Physics 208 - Grading Sheet.

Dept. of Physics and Astronomy. TAMU.

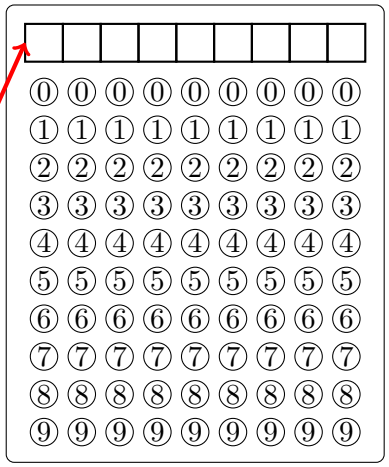
Marking Instructions

Fill oval completely ① ● ③ ④ ⑤

Erase cleanly ① ② ③ ④ ⑤

Students Fill Only this information

1. First Name: _____ Last Name: _____
2. Section: _____
3. Clearly hand-write your 9-digit UIN in the square boxes at the right.
4. Then fill out the bubbles below corresponding to the digits in the UIN.



Exam Information:

1. Fill whether this is exam 1, 2, 3 or the Final ① ② ③ Ⓕ

Graders Fill Only this information

List of Learning Objectives: mark only those objectives achieved.

1. ① ② ③ ④ ⑤	21. ① ② ③ ④ ⑤	41. ① ② ③ ④ ⑤	61. ① ② ③ ④ ⑤
2. ① ② ③ ④ ⑤	22. ① ② ③ ④ ⑤	42. ① ② ③ ④ ⑤	62. ① ② ③ ④ ⑤
3. ① ② ③ ④ ⑤	23. ① ② ③ ④ ⑤	43. ① ② ③ ④ ⑤	63. ① ② ③ ④ ⑤
4. ① ② ③ ④ ⑤	24. ① ② ③ ④ ⑤	44. ① ② ③ ④ ⑤	64. ① ② ③ ④ ⑤
5. ① ② ③ ④ ⑤	25. ① ② ③ ④ ⑤	45. ① ② ③ ④ ⑤	65. ① ② ③ ④ ⑤
6. ① ② ③ ④ ⑤	26. ① ② ③ ④ ⑤	46. ① ② ③ ④ ⑤	66. ① ② ③ ④ ⑤
7. ① ② ③ ④ ⑤	27. ① ② ③ ④ ⑤	47. ① ② ③ ④ ⑤	67. ① ② ③ ④ ⑤
8. ① ② ③ ④ ⑤	28. ① ② ③ ④ ⑤	48. ① ② ③ ④ ⑤	68. ① ② ③ ④ ⑤
9. ① ② ③ ④ ⑤	29. ① ② ③ ④ ⑤	49. ① ② ③ ④ ⑤	69. ① ② ③ ④ ⑤
10. ① ② ③ ④ ⑤	30. ① ② ③ ④ ⑤	50. ① ② ③ ④ ⑤	70. ① ② ③ ④ ⑤
11. ① ② ③ ④ ⑤	31. ① ② ③ ④ ⑤	51. ① ② ③ ④ ⑤	71. ① ② ③ ④ ⑤
12. ① ② ③ ④ ⑤	32. ① ② ③ ④ ⑤	52. ① ② ③ ④ ⑤	72. ① ② ③ ④ ⑤
13. ① ② ③ ④ ⑤	33. ① ② ③ ④ ⑤	53. ① ② ③ ④ ⑤	73. ① ② ③ ④ ⑤
14. ① ② ③ ④ ⑤	34. ① ② ③ ④ ⑤	54. ① ② ③ ④ ⑤	74. ① ② ③ ④ ⑤
15. ① ② ③ ④ ⑤	35. ① ② ③ ④ ⑤	55. ① ② ③ ④ ⑤	75. ① ② ③ ④ ⑤
16. ① ② ③ ④ ⑤	36. ① ② ③ ④ ⑤	56. ① ② ③ ④ ⑤	76. ① ② ③ ④ ⑤
17. ① ② ③ ④ ⑤	37. ① ② ③ ④ ⑤	57. ① ② ③ ④ ⑤	77. ① ② ③ ④ ⑤
18. ① ② ③ ④ ⑤	38. ① ② ③ ④ ⑤	58. ① ② ③ ④ ⑤	78. ① ② ③ ④ ⑤
19. ① ② ③ ④ ⑤	39. ① ② ③ ④ ⑤	59. ① ② ③ ④ ⑤	79. ① ② ③ ④ ⑤
20. ① ② ③ ④ ⑤	40. ① ② ③ ④ ⑤	60. ① ② ③ ④ ⑤	80. ① ② ③ ④ ⑤

Physics 208 - Exam III

Fall 2017 (all sections) November 13th, 2017.

Please fill out the information and read the instructions below, but
do not open the exam until told to do so.

Rules of the exam:

1. You have 75 minutes (1.25 hrs) to complete the exam.
2. Formulae are provided to you with the exam on a separate sheet. Make sure you have one before the exam starts. You may not use any other formula sheet.
3. Check to see that there are 6 numbered (6 double-sided) pages plus a blank page for additional work if needed, in addition to the scantron-like cover page. Do not remove any pages.
4. If you run out of space for a given problem, the last page has been left blank and may be used for extra space. Be sure to indicate at the problem under consideration that the extra space is being utilized so the graders know to look at it!
5. You will not be allowed to use calculators on this exam since all problems use symbols in their problem statements or the numbers have been chosen to make any required arithmetic calculations straightforward. If there are problems resulting in numerical answers you may leave them in fractional form.
6. **NOTE** that you **must** show your work clearly to receive full credit.
7. Cell phone use during the exam is strictly prohibited. Please turn off all ringers as calls during an exam can be quite distracting.
8. Be sure to put a box around your final answer(s) and clearly indicate your work. Credit can be given only if your work is legible, clearly explained, and labelled.
9. All of the questions require you show your work and reasoning.
10. Have your TAMU ID ready when submitting your exam to the proctor.

