**ENGG1100 Introduction to Engineering Design**

**Faculty of Engineering, The Chinese University of Hong Kong**

**Laboratory 3: Electronics Basics II**

**Laboratory Record and Report Sheet**

Group No: \_\_\_\_\_\_\_\_\_\_\_\_, Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Student 1:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(SID)\_\_\_\_\_\_\_\_\_\_\_\_\_ ; Student 2:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(SID)\_\_\_\_\_\_\_\_\_\_\_\_\_

***After your group has completed this lab work, demonstrate your results to the tutor and ask the tutor (TA) to sign below.* Submit this sheet to the tutor within one week after this laboratory session finishes.**

Name of the tutor/ signature of the tutor: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ /\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

***Experiment I: Time-domain signal measurement***

**Procedures:**

1. Connect the oscilloscope probe to the signal generator output. Use the oscilloscope to *observe the waveforms of the following settings.*
2. Plot the waveforms and **label clearly the axes for each plot** (for example, voltage in Volts and time in ms). The required settings are (Note: **Peak-to-peak voltage = Pk-Pk, Frequency =F)** :
   1. **Pk-Pk =1 Volt , F = 20Hz, Waveform :Sine, Offset = 0 Volt**
   2. **Pk-Pk =2 Volts , F = 200Hz, Waveform :Sine, Offset = 0 Volt**
   3. **Pk-Pk= 1 Volt , F = 2KHz, Waveform :Square, Offset = 0 Volt**
   4. **Pk-Pk= 1 Volt , F = 20Hz, Waveform :Square, Offset = 0.5 Volts**

**\*\* You must plot the waveforms by hand, photocopying is not acceptable)**

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| --- | --- |
| (2a) | (2b) |
| (2c) | (2d) |

1. *State the similarities and differences between the waveforms of (2a) and (2b) below.*

|  |  |
| --- | --- |
| Similarities | Differences |
|  |  |

1. *State the similarities and differences between the waveforms of (2a) and (2c) below.*

|  |  |
| --- | --- |
| Similarities | Differences |
|  |  |

1. *State the similarities and differences between the waveforms of (2a) and (2d) below.*

|  |  |
| --- | --- |
| Similarities | Differences |
|  |  |

***Experiment II-A: Soldering exercise using the Prototyping Board***

**Procedures:**

1. Place the resistors (5.1 KΩ each) side-by-side on the component side of the prototyping board. There should be an empty column (of holes) between resistors.
2. Solder the resistors to make sure they are firmly fixed on the board.
3. Bend the pins of each resistor so that all three resistors are connected in parallel. Solder the circuit. *Draw the schematic of the circuit that you have just soldered in the box below.*

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1. Measure the resistance of the resistor network by a multi-meter. It should be 1.7 KΩ if you make every connection correct. Can you explain why it is 1.7 KΩ?

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| Answer: |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| ***Experiment II-B: Soldering components onto a Printed Circuit Board (PCB)***  **Procedures:**   1. Place and solder the components given. Start with the flattest and smallest components first. 2. Functions of each part,   Part A is the input sensor inlets of the system board,  Part B is for the input buttons with LED indicators,  Part C is the regulated power unit of the system board.  Part D is the resistor networks for limiting currents for LEDs.   1. Feel free to ask TAs for help. They will help you to test whether your board is working or not. 2. There are still some missing components. They will be provided later in the coming laboratory sessions!   It is a good practice to have a soldering check list so that you won’t miss any components.  Circle or put a tick next to the component below if you have soldered it on the board.   |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Part A | |  |  | | --- | --- | | S1 |  | | S2 |  | | S3 |  | | S4 |  | | S5 |  | | S6 |  | | | Part B | |  |  | | --- | --- | | B1 | LED1 | | B2 | LED3 | | B3 | LED5 | | B4 | LED2 | | B5 | LED4 | | B6 | LED6 | | | Part C | |  |  | | --- | --- | | SW | C4 | | Fuse | LED | | Diode | Vin | | Voltage Regulator |  | | C1 |  | | C2 |  | | | Part D | |  |  | | --- | --- | | RESp1 |  | | RESp2 |  | |  |  | |  |  | |  |  | |  |  | |   ***Conclusions and discussions***  Write about 100 words on what you have learned from this laboratory exercise.  --END-- |