PHYSICS DEPARTMENT

PHY 2054 3rd Exam March 26, 2001

Buchler/Ipser

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) Print your name on this sheet and sign it also.
(3) Do all scratch work anywhere on this exam that you like. At the end of the test, this exam printout is to be turned in. No credit will be given without both answer sheet and printout with scratch work most questions demand.
(4) **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.
(5) There is no penalty for guessing.

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

m(electron) $= 9.1 \times 10^{-31}$ kg	$k_E = 9 \times 10^9$ N·m^2/C^2
e(electron) $= 1.6 \times 10^{-19}$ C	$\epsilon_0 = 8.85 \times 10^{-12}$ F/m
$\mu_0 = 4\pi \times 10^{-7}$ Tm/A	1 eV $= 1.6 \times 10^{-19}$J
m(proton) $= 1.67 \times 10^{-27}$kg	$c = 3 \times 10^8$ m/s

1. A rigid conducting rod of mass M is perpendicular to and slides down a set of conducting parallel rails (see Fig. 1) with constant speed v_0. The rails make an angle of 60° with the vertical gravitational acceleration ($g = 9.8$ m/s^2). There exists a uniform vertical magnetic field $\vec{B}_0$. The rails are connected to a light bulb of resistance R. Neglect the resistance of the rails and rod. If the magnetic field strength is doubled, the constant velocity now becomes

(1) $v_0/4$ (2) $v_0/2$ (3) v_0 (4) $2v_0$ (5) $4v_0$

2. How long (in cm) should a quarter-wave length antenna be so as to be optimal for Classic 89 (F = 89.1 MHz)?

(1) 84 (2) 1.2 (3) 708 (4) 350 (5) 150

3. The motor shown in Fig. 2.1 is rotating clockwise. The DC generator shown in Fig. 2.2 is also rotating clockwise.
[i] What is the direction of the current flow at point P?
[ii] What is the direction of the current flow at point Q?

(1) [i] to the left and [ii] to the right
(2) [i] to the right and [ii] to the right
(3) [i] to the right and [ii] to the left
(4) [i] to the left and [ii] to the left
(5) none of the above