CIRCUIT DESIGN AND COMPONENTS SELECTION

Lung sound has frequency of 100-2000Hz

The electret microphone has an output of 10-100mV

The stethoscope should not be bulky, power supply is 5V maximum

The IC chosen is MCP602 I/P 2.7-6.0V

The signal should oscillate half of the biasing voltage 3.3/2=1.65V

3.3V chosen to satisfy all supply of components including microcontroller

Coupling capacitor of 1uF chosen at the input to prevent DC signal from getting into the amplifier

The input side should act as High Pass Filter.

Choosing the input resistor decision driven by input frequency of 100 ohms

In order to bias the signal to oscillate at the middle of the input voltage we choose resistors R11 and R12 to be equal thus

From standard resistor chart, we can either choose 3.0k or 3.3k. 3.3k was the best choice for R11 and R12

With 3.3 as potential divider resistors the resulting Rinput is 1.65kOhm

With 3.3kOhm resistor the bias voltage will be given as

With 1.65kOhm the cut off frequency is given by

At the output we need to limit our frequencies at 2000Hz maximum

Design Problem is to fix either the value of resistor and find the value of capacitor or fix the value of capacitor and find value of the resistor

Trial one fixing capacitor at 1uF and f=2000Hz

Trial two, fixing resistor at 10kOhm

From standard capacitor chart, we can only choose 7.5nF or 8.2nF or 10nF

Trial one to test suitability of the 7.5nF capacitor

Trial two testing for 8.2nF

Trial three testing for 10nF

Thus 8.2nF is the best option

To conclude, the following were the selected components

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| S.No | Item | Quantity | Value |
|  | Resistor | 2 | 3.3k |
|  | Resistor | 1 | 10k |
|  | Capacitor | 1 | 8.2nF |
|  | MCP602 | 1 | 2.7-6.0V |
|  | Battery | 1 | 3.7V |
|  | Microphone | 1 | 20-100mV |

