Inductive RFID Lab 1
Worksheet

Group: _____________________ Class: ____________ Date: ____________

Part 1. Read Range Measurement
Calculate theoretical far-field distance for the antenna of the reader. Then measure the actual maximum distance the card can be read from the reader. Dimensions of antenna 21.5cm X 23cm.

The approximate outer edge of the reactive near field is given by:

\[ r \approx \lambda \]

Where \( \lambda \) is wavelength. The outer boundary of this region for an electrically large antenna:

\[ r = \frac{2D^2}{\lambda} \]

Where D is the largest dimension of radiating antenna.

Theoretical far-field distance: ________cm
Experimental maximum distance: ________cm

Part 2. Orientation Sensitivity
Measure the maximum distance from the reader that a tag can be read if tilted at 45°. Measure the maximum distance from the reader that a tag can be read if tilted at 90° (vertical orientation).

45° degree max. distance: ________cm
90° degree max distance: ________cm

Part 3. Performance Through a Dielectric
Measure the maximum distance the tag may be read through a standard classroom desk.

Max distance through desk: ________cm

Part 4. Conductors Effect on Magnetic Flux
Maximum distance the tag can be read while next to metal slab.

Max distance while next to metal: ________cm
Part 5. Antenna’s Magnetic Fields Test
Measure the maximum distance for the antenna and tag on the same horizontal plane. Measure from the edge of the antenna to the center of the tag keeping the tag horizontal (flat).

Max distance on horizontal plane: _________cm

Questions.

1. What powers the chip inside the tag to allow RFID to work? Explain.

2. What is the expected read distance for a tag with a vertical orientation in the center of the antenna (Part 2)? Why?

3. What is the expected read distance for a tag flush with a metal slab (Part 4)? Why? Hint: How does the metal affect the magnetic fields.

4. Why in Part 5 are you able to read the RFID tag? Explain.