



# MASENO UNIVERSITY

## UNIVERSITY EXAMINATIONS 2012/2013

### THIRD YEAR FIRST SEMESTER EXAMINATIONS FOR THE DEGREE OF BACHELOR OF SCIENCE IN COMPUTER SCIENCE AND TECHNOLOGY (MAIN CAMPUS)

#### SCS 303: COMPUTER ARCHITECTURE I

*Date: 6<sup>th</sup> December, 2012*

*Time: 2.30 – 4.30 p.m.*

#### INSTRUCTIONS:

- (a) Attempt Question ONE and any other TWO questions.
- (b) diagrams, where required, should be clearly drawn and labeled.
- (c) MOBILE PHONES are STRICTLY FORBIDDEN in this exam.



### **Question One (compulsory 30marks)**

- a) Distinguish among the following: Computer Architecture, Computer Organization, and Computer Engineering explaining what effect each may have on overall performance of a microprocessor based system. 6marks
- i. Computer Architecture,
  - ii. Computer Organization,
  - iii. Computer Engineering
- b) Differentiate between Microcontroller and Microcomputer 4marks
- c) What are the functions of an accumulator? 2marks
- d) List the two 16 – bit registers of 8085 microprocessor. 2marks
- e) List the allowed register pairs of 8085. 3marks
- f) Differentiate between an Opcode and an Operand 2marks
- g) What is an instruction? 2marks
- h) List out the five categories of the 8085 instructions. Give examples of the instructions for each group. 5marks
- i) Outline the steps involved to fetch a byte in 8085 4marks

### **Question Two (20 marks)**

- a) Memory Design and technology have been a major influence on the present day computer architecture. Comment on this, including memory access time, width and technology used as examples. 10marks
- b) Outline the main characteristics of CISC and RISC Computers 10marks

### Questioned Three (20 marks)

- a) A system's hardware has the greatest influence on its performance. It is the ultimate limiting factor on how fast a process will run before it has to start sharing what is available with the operating system and other user processes. State any five hardware factors that can limit the overall system performance: 10marks
- b) Use sketches to explain how hierarchical memory system may be implemented, giving examples for each block. How does this arrangement ensure improved computer performance? 10 marks

### Question Four (20 marks)

- a) What is meant by the following terminologies in hierarchical memory systems: 8marks
- i. Re-load transient
  - ii. Effective access time.
  - iii. Hit-rate
  - iv. Miss-rate
- b) Determine the effective access time for a computer system that makes use of L1 cache with access time of 10 nanoseconds and main memory with 60 nanoseconds access time, for a hit-ratio of 95%. 6marks
- c) List and explain the three different strategies used during block replacements in cache memory: 6marks

### Question Five (20 marks)

- a) State Moore's Law and explain the major evolutionary developments that have been realized in the Intel Microprocessor family, starting from the 8-bit 8080 microprocessor to the current high performance Pentium machines. Your explanation should include the year(s) of development in terms of chip density, technology, operation speed and power consumption. 12marks
- b) Mention any two manufacturers of microprocessors today. What would you suggest is the number of components (transistors) in each of the microprocessors? 3marks
- c) Explain virtual memory systems function in a microprocessor based system. 5marks