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.

\[ \omega = \frac{qB}{2\pi m} = 9.31 \times 10^9 \text{ Hz} \]

(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.

\[ C = \varepsilon_0 \frac{A}{d} = 6.23 \times 10^{-8} \text{ F} \]

(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 \( t = 2.25 \text{ s} \).

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

\[ Q = 0.122 \text{ C} \]

(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 \( a = 1.80 \text{ cm} \), and inner radius \( a/2 \).

\[ 5.76 \times 10^{-3} \text{ J} \]