
UNIVERSITI SAINS MALAYSIA

First Semester Examination
Academic Session 2006/2007

October/November 2006

EEE 520 – EMBEDDED MICROPROCESSOR SYSTEMS

Duration: 3 hours

Please check that this examination paper consists of FIVE pages of printed material and ONE page Appendix before you begin the examination.

This paper contains SIX questions.

Instructions: Answer **FIVE (5)** questions. If a candidate answer more than five questions, only the first five answered will be examined and awarded marks.

Answer to any question must start on a new page.

Distribution of marks for each question is given accordingly.

All questions must be answered in English.

1.
 - (a) What are the important features of the Embedded systems? Explain, with suitable examples, the basic tools required in the development of embedded system.
(25%)
 - (b) What are the design challenges for a developer of an embedded system? Explain them, with suitable examples, in detail.
(30%)
 - (c) What are the advantages of using a single purpose processor, in comparison with a general purpose processor? Which one will you prefer when you are going to design an embedded system which will be fabricated in large number?
(15%)
 - (d) In connection with the development of a system, 32x8 memory (RAM) is required while single chips of value 16x4 are readily available. How can you connect them to obtain the desired memory?
(30%)
2.
 - (a) What do you understand by bus loading? Under overloaded condition, what type of problems may arise? How can you decrease time delay? Explain with the help of suitable diagram.
(35%)
 - (b) What are the problems experienced in the design of an embedded system in the industry? How are these solved by taking different platforms for the design purposes? Explain with suitable examples the advantages and limitations of PC-Platform.
(30%)

- (c) What are the advantages and limitations of PC/104 platform for embedded systems ? What are its different versions? How can you further economize in the light of your basic requirements?
(35%)
3. (a) You are required to design a car park system to count the number of car enter by the car park area, number of available parking lot and to display the result on PC and LCD. Display 'No Entry' if the available parking lot is empty. The system can also switch on the lights at 7.00 pm and switch off the lights at 7.00 am. The proposal should have the block diagram, concept of operation and flow chart.
(50%)
- (b) System testing and debugging such as emulators, simulators and general equipment laboratory are necessary to verify that the program performs its task correctly and the hardware is under the software control. Explain the common debugging and testing techniques available with debugging tools.
(50%)
4. (a) An 8051 micro controller based system is designed to work with 8 sensors, two memory ICs (RAM and ROM) and one I/O port. The ROM is used to store the program code and data of sensors will be kept in the RAM. I/O port is used to display the reading on LCD. Draw and explain the configuration of the system showing the 8051 signal lines to be used for address, data and control buses. Write the starting address and ending address for each memory block.
(50%)

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- (b) Some designs use daisy chained priority interrupt and some designs use nested interrupt. Explain the difference between daisy chained interrupt and nested interrupt. (50%)
5. (a) The processor, EPROM, switches and displays are among several of common component of hardware existing in the embedded system. Explain how of each component can be tested? (40%)
- (b) Design of (hardware and software) 8051 microcontroller found to be incorrect as shown in Figure 1 below. Explain with suitable diagram (refer to Appendix I) why the design is incorrect and redesign to correct it (hardware and software). (60%)

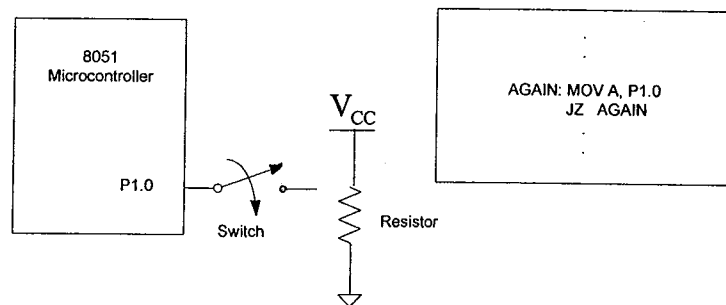


Figure 1