
Your name: _____ ID: _____ Oct. 19th, 2020

EE214000 Electromagnetics, Fall, 2020

Quiz #1-1, Open books, notes (21 points), due 11 pm, Wednesday, Oct. 21st, 2020
(email solutions to 劉峰麒 alex851225@gmail.com)

Late submission won't be accepted!

1. When you design a capacitor, what are the key parameters to increase its capacitance? (6 points)

2. In Sec. 7.3, for a cylindrical capacitor of length L , we derive a capacitance given by

$$C \equiv \frac{Q}{V} = \frac{2\pi\epsilon L}{\ln(b/a)}.$$

Show that, when the radii a and b are big, the expression converges to $C = \frac{\epsilon S}{d}$ with $d = b - a$. (5 points)

3. In Sec. 7.4, we derive the expression $C \equiv \frac{Q}{V} = \frac{4\pi\epsilon}{(1/a - 1/b)}$ for the capacitance of a

spherical capacitor. Argue that when radii a and b are big, the expression also

converge to $C = \frac{\epsilon S}{d}$ (4 points)

4. If you have a few capacitors in your hands and you want to connect them together to have a high capacitance for your circuit, would you choose serial or parallel connections for your capacitors? (3 points)

5. For a high-speed circuit containing R and C , if you would like to have a signal bandwidth > 1 GHz, what is the requirement on the RC time constant of the circuit? (3 points)