



MASENO UNIVERSITY
UNIVERSITY EXAMINATIONS 2013/2014

**SECOND YEAR FIRST SEMESTER EXAMINATIONS FOR THE
DEGREE OF BACHELOR OF SCIENCE IN INFORMATION
TECHNOLOGY
(MAIN CAMPUS)**

CIT 205: PLATFORM TECHNOLOGIES II

Date: 27th November, 2013

Time: 11.00am – 1.00pm

INSTRUCTIONS:

- Answer QUESTION ONE and any other TWO questions.

Question 1 (30 marks)

- a) In the context of the classical von Neumann model of a programmable machine, describe the components of the *instruction cycle* and explain how interrupts are supported . (6 marks)
- b) Explain the role of the system level interconnection structure in a computer system and describe on the *bus* and the *central switch* structures. (6 marks)
- c) Outline the internal organization of the hard disk using the terms cylinder, head, track and sector. (6 marks)
- d) Provide a convincing argument that employment of a hierarchical memory organization in a typical computer system results in overall system performance enhancement at more acceptable cost. (6 marks)
- e) In the context of the performance enhancement using parallelism, describe *data parallel* and *function parallel* architectures giving examples of each. (6 marks)

Question 2 (20 marks)

- a) Describe the distinguishing characteristics of the following memory types and further, explain with justification their possible areas of application (within a typical computer system). Memory types: PROM, EPROM, Flash ROM, DRAM, SRAM. (8 marks)
- b) Describe the memory organization known as *memory interleaving*. Provide a convincing argument that its use does indeed results in memory performance enhancement. (6 marks)
- c) In the context of a memory subsystem employing caching, explain the term placement policy and replacement policy highlighting their effects on cached memory performance. (6 marks)

Question 3 (20 marks)

- a) Describe the general organization, including the programming model, of an I/O device interface adapter. Explain the concept mapping the module to the processor's I/O space. (8 marks)

- b) Explain the role of the hard disk storage system in a computer system's performance and reliability. Describe how the RAID technology may be used for enhancement of reliability, performance or both. (6 marks)
- c) Name the two most popular disk interface standards used on PCs and server systems. Briefly outline the advantages of each of the two standards. (6 marks)

Question 4 (20 marks)

- a) Using an appropriate illustrative diagram, outline the classical internal organization of the CPU. Using RTL notation, outline the instruction fetch cycle. (8 marks)
- b) Briefly explain instruction pipelining as a performance enhancement technique. (6 marks)
- c) Superscalar architectures endeavor to exploit instruction level parallelism (ILP) whereas MIMD architectures endeavor to exploit process (or thread) level parallelism. Explain how. (6 marks)

Question 5 (20 marks)

- a) Using an appropriate illustrative diagram, outline the organization of an array processor system. Also outline its operation. (8 marks)
- b) MIMD architectures may be classified into shared memory systems and distributed memory systems. Clearly and using appropriate illustrative diagrams, explain the differences. (6 marks)
- c) Using an illustrative diagram explain the shared disk multi-computer cluster architecture. Explain the objectives of *highly available server* and the fault-tolerant server design approaches. (6 marks)