Physics 235 Winter 2013: Exam #2
Form #1

Please print your name:_____

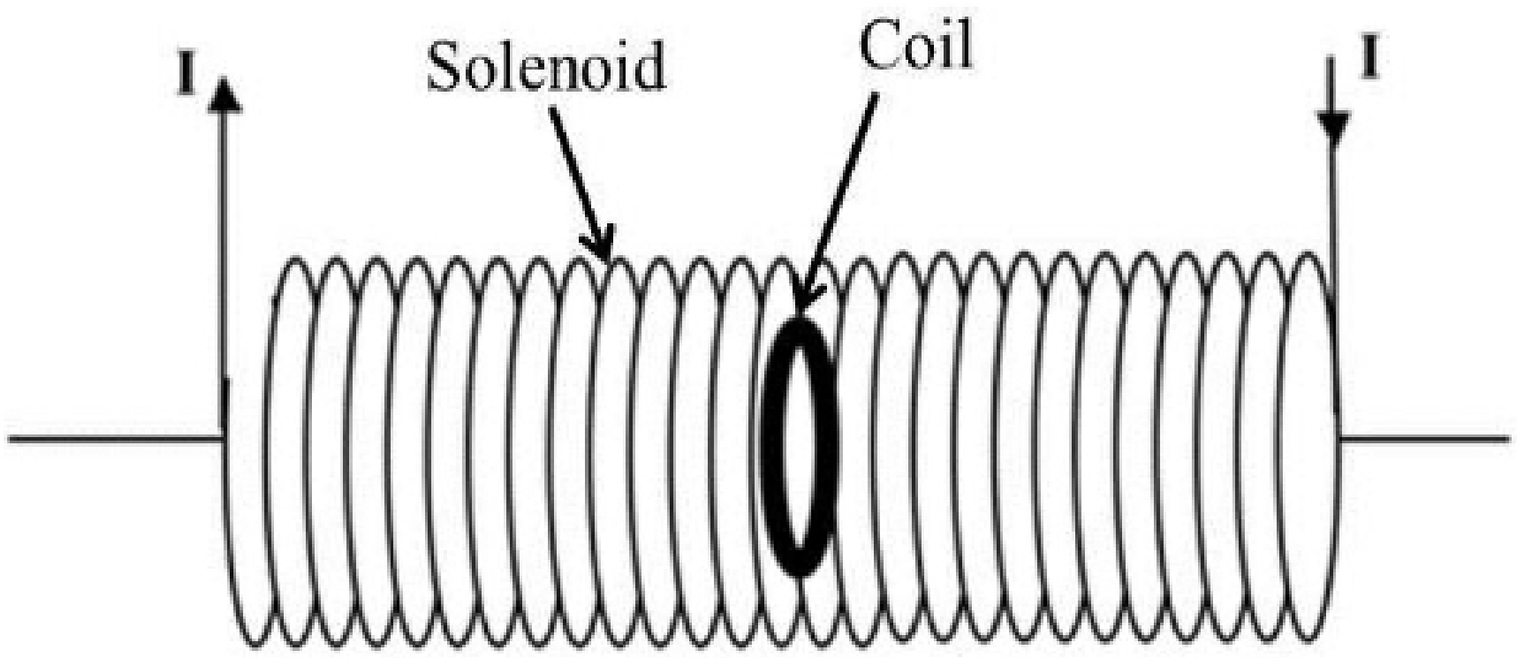
Instructions

1. Fill in your name above
2. Fill in your name, ID number, and **form number** on your scantron sheet
3. This will be a 1 hour 50 minute, closed book exam.
4. You may use a calculator, please do not share calculators.
5. The exam includes 20 multiple choice questions which will be machine graded. Each question is worth 5 points. No partial credit will be given.
6. For this exam, you can bring *two* 3x5" cards with any notes you wish to have. You will also find all the physical constants that you might require listed below.

Constants you might need:

