Examination: Final   Semester: Summer 2020
Duration: 2 Hours (120 minutes actual) + 30   Full Marks: 40
minutes extra for uploading the document +
other issues.

CSE 360: Computer Interfacing

Your actual time for answering these 4 questions is 2 Hours (120 minutes) + Extra 30 minutes is for internet, load-shedding issue, and the most important is converting your answer sheet to pdf, renaming it by your Section_ID (for example- 02_160217) and uploading it on buX. Any request of "can't upload the document because the time is over, I was writing till the end of 2 hours and can't upload the document" **will NOT be accepted**. There will be no backup final. Hope for the best.

Questions (Set 2)

Q1.   In this pandemic, to help mass people, BRAC settled down some COVID testing   Mark
Booths all over the country. They are facing some scenarios depending on this
pandemic situation. Write the answer of the following scenario-based questions
according to the marks. **[Total 10]**

a) **Scenario1:** COVID testing booths are recently trying to establish fingerprint   4
mechanism for each patient to register their name directly on register book of
COVID Patient (except under 18). Can you suggest them how they can
establish a secured fingerprint identification device by explaining them the
working of the proposed fingerprint sensor and connect it with Arduino or
Raspberry Pi to anyone of the BRAC Software and Development team? You
must explain the data flow of the Sensor, GPIO (if used) and a processing
unit (Arduino / Raspberry Pi)? Describe shortly.

b) **Scenario2:** The recently established COVID testing booths of BRAC are   2
now targeting to increase security system. Can you suggest how they can do
it by Raspberry Pi?

c) **Scenario3:** In this pandemic situation, for safety purpose, BRAC University   4
Cafeteria wants to make its entry door digital so that when any person will
come near the door, it will automatically be opened, so that nobody needs to
touch it. Can you establish a system for them by using any Sensor, GPIO
devices and a processing unit (Arduino / Raspberry Pi)? Describe shortly.

NB: Answer can be different for each student. You can use any sensor, GPIO
or processing device from your knowledge, but the answer must be logical.

Q2. Let's assume a scenario, A Matrix Keyboard is connected to 8255. Suppose, **columns** are connected to port A and **rows** are connected to port B of 8255. User wants to see the pressed key in a seven-segment display. (For example: If the user press 7 in matrix keyboard, it will be displayed on the seven-segment display). **[Total 10]**
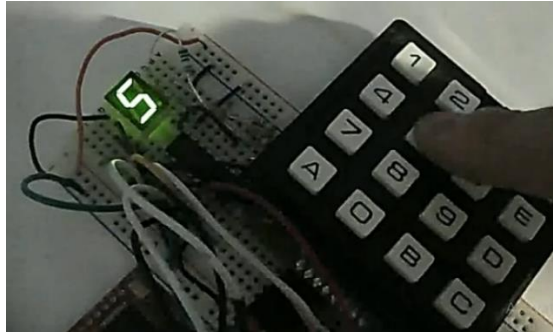
Figure: Matrix Keyboard and Seven-Segment Display Interfacing with 8255.

a) How can you connect a matrix keyboard and a seven-segment display in 8255 in which ports and in which pins?   1.5

b) What is the value of the control word register? [mention the reason]   1.5

c) Suppose the user pressed the button 7 in matrix keyboard and 7 is displayed on Seven-segment display. Explain the input and output mechanism of 8255 and the devices. You must mention the port and pin number, signals, type of data passing through ports.   3.5

d) You know that, in matrix keyboard the buttons are usually push-buttons. Moreover, we face key-debouncing when we use push buttons in keyboard. Explain key-debouncing and key-debouncing technique (Software or Hardware).   3.5

Q3. a) Suppose, you have bought a smart watch for checking the temperature and oxygen level of your body whenever necessary. **Explain** the sensors and working mechanism of those sensors which can serve the above purposes.   4

b) While using those sensors, to display reading from those sensors, we want to use LCD Display. On the display, cursor will move **left to right**   2

Figure: Smart watch displaying oxygen level data on LCD

From the above scenario, **Explain** In which case Data register will perform, and in which case command register will perform. **Explain** the reasons also.

c) How IC will send data to LCD. Explain them in both cases of half byte and full byte mode. What are the differences between them?   2

d) There is a RAM inside LCD. What values will be stored there if the smart watch LCD display shows the Oxygen level is 97. You can just show the values stored in LCD RAM for 97 only.   2

Q4. Suppose, to design an interfacing project, you have to use two Ardiuno as Master devices for multitasking. You can connect several slave devices easily with these master devices. Now answer the following questions. **[Total 10]**

a) **Identify** the protocol and **explain** the working mechanism of the protocol   4

b) If there arises a scenario, where two masters have to data transfer at the same time. How does the protocol solve this conflicting issue?   2

c) Can you **identify** another protocol which has byte limitation like this protocol and also has an extra error checking mechanism? List the differences of these two protocols.   4