

**UGANDA MARTYRS UNIVERSITY**  
**FACULTY OF SCIENCE**  
**DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION SYSTEMS**

**END OF SEMESTER ONE EXAMINATION**

**ACADEMIC YEAR 2023/2024**

**(CSC 61103) COMPUTER ARCHITECTURE AND LOGIC**

**BSc. IT, BSc.CS, DIP.CS, YEAR ONE**

**Time : 3 Hours**

**Date:.....**

---

***Instructions:***

---

1. *Read carefully through ALL the questions before attempting*
2. ***ANSWER ONLY FOUR (4) Questions.** (Each question carries equal marks)*
3. *Ensure that your **Registration number** is indicated on all pages of the examination answer booklet.*
4. *Ensure your work is **clear and readable**. Untidy work shall be penalized*
5. *Any type of examination malpractice will lead to automatic disqualification*



### Question 1.

- a) With an example, distinguish between the following terms. ( 4 marks)
- i. Computer Architecture and Computer Organization
- b) Briefly explain the four core functions of a computer system in relation to computer architecture. (8 marks)
- c) Computer generations have evolved over time; what technology differentiates the different stages a computer had gone through from generation 1 to present? (5 marks)
- d) A computer motherboard has expansion slots. What is the relevance of expansion slots? List any three components that can be attached onto the expansion slots with their functionality? (8 marks)

### Question 2

- a) Distinguish between the following as used in computer architecture: (6 marks)
- i) Storage medium from a Storage device,
- ii) Data Bus and Address Bus
- iii) Primary Memory and Secondary Memory
- b) All modern computers are based on concepts developed by John Von Neumann at the Institute of Advanced Studies. Briefly explain any three concepts that are outlined by this architecture. (6 marks)
- c) As a computing student, you have been tasked to buy computers that are to be used by UNICEF Organization. Briefly explain any three factors you would put into consideration while making this purchase. (6marks)
- d) With an illustration explain the basic instruction cycle of a computer. Explain the alteration that is made on the instruction cycle in case of interrupt driven machines.( 7 Marks)

### Question 3.

- a) How is Non numeric data represented in the computer world. (2 marks)
- b) State any two reasons why data in digital computers is represented using the binary number system. (4 marks)
- c) Discuss the applicability of the Hexadecimal and Octal number systems in the computer world. (4marks)
- d) Convert the following from one radix to another. ( 15 marks)
- i.  $101010111101111_2$  to Octal
- ii.  $432_{10}$  to binary
- iii.  $735_{10}$  to Hexadecimal
- iv.  $98DF_{16}$  to Binary
- v.  $43.625_{10}$  to Binary

### Question. 4

- a) Discuss the design of a typical input or output interface. (4marks)



- b) All computer modules are linked by an interconnection. It is also noted that the input/output (peripheral devices) connect to the internal modules through an I/O module. Why are peripheral devices not connected directly to the System bus? (6marks)
- c) Giving relevant examples, explain three main classifications of external devices. (6marks)
- d) Suppose you are working in your word processor document and you press the letter "g" on the keyboard. Give a brief summary of what happens; from the time you press the key, to the time you see it displayed on your display screen/monitor. (6marks)
- e) Explain with the help of a block diagram, the DMA transfer in a computer system. (3marks)

### Question 5

- a) Explain the importance of memory to a computer system. (2 marks)
- b) Distinguish between the following types of memory (6 marks)

i. Static Ram and Dynamic Ram

ii. EPROM and EEPROM

- c) With an illustration, explain the memory hierarchy system of the computer. (8 marks)
- d) Briefly explain the relationship between access time, memory cost and capacity while dealing with memory hierarchy. (6 marks)
- e) Explain the importance of cache memory and show how its integrated into the computer system. (3marks)

### Question 6

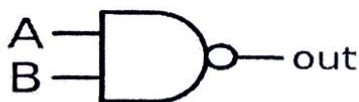
- a) Define a logic gate. (2marks)
- b) Why are logic gates important to modern day electronic computers? (3marks)
- c) Explain the logic of the following gates. (6 marks)

i. AND

ii. OR

iii. NOT

- d) