

# ECE3073 Computer Systems

## Practice Questions

### Introduction

i) This computer architecture has higher memory bandwidth because it has separate data and instruction memory spaces:

Harvard architecture .....**X**  
von Neumann architecture .....

Put a cross against the correct answer

ii) Considering a computer with separate I/O space, mark the following attributes as 'A' for an advantage and 'D' for a disadvantage:

A separate (smaller) I/O address space requires less address decoding logic .....**A**  
A separate I/O address space requires its own read and write instructions ..... **D**  
A separate I/O address space means that there is more space for instructions and data in the memory space ..... **A**  
A separate I/O address space requires additional bus control signals ..... **D**

iii) For the following software architecture attributes indicate with a 'C' if this is true of CISC architecture or 'R' if it is true of RISC architecture:

Results in simpler computer hardware .....**R**  
Is simpler to produce a compiler to support this architecture ..... **R**  
Is easier for humans to write in the associated assembler code .....**C**  
Individual instructions run faster ..... **R**  
Individual instructions are more powerful ..... **C**  
The processor tends to have more registers .....**R**

Although the following material does not involve practice questions I think that is valuable information to help you answer test/exam questions

### How to answer exam questions

#### *Presentation*

Although the marker should not be influenced by the presentation of your answer it is inevitable that a neatly set out answer, concisely written, with a minimum of grammatical and spelling errors will create a good impression.

#### *Content*

There are basically two kinds of examination questions, descriptive and those requiring calculation. The requirements of these two kinds of questions are different:

1) Answering descriptive questions

First of all, what is your target audience? You must not think that you are writing your answer to be read by your lecturer who (presumably) knows all the answers. This approach may lead you to leave out details “because the lecturer knows what I am saying”. Your answer should be targeted at someone who has the same level of knowledge that you had when you started the subject. When you started you had no detailed knowledge of the subject content. So, when you have written an answer you should reread it and ask yourself “if I didn’t know anything specific about the topic would I understand the answer to the question after reading my answer?”

Example

Question

By referring to Intel 8086 microprocessor, explain the sequence of events which takes place during the servicing of an interrupt. You should assume that the interrupting device causes an INTR type interrupt.

A possible answer

An interrupting device signals that it requests service by pulling the wired-or line INTR low. When the 8086 has completed its next instruction and provided interrupts are enabled the microprocessor starts to service the INTR interrupt. The state of the microprocessor is saved by pushing the instruction pointer (ip), code segment register (cs) and flag register onto the stack. Interrupts are now disabled by clearing the IF (INTR interrupt) and TF (single step interrupt) flags. By performing two interrupt acknowledge cycles (a bit like I/O reads) the interrupting device transfers its interrupt type to the 8086. The interrupt type is one byte and has a value between 0 and 255. This is multiplied by 4 to give an address in the interrupt vector table where the microprocessor can find a new instruction pointer and code segment register contents. Code segment and instruction pointer registers are loaded with the new values which point to the interrupt service routine. At the start of the interrupt service routine all registers which are used in the service routine are pushed onto the stack to save their current value. When the interrupt service routine finishes these registers are restored by popping them off the stack. The IRET instruction restores original cs, ip and flags and the microprocessor reverts to processing the code as it was before the interrupt.

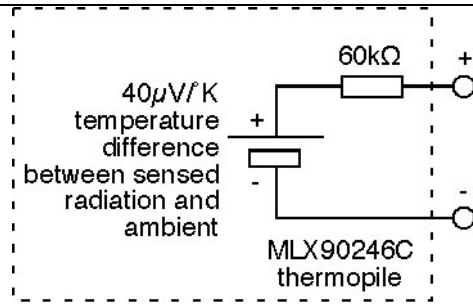
2) Answering questions that require the derivation of an equation or a numerical calculation

In either of these two cases you should provide all of the intermediate steps in the calculation and enough of a description to understand what you have done. This will convince the marker that you do understand how to do the derivation/calculation and if you make a mistake you can still get some marks for the correct method.

Example

Question

The MLX90246C is a thermopile sensor that measures infrared radiation. It can indicate the temperature difference between ambient or room temperature and the temperature of an object placed in front of the sensor. The following illustration shows a functional diagram of the sensor:



For the MLX90246C sensor what will be the output voltage if the temperature difference between sensed object radiation and ambient is 50°C?

Answer

Output voltage = (voltage change per °K) \* change in temperature

$$40 \times 10^{-6} \times 50 = 2 \times 10^{-3} \text{V}$$

### *Mistakes in the questions*

It may happen that you find an error or an omission in an exam question. If the invigilators cannot get an answer to your query then if possible you should make a reasonable assumption about the missing/incorrect material and explain this in your answer.

### *Zero Mark*

If students do not know the answer to an exam question then some of them think that they should write down the answer to another question (the one they would have preferred to be asked). This kind of answer gets zero marks.

Note that your exam will not contain the two questions discussed above.

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