UNIVERSITY OF DAR ES SALAAM

COLLEGE OF INFORMATION AND COMMUNICATION TECHNOLOGIES
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SUPPLEMENTARY UNIVERSITY EXAMINATIONS - SEMESTER TWO - 2013/2014

IS 139: INTRODUCTION TO COMPUTER ARCHITECTURE (3.0 Units)

18th September, 2014

INSTRUCTIONS TO CANDIDATES:

1. This examination consists of one question in section A and four questions in section B
2. Answer the question in section A and any three questions from section B
3. Each question carries 25 marks
4. Time allowed is 2 Hour

SECTION A

QUESTION ONE (25 Marks)

(a) What are the three basic components that make up a computer? (3 marks)

(b) Draw the symbols and truth tables for the following gates: (12 marks)

i. AND ii. OR iii. NOT

(c) Convert the following numbers: (4 marks)

i. Binary 11001 to decimal ii. Decimal 0.8125 to binary

(d) Name the two principal parts of a CPU (4 marks)

(e) Name the two types of RAM (2 marks)

SECTION B

QUESTION TWO - (25 Marks)

(a) Define the following terms as related to computer memory: (4 marks)

i. Hit rate ii. Miss rate

(b) Describe the three forms of locality (6 marks)

(c) What are the two fields in a fully associative cache address and how are they used to access a location in cache? (4 marks)

(d) Suppose, in a fully associative cache scheme, we have 14-bit memory addresses and a cache with 16 blocks, each block of size 8. Draw a diagram depicting the field format of a memory reference (6 marks)

(e) Consider a system with a main memory access time of 200ns supported by a cache having a 10ns access time and a hit rate of 99%. What is the Effective Access Time (EAT) of such a system? (5 marks)

QUESTION THREE - (25 Marks)

(a) Name 4 considerations when designing instruction sets (4 marks)

(b) What is the difference between big endian and small endian instruction formats? (4 marks)

(c) What are three reasons that may cause an instruction pipeline to stall? (3 marks)

(d) Assume you have a machine that uses 16-bit integers and you are storing the decimal value 7 at an address: (10 marks)

i. Show how this is stored on a big endian machine ii. Show how this is stored on a little endian machine

(e) Mention any two types of addressing modes and explain how they work (4 marks)

QUESTION FOUR - (25 Marks)

(a) Describe 3 classes of computers (6 marks)

(b) State the Principle of Equivalence of Hardware and Software. What does it allow computer designers to do? (4 marks)

(c) State Moore's Law? Mention 3 implications of this law as related to computer architecture (5 marks)

(d) Describe the different generations in the evolution of computers. For each generation describe its defining characteristic (10 marks)

QUESTION FIVE - (25 Marks)

(a) Explain the following terms: (8 marks)

i. Bit ii. Byte iii. Word iv. Nibble

(b) Name the three ways in which signed integers can be represented in digital computers (6 marks)

(c) Explain the following terms as related to floating point numbers: (3 marks)

i. Range ii. Precision iii. Accuracy

(d) Convert the following 8-bit binary numbers into decimal: (8 marks)

i. 11010001 ii. 01101100 iii. 00111101 iv. 00000111