061306T4CSC

COMPUTER SCIENCE LEVEL 6

ICT/OS/CS/CR/01/6/A

Understand Computer Organization and Architecture

Nov/Dec 2024

TVET CURRICULUM DEVELOPMENT, ASSESSMENT AND CERTIFICATION COUNCIL (TVET CDACC)

WRITTEN ASSESSMENT

Time: 3 HOURS

INSTRUCTIONS TO CANDIDATE

1. Marks for each question are indicated in the brackets.
2. The paper consists of **TWO** sections: **A** and **B**.
3. Candidates are provided with a separate answer booklet
4. **DO NOT** write on this question paper.

This paper consists of FOUR (4) printed pages

Candidates should check the question paper to ascertain that all pages are printed as indicated and that no questions are missing.

SECTION A (40 Marks)

Answer ALL the questions in this section.

1. Although Web-based user interfaces are somewhat limited when compared to CLIs and GUIs, their use in organizations has grown and continues to grow. List FOUR advantages that Web interfaces offer over CLIs and GUIs? (4 marks)
2. Based on the Von Neuman architecture, describe a computer system mode of working. (4 marks)
3. Virtual machines are implemented for use today. State at least THREE advantages that result from the use of virtual machines. (3 marks)
4. Each instruction must contain the information required by the CPU for execution. Each instruction format consists of TWO components. Explain the components (4 marks)
5. State FOUR differences between RISC and CISC. (4 marks)
6. Although instruction sets vary among machines, most of them include the same general types of operations. Explain any THREE operations of instructions in a machine. (6 marks)
7. A computer must have a way of detecting the arrival of any type of input, what are these TWO ways. (2 marks)
8. Using a diagram explain the computer memory hierarchy considering speed of access, capacity and pricing. (6 marks)
9. All information to be used in a computer must be represented in a format suitable for the machine. This is as electrical signals. A bit is the basic unit of signal, and it has two states: it is either “on” (1.5V) or “off” (0.5V). This is a binary system and these two states are symbolized by the binary digits 1 and 0 respectively. Explain how the following data is represented in a computer. (4 marks)
    i) Signed positive integer and Signed negative integer
    ii) Real Numbers
10. Use a diagram to illustrate the AND logic gate. (3 marks)

SECTION B (60 Marks)

Answer Any THREE Questions in This Section

11.

a) If you are a computer builder trying to make your system as price-competitive as possible, outline the features and organization you would select for its memory hierarchy. (8 marks)

b) Consider a byte-addressable computer with 24-bit addresses, a cache capable of storing a total of 64KB of data, and blocks of 32 bytes. Show the format of a 24-bit memory address for direct mapped. (6 marks)

c) Direct memory access (DMA) is one of the I/O control methods. Explain the working of DMA. (6 marks)

12.

a) Given the function: **F(x,y,z) = xz + (xy + z)**

i. Construct the truth table for **F**. (4 marks)

ii. Draw the logic diagram using Boolean expression. (5 marks)

b) In the context of cached memory system. Explain the following performance factors; hit ratio and miss penalty. (4 marks)

c) Memory performance is measured using various principles. Explain the principle of locality and its relevance to cache memory performance. (3 marks)

d) Outline TWO differences between sequential circuits and combinational circuits. (4 marks)

13.

a) Outline SIX design issues of cache memory of a computer. (6 marks)

b) Storage technologies at all levels of the storage hierarchy can be differentiated by evaluating certain core characteristics as well as measuring characteristics specific to a particular implementation. Explain any FOUR characteristics of storage. (8 marks)

c) Briefly explain the basis of Flynn's taxonomy of parallel computer architectures. (6 marks)

14.

a) I/O module can operate using various techniques. Explain the three basic techniques used in the operation of I/O module. (6 marks)

b) Describe any FIVE characteristics of computer memory . (5 marks)

c) Indicate the kind of upgrades the following fall under. (3 marks)

i. 1.73 GHz to 2.56 GHz

ii. 256 MB to 512 MB

iii. 40 GB to 120 GB

d) Describe three standards of buses (6 marks)

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