UNIVERSITI SAINS MALAYSIA

First Semester Examination
Academic Session 2007/2008

October/November 2007

EEE 520 – EMBEDDED MICROPROCESSOR SYSTEMS

Duration: 3 hours

Please check that this examination paper consists of FOUR pages of printed material before you begin the examination.

This paper contains SIX questions.

Instructions: Answer **FIVE (5)** questions.

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.

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1. (a) How will you differentiate between an embedded system and a general purpose system? Explain with the help of hardware and software of the system.

A microcontroller based system has been developed .It is required to be converted into an embedded system. Explain with respect to different blocks of the system.

(50%)

(b) What do you understand by the Hardware and software partitioning of the embedded system. Some operations can be completed either using hardware or software. How will you accomplish the task? Justify your selection with suitable examples.

(30%)

(c) What do you understand by firmware of a system? Explain with suitable examples.

(20%)

2. (a) What are the characteristics of ideal memory? Justify the statement that flash memory is an ideal memory. Explain the operation of basic flash memory cell. With the help of suitable diagrams, explain the operations of programming, read and erase. Draw and explain the basic flash memory array.

(30%)

(b) How will you develop a microcontroller based system for the measurement of a physical quantity. With the help of a suitable sensor, explain different steps in the development of the system to achieve the goal. What modifications will be required to convert it into an embedded system?

(40%)

(c) In connection with the development of an intelligent system appreciable amount of RAM is required. However, available chips are very small values? How can you build the required memory block by using the available chips of small capacity as well as small word length?

(30%)

3. (a) What do you understand by interfacing of the systems? What are the important points which must be kept in mind during design?

(30%)

(b) What are the advantages and limitations of multiprocessor system? If the processors are on the same board, how will you communicate between them? Explain, any one method, with the help of suitable diagrams.

(40%)

(c) What is the importance of I^2C bus structure ? How is it used in the transfer of data at a high rate? What are its limitations? Give some of its applications.

(30%)

4. (a) Top-down design and modular design are program design techniques could be used to ease the task in the design phase during software development process. Explain each of the techniques with the examples.

(50%)

(b) (i) What is the purpose system testing and debugging.

(ii) Testing and debugging tools can be divided into 3 categories. List down the categories and explain each of the category.

(50%)

5. (a) Give a reason of why multiprocessor/distributed system are needed? Make comparison if the system need to be develop with a single processor and multiprocessor.

(50%)

(b) What are the factors to select the number of processor to be used and how to distribute the tast among them.

(50%)

6. (a) What are the factor should be consider when selecting a communication bus and protocol for a multiprocessor system.

(50%)

(b) Multitasking is one of the feature for a Real Time Operating System (RTOS). Explain the multitasking used in the RTOS.

(50%)

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