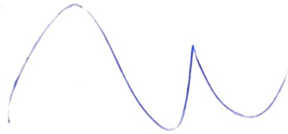

1 SDEP endsem

1 Sensor characteristics

1 to 3.6V output
(0% RH) → (100% RH)

Supply voltage : 5V DC

~~Output~~ Protected against reverse polarity so no additional protection needed

Basic calculations:

Output voltage at 30% humidity =

$$1 + \frac{26}{1000} \times 30 = 1.78V$$

output voltage at 60% humidity =

$$1 + \frac{26}{1000} \times 60 = 2.56V$$

Accuracy is ±3% so to be safe we consider voltages margins
2.5V for 60%
and
1.86V for 30%.

Design Summary:

As the cost for failure of this device is very high (100,000 $), the solution needs to be extremely reliable, even if that means the cost of the device is more. The safety provided by the device is worth the additional cost.

- UI - In the problem statement the buzzer rings if the humidity is either too high or too low. However it would be more intuitive if along with the buzzer, LEDs indicate which of the two scenarios have taken place.

- Sensor: I assume that the sensor is perfectly linear within the range of humidities given and its output does not vary appreciably with temperature as we expect it to be fairly constant in a greenhouse

- ~~Power supply: As this is a low voltage device, a linear regulator will be extremely inefficient, hence a flyback converter will be preferred for this application. However, care must be taken to comply with EMI requirements~~

We see a tradeoff in the price of components and their quality. As this is a critical application, we choose costlier, better quality components to ensure reliability.

We also choose a very simple outer casing which is see through to ensure fast repairability should anything go wrong with the device. This is because the device can't be down for more than 2 hours at a time without incurring a large loss. Hence quick access and repairability is key here.