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KIRIRI WOMEN'S UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATION, 2023/2024 ACADEMIC YEAR
FIRST YEAR, SECOND SEMESTER EXAMINATION
FOR THE BACHELOR OF SCIENCE IN COMPUTER SCIENCE
KCS 103 – INTRODUCTION TO COMPUTER ORGANIZATION

Date: 04TH December 2023
Time: 2:30PM – 4:30PM

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS

QUESTION ONE (30 MARKS)

a) Define the following terms:
   i) Instruction Set
   ii) Computer Memory
   iii) System software. (6 Marks)

b) Classify microprocessor based on the following;
   i) Size of the data
   ii) Instruction Set (6 Marks)

c) Computers can be classified into different categories. State and explain any three categories of computers. (6 Marks)

d) Why should assembly language be avoided for general application development? Under what circumstances is assembly language preferred or required? (4 Marks)

e) With aid of a diagram explain an instruction cycle. (4 Marks)

f) Explain any two types of Read-Only-Memory (ROM). (4 Marks)

QUESTION TWO (20 MARKS)

a) A basic computer structure consists of input and output components, memory component, ALU and control unit. Using a well labelled diagram, explain these basic structure of a computer. (10 Marks)

b) The performance of a microprocessor is based on three main characteristics. State and explain each one of them. (6 Marks)

c) Give the difference between multiple and single bus structure. (4 Marks)

QUESTIONS THREE (20 MARKS)

a) Define a bus in computer bus structure. (2 Marks)

b) Discuss the following types of buses
   i) Data bus
   ii) Address bus
   iii) Control bus (6 Marks)

c) There are two types of software, giving examples state and explain them. (4 Marks)

d) Explain the following types of instruction set.
   i) RISC
   ii) CISC (8 Marks)

QUESTION FOUR (20 MARKS)

a) There are different registers used during the execution of an instruction, explain the function following five registers.
   i) Instruction Register (IR)
   ii) Program Counter (PC)
   iii) Memory Address Register (MAR)
   iv) Memory Data Register(MDR)
   v) Accumulator (ACC) (10 Marks)

b) The process of executing a program revolves within fetching the instruction, decoding it and execution of the instruction. Explain the different steps involved in execution of the following peace of an arithmetic instruction.

Load LOCA, R1
Add R1, R0 (10 Marks)

QUESTION FIVE (20 MARKS)

a) A digital computer has a memory unit with 32 bits per word. The instruction set consists of 110 different operations. All instructions have an operation code part (opcode) and two address fields: one for a memory address and one for a register address. This particular system includes eight general-purpose, user-addressable registers. Registers may be loaded directly from memory, and memory may be updated directly from the registers. Direct memory-to-memory data movement operations are not supported. Each instruction is stored in one word of memory. (10 Marks)
   i) How many bits are needed for the opcode?
   ii) How many bits are needed to specify the register?
   iii) How many bits are left for the memory address part of the instruction?
   iv) What is the maximum allowable size for memory?
   v) What is the largest unsigned binary number that can be accommodated in one word of memory?

b) Convert binary number 01000110 to its equivalent
   i) Decimal number
   ii) Octal number
   iii) Hexadecimal number (6 Marks)

c) Explain how the read and write operations are performed by the computer. (4 Marks)