UNIVERSITI SAINS MALAYSIA

Semester I Examination
Academic Session 2005/2006

November 2005

EEE 520 – EMBEDDED MICROPROCESSOR SYSTEM

Time : 3 hours

INSTRUCTION TO CANDIDATE:

Please ensure that this examination paper contains **FOUR (4)** printed pages and **SIX (6)** questions before answering.

Answer **FIVE (5)** questions.

Distribution of marks for each question is given accordingly.

All questions must be answered in English.

...2/-

1. (a) What are differences between Multitasking and Concurrency. Explain the answer with suitable diagram.

(50%)

(b) There are a number of ways to describe the software design, depending on what information is to be conveyed. List and explain for each possible ways.

(50%)

2. (a) Interrupt Service Routine (ISR) is the important subroutine in any interrupt processing. Using any microcontroller as an example, describe the function of ISR in embedded system.

(40%)

(b) An interrupt input can be edge or level sensitive. With pool timer as example, describe edge and level sensitive input in details. You must clearly justify the usage of both edge and level in given example.

(60%)

3. (a) Emulator is one of the tools for debugging either hardware or software in embedded system. But users who have access to sophisticated emulators may question why additional debug tools should be incorporated into the design. Give the reasons?

(50%)

(b) Use of debugging breakpoints requires that the code be executed from RAM. Explain in details how this operation can be done?

(50%)

...3/-

4. (a) What do you understand by an embedded system? Give some examples and highlight the importance of microprocessor based embedded systems.

(15%)

(b) Give important aspects which should be considered in the selection of a processor to be used in an embedded system. What are the advantages of multiprocessor system over single CPU system?

(50%)

(c) When does the power requirement of an embedded system become an important issue? Explain it with the help of suitable examples.

(35%)

5. (a) What are the main components of multi-chip design? How do they work in a co-ordinated system? Explain the bus timing diagram of a microprocessor. What are the advantages and limitations of multiplexing the address and data buses? What is the purpose of waitstates in the timing diagram?

(25%)

(b) What are the microprocessor memory architectures? Explain them with the help of suitable diagrams. Explain the differences between programmable ROM (PROM) and masked ROM (MROM).

Design a masked ROM for storing a table whose working equation is, $Y = X^2 + 6$. Draw the structure of the bi-polar MROM.

(40%)

...4/-

(c) What are the different types of RAMS? Explain the operation of DRAM. Draw and explain its structure for a 16K x 1 DRAM. Explain the reasons behind the multiplexing of ROW and COLUMN address buses.

(35%)

6. (a) What do you understand by interfacing? What is its importance in the case of embedded system? What are the components needed to interface a sensor with the processor? What is the role of analog to digital converter?

(25%)

(b) What is the importance of the assessment of bus loading in the design of embedded system? How will you design it for proper operation?

(20%)

(c) Explain the differences between I^2C bus and microwire with the help of their timing diagrams.

(25%)

(d) Briefly describe any TWO of the following.

(i) EEPROM

(ii) DMA

(iii) Register based multiprocessor communication.

(30%)

ooo0ooo