In The Name of God

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All of the codes are in the proteus and simulated in the protues. Note that all of the sections of the first question were merged into a single file. And all of the requirments are implemented inside a single file.

1 QUESTION 1

The AIN0 voltage is equal to $\frac{5*10^3*10}{R_1+10^3*10}$.
The voltage that the humidity sensor generates when it's equal to 80 percent is equal to $0.034*80+0.6=3.32$.
By putting equal both of the equations we reach to the number $R1 = 5060\Omega$.

2 QUESTION 2

1. Because a 1 percent change in humidity causes a 7 number change in the adc calculated value, so the percision to which it can measure the humidity is $\frac{1}{7}$.
2. Because of heavy usage of this formula we calculate the general formual so we can find the resistence for any given p % of humidity.

$$R_1 = \frac{5*10^4}{0.6+0.034*p} - 10^4$$

By substuting the given percents we reach to:

$$R_2 = 29062\Omega$$

$$R_3 = 8939\Omega$$

3. The source code and simulation results can be both found in the attached files.

4. The best mode for putting ADC to sleep is ADC noise reduction mode. you can enable this mode by simple putting SM2..0 bits equal to the "001".