Instructor: *P. Kumar*

PHYSICS DEPARTMENT

PHY 2049 Midterm II June 20, 2007

Name (print, last first): _____ Signature: _____

On my honor, I have neither given nor received unauthorized aid on this examination.

YOUR TEST NUMBER IS THE 5-DIGIT NUMBER AT THE TOP OF EACH PAGE.

DIRECTIONS

(1) **Code your test number on your green answer sheet (use 76–80 for the 5-digit number)**. Code your name on your answer sheet. **Darken circles completely (errors can occur if too light)**. Code your student number on your answer sheet.
(2) **Blacken the circle of your intended answer completely, using a number 2 pencil**. Do not make any stray marks or the answer sheet may not read properly.
(3) The answers are rounded off. Choose the closest to exact. There is no penalty for guessing.

>>>>>>>>>**WHEN YOU FINISH** <<<<<<<<<
Hand in the green answer sheet separately.

1. A 60-watt light bulb carries a current of 0.5 A. The total charge passing through it in one hour is:

(1) 1800C (2) 3600C (3) 3000C (4) 2400C (5) 120C

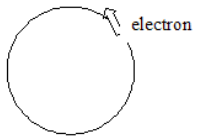
2. Five cylindrical wires are made of the same material. Their lengths and radii are
wire 1: length l, radius r
wire 2: length l/4, radius r/2
wire 3: length l/2, radius r/2
wire 4: length l, radius r/2
wire 5: length 5l, radius 2r
Rank the wires according to their resistances, least to greatest.

(1) 1 and 2 tie, then 5, 3, 4 (2) 1, 2, 3, 4, 5 (3) 5, 4, 3, 2, 1 (4) 1, 3, 4, 2, 5 (5) 1, 2, 4, 3, 5

3. Two conductors are made of the same material and have the same length. Conductor A is a solid wire of diameter 1m. Conductor B is a hollow tube of inside diameter 1m and outside diameter 2m. The ratio of their resistance, R_A/R_B, is:

(1) 3 (2) $\sqrt{2}$ (3) 2 (4) 1 (5) 4

4. Electrons are going around a circle in a counterclockwise direction as shown. At the center of the circle they produce a magnetic field that is:

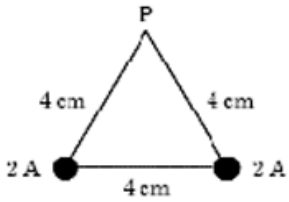


(1) into the page (2) out of the page (3) to the left (4) to the right (5) zero

5. Two long straight wires are parallel and carry current in the same direction. The currents are 8.0 and 12A and the wires are separated by 0.40 cm. The magnetic field in tesla at a point midway between the wires is:

(1) 4.0×10^{-4} (2) 0 (3) 8.0×10^{-4} (4) 12×10^{-4} (5) 20×10^{-4}

6. Two long straight wires pierce the plane of the paper at vertices of an equilateral triangle as shown. They each carry 2A, out of the paper. The magnetic field at the third vertex (P) has magnitude (in T):

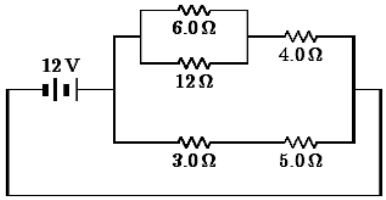


(1) 1.7×10^{-5} (2) 1.0×10^{-5} (3) 2.0×10^{-5} (4) 5.0×10^{-6} (5) 8.7×10^{-6}

7. Nine identical wires, each of diameter d and length L, are connected in parallel. The combination has the same resistance as a single similar wire of length L but whose diameter is:

   (1) 3d (2) 9d (3) d/3 (4) d/9 (5) d/81

8. The current in the 5.0-Ω resistor in the circuit shown is:

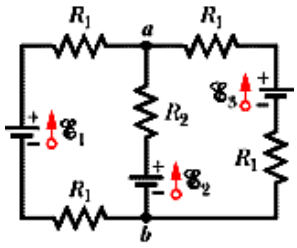


   (1) 1.5A (2) 0.42A (3) 0.67A (4) 2.4A (5) 3.0A

9. A proton (charge e), traveling perpendicular to a magnetic field, experiences the same force as an alpha particle (charge 2e) which is also traveling perpendicular to the same field. The ratio of their speeds, $v_{\text{proton}}/v_{\text{alpha}}$, is:

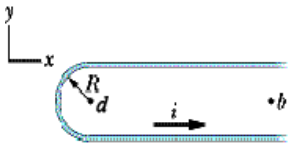
   (1) 2 (2) 0.5 (3) 1 (4) 4 (5) 8

10. In the figure, the resistances are $R_1 = 1.5\Omega$, $R_2 = 2.3\Omega$, and the ideal batteries have emfs $\mathcal{E}_1 = 2.0$ V, and $\mathcal{E}_2 = \mathcal{E}_3 = 3$ V. What is the current through the branch containing the battery $\mathcal{E}_3$?



   (1) 0.101A
   (2) −0.232A
   (3) 0.132A
   (4) −0.323A
   (5) None of these

11. In the figure, a current $i = 25$ A is set up in a long hairpin conductor formed by bending a wire into a semicircle of radius R = 1.0 mm. (Take the positive direction of the z axis to be out of the page.) What is the magnitude and direction of B at a?



   (1) 0.0129 T, out of the paper
   (2) 0.0100 T, out of the paper
   (3) 0.0129 T, into the paper
   (4) 0.0100 T, into the paper
   (5) None of these

12. At the end of the exam please check your scantron sheet. Make sure that you have entered your name, your UF ID, the correct answers and the exam code. Also please do not forget to sign the scantron sheet at the back.

   (1) I have done all.
   (2) Please stop bothering me, I am taking an exam.
   (3) What is a scantron?
   (4) Why?
   (5) None of these.