

FINAL EXAM

Name (print) _____ Name (signed) _____

Discussion Instructor (circle one): An Chen Emerson Iguchi Stoops

Discussion Section #: _____

REPORT ALL NUMBERS TO THREE SIGNIFICANT FIGURES!

Use the conversion constants and data given on the front page.

5 points each

- (a) Calculate the cyclotron frequency, in Hz, of an electron in a magnetic field of 3330 gauss.

$$\omega = \frac{qB}{2\pi m} = 9.31 \cdot 10^9 \text{ Hz}$$

- (b) Calculate the capacitance of a parallel plate capacitor which is circular with a radius of 1.57 m, and a plate separation of 1.10 mm. There is no dielectric.

$$C = \frac{\epsilon_0 A}{d} = 6.23 \cdot 10^{-8} \text{ F}$$

- (c) Calculate the magnetic dipole moment of a rectangular coil of wire consisting of 327 turns and carrying a current of 2.34 A, with a length of 4.26 cm and a width of 2.25 cm.

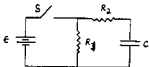
$$M = NIA = 0.733 \text{ A} \cdot \text{m}^2$$

- (d) A 12.0 pF capacitor is charged to 110 V. It is connected at both ends to an uncharged 17.0 pF capacitor. Find the potential across the pair of capacitors.

$$45.5 \text{ V}$$

- (e) In the circuit shown the switch is closed for 1.75 s, and opened at $t = 0$. Calculate the charge on the capacitor at $t = 2.25$ s.

$R_1 = 2250 \Omega$, $R_2 = 1550 \Omega$, $C = 3.50 \times 10^{-3} \text{ F}$,
 $\epsilon = 150 \text{ V}$.



$$0.122 \text{ C}$$

- (f) Calculate the magnetic energy stored in a toroid with 975 turns carrying 1.75 A. The cross section of the toroid is square, of side $a = 1.80$ cm, and inner radius $a/2$.



$$5.76 \cdot 10^{-3} \text{ J}$$