MASENO UNIVERSITY

UNIVERSITY EXAMINATIONS 2016/2017

FIRST YEAR SECOND SEMESTER EXAMINATIONS FOR THE DEGREE OF BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY

CITY CAMPUS

CIT 104: COMPUTER ARCHITECTURE

Date: 16th June, 2017 Time: 5.30 - 8.30 pm

INSTRUCTIONS:

- Answer ALL question in SECTION A and any other TWO from SECTION B
- Write your registration number on all sheets of the answer book used.
- Use a NEW PAGE FOR EVERY QUESTION attempted, and indicate number on the space provided on the page of the answer sheet.
- Fasten together all loose answer sheets used.
- No mobile phones in the examination room.

SECTION A: COMPULSORY (30 MARKS)

Question 1.

a) Define computer architecture? (2 marks)

b) State and briefly describe the 3 major subsystems of any modern computer architecture. (6 marks)

c) Outline 3 types of computer systems in terms of their architectures (3 marks)

d) What are the 3 major concepts that influence the commercial success of computer systems? (3 marks)

e) State any 4 desirable qualities of any computer system (4 marks)

f) State and describe at least four measures of performance of computer systems (4 marks)

g) State and explain any 3 logical organizations of computer memory in terms of access (6 marks)

h) What is a register and where does it reside in a computer system? (2 marks)

SECTION B: ATTEMPT ANY TWO QUESTIONS FROM THIS SECTION

Question 2 (20 MARKS)

a) Using a diagram, briefly explain the components of the Von-Neumann Architecture (8 marks)

b) What bottleneck in the Von-Neumann Architecture did the Harvard Architecture address, and how? (4 marks)

c) With the aid of a diagram, briefly explain the Von-Neuman machine cycle (8 marks)

Question 3 (20 MARKS)

a) With the aid of a diagram, briefly describe the functions of the major subsystems of a modern computer architecture. (8 marks)

b) Briefly explain how the following architectures operate

i. Stack-based architecture (3 marks)

ii. Accumulator-based architecture (3 marks)

iii. Memory-register architecture (3 marks)

iv. Register-register architecture (3 marks)

Question 4 (20 MARKS)

a) State and briefly describe the major components of a CPU (2 marks)

b) With the aid of a diagram, briefly describe the Fetch/Execute Cycle (6 marks)

c) What are the functions of the following components of the CPU as used in the Fetch/Execute Cycle

i. Program counter (2 marks)

ii. Memory address register (2 marks)

iii. Memory data register (2 marks)

iv. Instruction register (2 marks)

v. Control unit (2 marks)

vi. Arithmetic logic unit (2 marks)

Question 5 (20 MARKS)

a) What are some of the desirable characteristics of an ideal memory? (3 marks)

b) Why are memory devices organized in some form of hierarchy? (3 marks)

c) Using a diagram, show the memory hierarchy highlighting the characteristics of memory devices used at each level in terms of cost, capacity, and speed. (8 marks)

d) What is Cache Memory and how does it improve computer performance? (4 marks)

e) How does a register improve the performance of a computer system? (2 marks)