Uva Wellassa University, Sri Lanka
End Semester Examination – July 2010
SCT 363-2 Embedded Systems

Time: Two (02) hours

Total 04 Questions
Answer all questions
All questions carry equal marks

01)

I. What are the main components of an embedded system? Explain them briefly.

(05 marks)

II. What are the main advantages of using a microprocessor for an embedded system? Explain main factors that are needed to consider when selecting a suitable microprocessor for an embedded project.

(08 marks)

III. Explain why any embedded system design process should be done in a systematic manner. What are the key steps in the embedded system design process? Explain them briefly.

(12 marks)

02)

You are required to display the temperature of a furnace using a micro-controller circuit. The temperature can vary from 30 ^{0}C- 400 ^{0}C. The operator should be able to see the operating temperature of the furnace even from a 3m distance to the display.

I. Explain what type of display is most appropriate for the above purpose. Give reasons for your selection.

(05 marks)

II. Draw a simple circuit diagram and explain how you can interface the display proposed in question 01 can be interfaced to a PIC 16F877 micro controller.

(08 marks)

III. The production manager wants to remotely monitor the temperature of the furnace by using a desktop computer located at a 30 m distance from the furnace. Explain which communication protocol is most appropriate to achieve the above task. Give reasons for your selection. Draw a circuit diagram and explain how you can implement it.

(12 marks)

03)

I. Explain how you can use an output shift register to interface Seven Segment Display (SSD) to a microcontroller using only three pins of a microcontroller.

(05 marks)

II. Explain the advantages of using a matrix keypad in an embedded system project. Draw a circuit diagram and explain how you can interface 4X3 matrix keypad to a PIC 16F877 microcontroller.

(08 marks)

III. You are required to design a two number single digit adder (Simple calculator). The results can have two digits. User enters the first number (single digit), "+" Key, second number (single digit), and "=" key to get the result. Draw a complete circuit diagram and explain how you can use seven segment displays, a 4X3 matrix keypad and a PIC 16F877 microcontroller to achieve the above task.

(12 marks)

04)

You are required to design a system to automatically count people inside an exhibition hall. Same door is to be used to get in and out from the main exhibition hall. Organizers decided to have only 100 people inside the exhibition hall at any instant. The number of people inside the hall is to be displayed outside the door in real-time.

I. Suggest a suitable sensor to count people passing through the entrance.

(Marks 6)

II. How you detect whether a person passing through the door went in or came out from the hall.

(Marks 6)

III. If more than one person passed through the door at the same time, how you can count them?

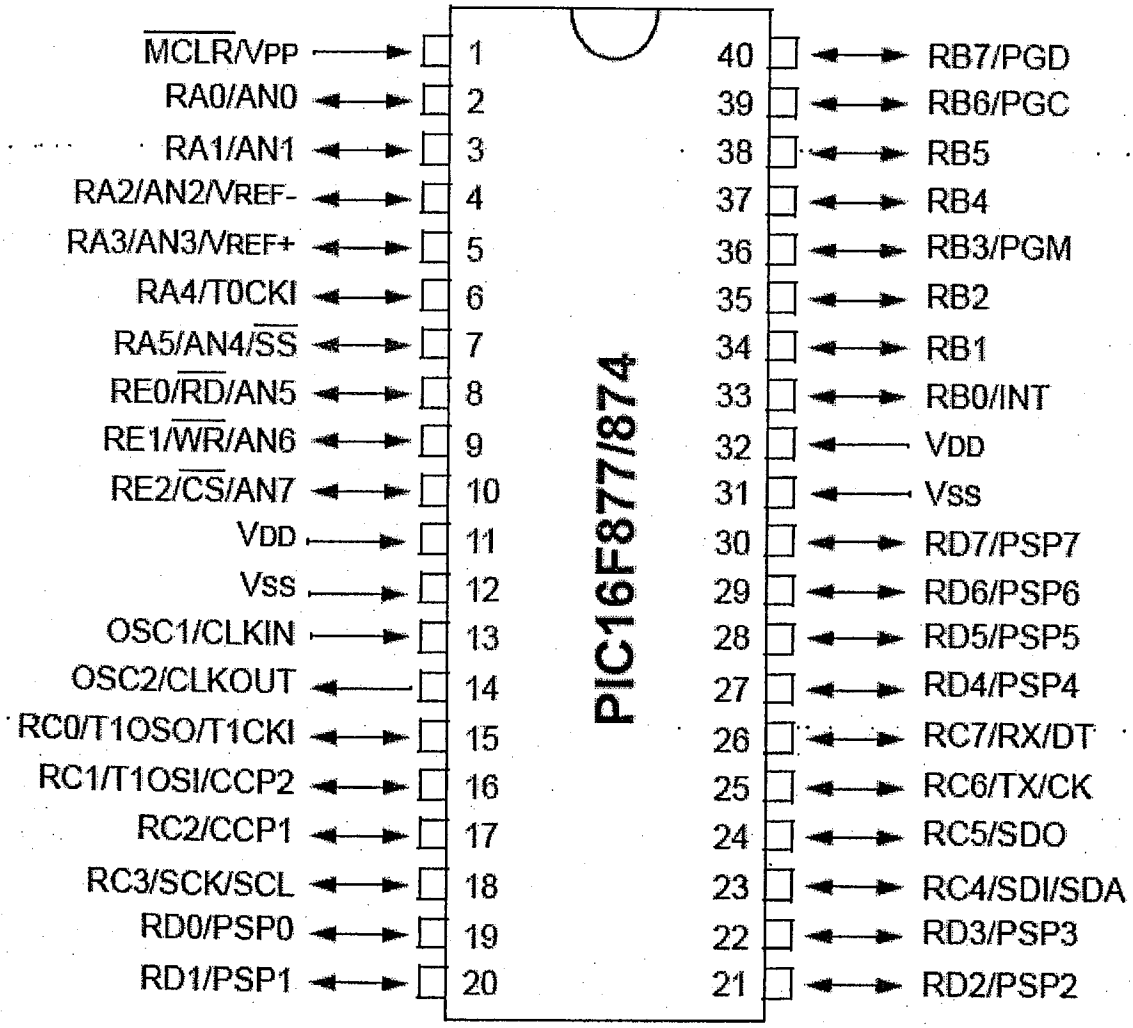
(Marks 6)

IV. If it is required to record the number of people inside the hall every 15 minutes and want to get a print out of the summary once a day, explain how you extend your system to suite this requirement.

(Marks 7)

PIN DIAGRAM

PDIP



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