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EE214000 Electromagnetics, Fall 2020

Your name: _____ ID: _____ Dec. 14th, 2020

EE214000 Electromagnetics, Fall, 2020
Quiz #14-1, Open books, notes (25 points), due 11 pm, Wednesday, Dec. 16th, 2020
(submission through iLMS)

Late submission won't be accepted!

1. Explain why you can't use the Ampere's law $\oint_C \vec{B} \cdot d\vec{l} = \mu_0 I$ to calculate the magnetic flux density at $P(r,\phi,0)$? Of course, you could try it to get a different answer but the answer is wrong (why?). (5 points)

2. Step by step, write down the derivation of the far-zone magnetic flux density for a magnetic dipole. (6 points)

3. Explain why the magnetic flux density B can be greatly increased nearby or inside a ferromagnetic material subject to an external current (6 points); whereas the electric field intensity E is usually reduced inside a dielectric material given an external charge. (3 points) Graphic illustrations along with text explanations are encouraged

4. In electrostatics, you learned that the electric field lines entering a perfect conductor along the surface normal of the conductor. How does the magnetic field lines in vacuum enter a non-conducting magnetic material with $\mu_r \to \infty$? (5 points)