MACHAKOS UNIVERSITY COLLEGE

(A Constituent College of Kenyatta University)
University Examinations 2013/2014

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

**FIRST YEAR FIRST SEMESTER EXAMINATION FOR DEGREE IN BACHELOR OF
SCIENCE COMPUTER SCIENCE
SCO 104: COMPUTER ARCHITECTURE**

Date: 17/12/2014   Time: 8:30 – 10:30 am

INSTRUCTIONS
Answer all questions in section A and any two questions from section B

Section A (30 Marks)

Question 1

a) Explain each of the following terms as used in a microprocessor system   (3 Marks)

   i. Arithmetic Logic Unit (ALU)

   ii. General Purpose Registers

   iii. Control Unit

b) Explain each of the following terms as used in a micro-controller system   (7 Marks)

   i. Program Counter (PC)

   ii. Instruction Register (IR)

   iii. Conditions Code Register/ Flags Register

   iv. Instruction Decoder Circuit

   v. Memory Data Register

   vi. Memory Address Register

   vii. Stack Pointer (SP)

c) Explain the term instruction as used in a computer system   (4 Marks)

d) Differentiate between CISC and RISC Instruction Set Architectures   (4 Marks)

e) Explain the Von-Newmann Fetch-Execute Cycle. (3 Marks)

f) Explain how the Von-Newmann architecture machine handles an interrupt to the fetch-execute cycle. (4 Marks)

g) With the aid of a diagram, list the major components of a computer system and explain the functions of each component listed. (5 Marks)

Section B (40 Marks)

QUESTION 2 (20 MARKS)

a) Distinguish between odd parity and even parity. (1 Marks)

b) Convert the following numbers (4 Marks)

    1. Binary 1101101_2 to its decimal equivalent.

    2. Binary 0.1011 to its decimal equivalent.

c) Convert the following numbers (4 Marks)

    1. Octal 7256_8 to its Binary equivalent.

    2. Hexadecimal $10A4_{16}$ to its Binary equivalent. .

d) Using the 2's Complement, calculate the output of +16 and -24 (3 Marks)

e) Explain any four factors that are considered in computer data representation (8 Marks)

QUESTION 3 (20 MARKS)

a) Identify any three classes of computer systems classification (3 Marks)

b) Name and explain the two types of Random Access Memory (RAM) that are used in computer systems (4 Marks)

c) With the aid of a diagram, explain the computer bus structure or Architecture. (5 Marks)

d) With the aid of a diagram, explain how the 4-bit controlled buffer register can be used to implement bus-organized computer architecture between 4 general-purpose registers called A, B, C and D. (8 Marks)

QUESTION 4 (20 MARKS)

a) Explain any four different types of Read Only memory (ROM) (4 Marks)

b) Differentiate between hardwired and micro-programed control in a microprocessor system. (4 Marks)

c) Name and explain the three main methods used for addressing I/O input/output devices in computer systems. (6 Marks)

d) Name and explain the three different classes of access methods that are used in a computer system to access external storage (6 Marks)

QUESTION 5   (20 MARKS)

a) Explain the concept of addressing modes in computer systems   (2 Marks)
b) Explain the concept of paging as used in computer systems   (2 Marks)
c) Explain **any five** types of addressing modes that are used in computer systems   (10 Marks)
d) A microprocessor system has 16 Address lines and 8 data lines. It also has 16kB memory chips. Provide the memory organization of the system if all the 16 address lines are in use.   (6 Marks)