**CE 3002 LAB PROJECT ASSESSMENT GUIDELINES**

The lab project assessment comprises of two phases. The first phase is project demonstration which is to be done by the 2 students in each team. The second phase is the oral examination, which will be conducted individually for each team member. The marks awarded for the project demonstration will be equal (common) for both the team members (unless an anomaly is observed during the demo) whereas the marks for oral assessment will be separate for each team member, based on individual’s contribution.

During the project demonstration, each team is expected to acquire the continuous blood pressure signal using the plethysmograph sensor and display the waveform on the monitor. The expected tasks listed in Table I can be taken as a guideline for breakdown of marks during the demo. You may be asked to show how you accomplished each task shown in Table I. However, as the project involves design and since there are many design alternatives available, the team has the freedom to choose design strategies other than the design tasks shown in Table I. Therefore, the tasks/design procedures shown in Table I need to be taken *only as an approximate guideline,* and the lab supervisor will assess each project by examining the design strategies adopted by each team. Students may be asked to show the final waveform displayed on the PC monitor (item no. 6 in Table I) skipping the stages 1-5, based on the project status. In this case, during the oral assessment individual team member’s design knowledge needed for steps 1-5 would be tested.

**Each Student must submit a printed copy of Table I to the supervisor at the time of the assessment for mark entry. Write your full name and class at the top of Table I.**

**TABLE I – ASSESSMENT BREAKDOWN**

**Name: Class:**

|  |  |  |  |
| --- | --- | --- | --- |
| **No.** | **Task** | **Remarks** | **Marks** |
| 1 | **Sensor Interfacing**: Basic sensor interfacing (connecting its leads, giving proper power supply) and displaying the raw (unprocessed) signal on the Oscilloscope. |  | (5) |
| 2 | **R-C high pass filter to remove DC bias:**  (a) Input to the filter should be the sensor output signal (which contains a DC bias). To be displayed on the oscilloscope.  (b) Output signal must be free from the DC bias, i.e., only the sinusoidal waveform component of the sensor output. To be displayed on the oscilloscope. |  | (5) |
| 3 | **Instrumentation amplifier (IA) output:**  (a) Input should be a very small magnitude sinusoidal waveform coming from the R-C filter. Output should be an amplified version of the same. Both waveforms to be displayed on the oscilloscope.  (b) Students should be able to demonstrate dynamic adjustment of the gain of the IA. |  | (5) |
| 4 | **Active lowpass filter:**  (a) Input to the filter is the amplified signal obtained from the IA. Output signal is a smoothened version of the same. There should be no change in the signal characteristics.  (b) Input and output to be displayed on the oscilloscope. |  | (10) |
| 5 | **Non-inverting adder using Opamp:**  (a) Voltage divider to generate fixed DC voltage that is to be added to the lowpass filter output.  (b) Input is a dual polarity (positive as well as negative values) signal obtained from the filter. Output is a signal completely shifted to the positive domain.  (c) Students have to demonstrate its functioning and show both the corresponding input and output waveforms on the oscilloscope. |  | (10) |
| 6 | **Analog-to-Digital Conversion (ADC), Data Acquisition using Matlab and System integration:**  (a) To demonstrate the independent functioning of the ADC circuit. For this, fixed DC voltage levels can be applied as inputs and corresponding 8-bit outputs can be obtained to verify the correct functioning of the ADC.  (b) The ADC output pins are to be connected to the parallel port of the PC. The voltage levels (digital 0 or 1) are to be read using Matlab. Students should be able to achieve this data acquisition and display the acquired signals on the computer screen.  (c) Integrating the analog and digital parts of the DAS and demonstrating the expected functioning of the entire system by displaying the final waveform on the PC screen.  (d) Additional analysis from the MATLAB |  | (25) |
| 7 | **Oral Assessment** |  | (40) |
|  | **Total Marks** |  | (100) |