
UNIVERSITI SAINS MALAYSIA

First Semester Examination
Academic Session 2008/2009

November 2008

EEE 520 – EMBEDDED MICROPROCESSOR SYSTEM

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.

1. (a) What are the advantages and limitations of an embedded system? What are the main components of an embedded system which is designed around a microcontroller? How can we reduce its cost for large scale production?

(30%)

- (b) What are the items which should be taken into consideration in the selection of processor for an embedded system? Explain them in detail.

(30%)

- (c) What do you understand by the software and hardware requirements of an embedded system? What are the factors which will decide the details of the hardware and software? What are the reasons due to which software specifications are not included in the detailed design of the system while hardware specifications are given with complete details?

(40%)

2. (a) Draw and compare the timing diagrams for the microcontrollers of the following companies.

- (i) Intel timing
- (ii) Microchip Timing
- (iii) MOTOROLA 68000 Family timing

What are the advantages and limitations of the microcontroller supplied by Intel?

(35%)

- (b) What do you understand by *wait* state? What is its need in the design of a system? How is it managed in different processor timing diagrams?
(25%)
- (c) Compare the performance of PROM and EPROM. Explain using suitable diagrams, the working principles of EPROM. What are the steps in the programming of an EPROM. Draw the timing diagram of an EPROM for read and write operations. State the conditions under which it is used in embedded systems.
(40%)
3. (a) What are the advantages and limitations of multi-processor systems? What are the techniques used for communication between processors when they are on the same board? Explain them with the help of suitable diagrams.
(40%)
- (b) What are the advantages and limitations of a PC platform for the development of embedded systems? What are other alternatives for the development of Industry-Standard Embedded systems?
(30%)
- (c) What do you understand by data acquisition systems? What are its components? Explain with the help of suitable diagrams.
(30%)
4. (a) List the design criteria of an embedded system. Describe briefly each of the criteria using example.
(50%)
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- (b) There are several important steps in the design of an embedded system . Describe each of them using a flow diagram.
(50%)
5. (a) There are two levels of language that can be used during development of an embedded system. List and describe briefly each of the language level used?
(50%)
- (b) A design engineer is required to develop an embedded system to control the room temperature in the School of Electrical and Electronic Engineering building. Compare and determine the suitability of the language level used during the development.
(50%)
6. (a) Interrupt and polling techniques are known as the I/O method for a CPU to get attention in an embedded system. Interrupt has some advantages over polling technique in several occasions. Nevertheless, there are some rules to be followed in choosing an interrupt. List the reasons and describe each of them briefly.
(50%)
- (b) An embedded system using multiprocessor solution may reduce the cost but requires more than a single microprocessor or microcontroller. Determine the criteria for choosing the number of processor sub-system and how to distribute the task among them.
(50%)