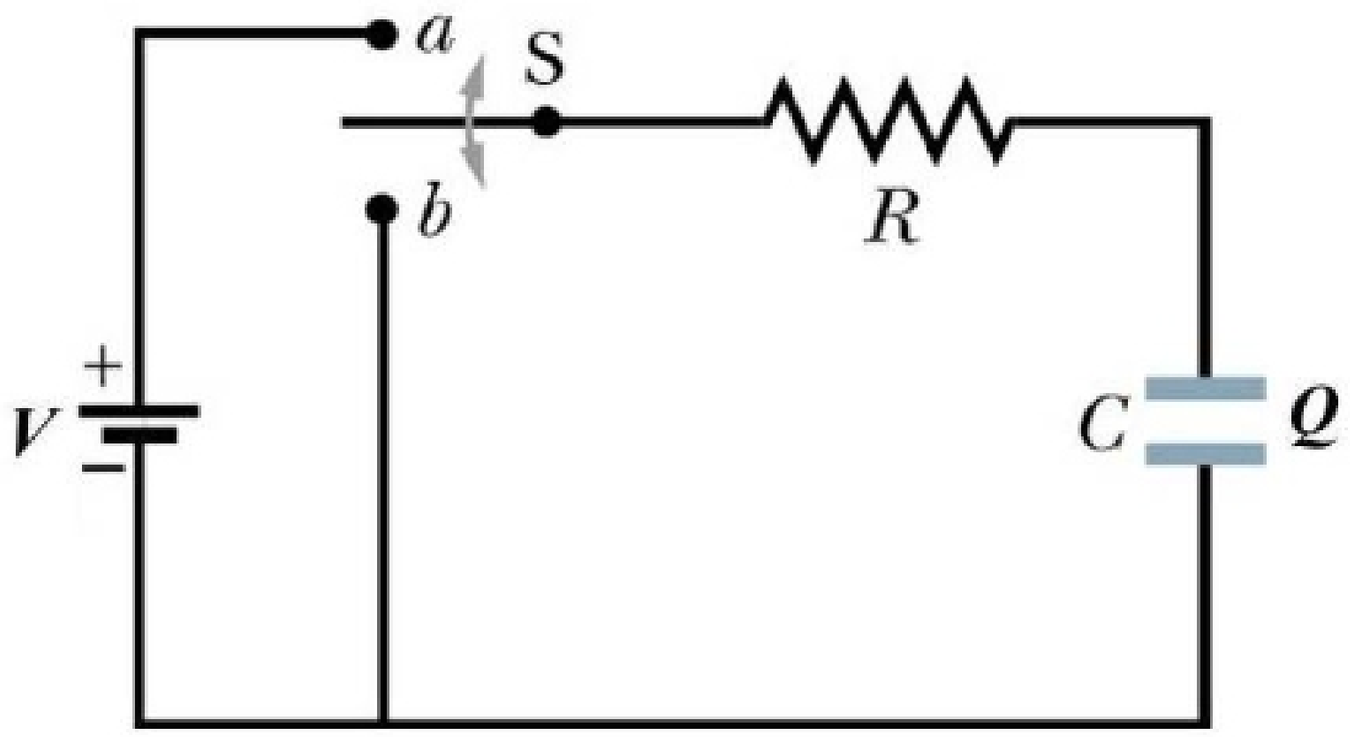
$k = 8.99 \times 10^{9}\ Nm^2/C^2$
$\varepsilon_0 = 8.85 \times 10^{-12}\ C^2/Nm^2$
$g = 9.8\ m/s^2$
$\mu_0 = 4\pi \times 10^{-7}\ Tm/A$
Mass of the electron: 9.11×10^{-31} kg
Magnitude of the electron charge: 1.6×10^{-19} C
Mass of the proton: 1.67×10^{-27} kg
Atomic Mass Unit (1 amu): 1.66×10^{-27} kg
1 Gauss = 10^{-4} T
Speed of sound in air = 340 m/s
Threshold of hearing $I_0 = 10^{-12}\ W/m^2$
Speed of light in vacuum = 3.0×10^{8} m/s
$k_B = 1.38 \times 10^{-23}\ m^2kg/s^2K = 1.38 \times 10^{-23}$ J/K
Astronomical Unit (1AU) = 1.5×10^{11} m

1. A 5.0 m long solenoid has a radius of 20 cm and 4000 turns/m. The current in the solenoid flows clockwise as viewed from the right and *decreases* at a rate of 3500 A/s. A small conducting coil of radius 10 cm containing *five turns* is placed in the center of the solenoid with its axis the same as the solenoid axis as shown. The resistance of the five-turn coil is 2 Ohms. Determine the current induced in the coil.



A) 2.4 A, clockwise as viewed from the right.
B) 1.38 A, clockwise as viewed from the right.
C) 0.65 A, counterclockwise as viewed from the right.
D) 0.03 A, counterclockwise as viewed from the right
E) 0.15 A, clockwise as viewed from the right.

2. In the circuit shown below, the capacitor is initially uncharged. The switch is then moved to position *a*. After a long time the potential difference across the capacitor is equal to that of the battery, $V = 10$ V and the capacitor has acquired a charge $Q = 60\ \mu C$. The switch is then moved to position *b*. If $R = 1.0 \times 10^5\ \Omega$, how long after the switch is closed to position *b* will the charge on the capacitor be $20\ \mu C$?



A) 0.066 s
B) 0.66 s
C) 6.60 s
D) 66 s
E) 660 s