061306T4CSC

COMPUTER SCIENCE LEVEL 6

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

UNDERSTAND COMPUTER ORGANIZATION AND ARCHITECTURE

July /August 2024

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

WRITTEN ASSESSMENT

TIME: 3 HOURS

INSTRUCTIONS TO CANDIDATE

1. The paper consists of **two** sections: **A** and **B**.
2. Answer **ALL** questions in Section **A** and any **Three** from section **B**
3. Marks for each question are indicated in the brackets
4. A separate answer booklet will be provided
5. Do not write on the question paper

This paper consists of FOUR (4) printed pages.

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

SECTION A: (40 MARKS)

Answer ALL the questions in this section

1. Discuss TWO differences between computer organization and computer Architecture.

   (4 Marks)

2. Explain the role of the ALU in a computer processor. (2 Marks)

3. Outline THREE types of bugs caused by improper memory management. (3 Marks)

4. Elaborate the concept of cycle stealing in the context of PIO operations. (2 Marks)

5. Highlight TWO differences between BCD and binary number system. (4 Marks)

6. Describe the functions of the main structural components of a processor. (3 Marks)

7. Draw a truth table for a XNOR gate. (4 Marks)

8. Calculate each of the following octal arithmetic giving your answer in binary. (4 Marks)

   a. 453 + 444

   b. 765 - 301

9. Explain TWO disadvantages of flash memory as used in computers. (4 Marks)

10. The figure below shows an arrangement of logical gates. Construct a truth table showing

    the outputs R, S and T. (4 Marks)
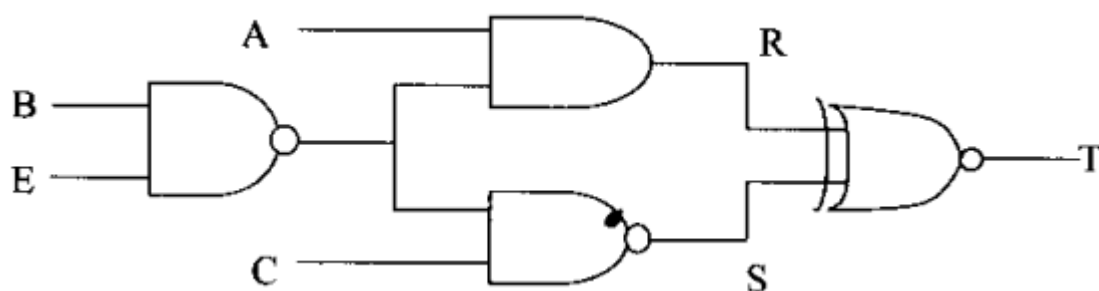
11. A Technician in Ungwaya College intends to familiarize trainers in the institution on

    examples of different ROMs used in computers. Outline THREE examples that he could

    mention. (3 Marks)

12. Describe THREE primary functions of a bus interface. (3 Marks)

SECTION B: (60 MARKS)

Answer any THREE questions in this section

13.

a. An electrical door operates under the control of three switches X,Y,Z. The door opens whenever switches X, Y and Z are in the same position. When X and Z are in different position, the door opens only if the switch Y is high. Draw a truth table to represent this information. (5 Marks)

b. Using a Karnaugh map, simplify the minimal terms using four variables (ABCD).
   $\sum m$ (0, 2, 8, 10, 12) (5 Marks)

c. Computer systems have different types of registers built to perform different functionalities. Describe the role of FIVE different types of registers. (10 Marks)

14.

a. Sarah, a graphics designer, has been experiencing performance issues and delays when working with large files. She believes that upgrading her input-output (I/O) devices could help improve her productivity. As her computer science consultant, you have been tasked with prescribing suitable I/O device specifications according to Sarah's needs.

   i. Describe FIVE factors you would consider when advising on most appropriate I/O device. (10 Marks)

   ii. Analyze the main differences between hard disk drives (HDDs) and solid-state drives (SSDs). (10 Marks)

15.

a. Computer systems need to efficiently move large volumes of data between memory, registers, and peripheral devices. Discuss FIVE strategies to optimize interrupt-driven I/O performance. (10 Marks)

b. Designing a high-speed system bus for modern processors presents several challenges due to the increasing demands for performance, scalability, and efficiency. Discuss FIVE such challenges. (10 Marks)

16.

    a. Describe FIVE benefits of effective memory organization.   (10 Marks)

    b. Draw a truth table to represent the following sum on min-terms.   (5 Marks)

        $F(A, B, C, D) = \sum m \, (2, 3, 10, 11, 12, 13)$

    c. Minimize the above expression in (16 b.) using a K-Map.   (5 Marks)

THIS IS THE LAST PRINTED PAGE