}{R_2}$ C) $\frac{V}{R_1}$ D) 0 E) ∞

15) What is the charge on the capacitor as $t \to \infty$?

A) V C

B) $(\frac{V}{R_1} R_2)C$

C) $(\frac{V}{R_2} R_1)C$

D) $(\frac{V}{R_1+R_2} R_2)C$

E) 0

Last Name: First Name:

Physics 102 Spring 2005: Test 2—Multiple-Choice Answers

	A	B	C	D	E
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

Answer Key
Testname: EXAM2_MATERIAL_USED_1

1) A
2) E
3) D
4) E
5) C
6) B
7) A
8) B
9) C
10) B
11) C
12) A
13) A
14) C
15) D