Fill out the information below and sign to indicate your understanding of the above rules

Name: _____ UIN:_____
(printed legibly)

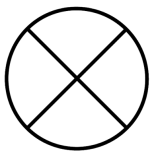
Signature: _____ Section Number: _____

Instructor: Mioduszewski Kocharovskaya Saslow **(circle one)**

A. A particle with mass ***m*** and positive charge ***q*** moves along the circular trajectory of radius ***R*** in the x-y plane in the counterclockwise direction in the uniform magnetic field of magnitude ***B***. (i) What is the direction of the magnetic field? (ii) What is the kinetic energy of this particle?

LO	P	F
3.1		
5.1		
46.1		
46.2		
48.1		

B. A long, straight wire carries a current of ***I*** in the direction shown (into the page). An electron is traveling in the vicinity of the wire. At the instant when the electron (charge of electron is ***-e***) is distance ***d*** from the wire and traveling with a speed of ***V*** directly toward the wire, what is the (i) **magnitude** and (ii) **direction** of the force that the magnetic field of the current exerts on the electron?

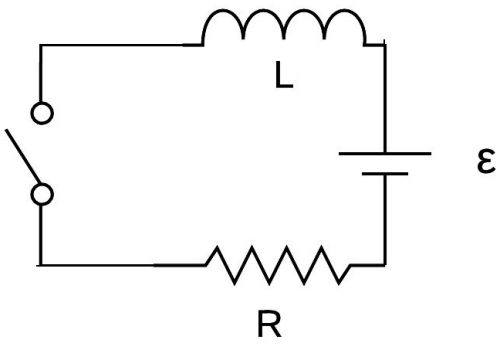


LO	P	F
46.3		
46.4		
52.1		

C. Two long, straight, parallel wires are distance ***d*** apart. One wire carries a current I_1. (i) What current is carried by another wire in the same direction if the *force per unit length* exerted by the first wire on the second is ***f*** ? (ii) Is the force between the wires attractive or repulsive?

LO	P	F
3.2		
49.1		
52.2		
53.1		
53.2		

D. An RL circuit is connected to a source of emf through a switch. What is the current through the circuit (i) immediately after the switch is closed and (ii) a very long time after the switch is closed?

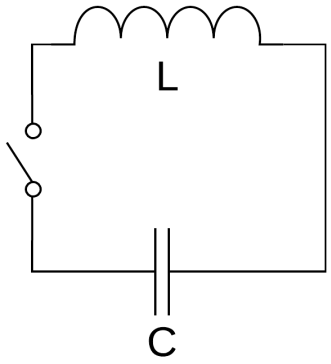


LO	P	F
65.1		
65.2		

Problem I.

An LC circuit consists of an inductor ***L*** and a capacitor ***C***. The initial charge of the capacitor is Q_o, and the initial current in the inductor is zero.

A. What is the initial energy stored in the capacitor?



B. What is the maximum current in the inductor?

C. When the current in the inductor has 1/3 its maximum value, (i) what is the energy stored in the inductor, and (ii) what is the charge on the capacitor?

LO	P	F
3.3		
3.4		
5.2		
31.1		
64.1		
66.1		
66.2		

Problem II.

A long, straight wire with a circular cross section of radius ***R*** carries a current ***I***. Assume that the current density is not constant across the cross section of the wire, but rather varies as $J=\alpha r^2$, where α is a constant and "r" is the distance from the center axis of the wire.

A. By the requirement that J integrated over the cross section of the wire gives the total current ***I***, what is the constant α in terms of ***R*** and ***I***?

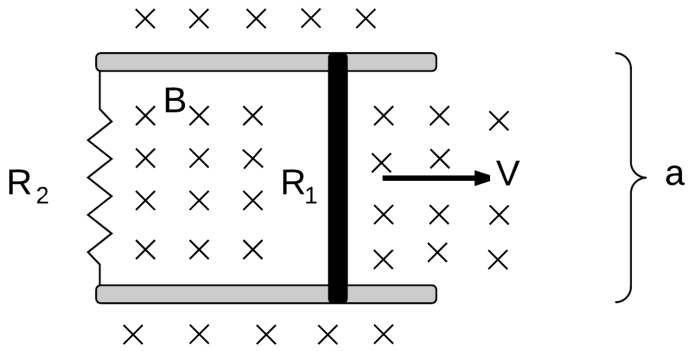
B. What is the magnitude of magnetic field B outside of the wire as a function of distance from the center of the wire ($r>R$)?

C. What is the magnitude of magnetic field B inside the wire as a function of distance from the center of the wire ($r<R$)?

LO	P	F
3.5		
5.3		
7.1		
7.2		
54.1		
54.2		
55.1		
55.2		

Problem III.

A rod of length ***a*** with resistance R_1 slides without friction on two resistance-free tracks which are connected by a resistor R_2 in a uniform magnetic field ***B*** that is perpendicular to the plane of the tracks.



A. What is the magnitude and direction (clockwise or counterclockwise) of the current through the resistors if the rod has constant velocity in the direction shown in the figure?

B. What force needs to be applied to the rod to maintain constant velocity of the rod?

LO	P	F
36.1		
41.1		
49.2		
58.1		
59.1		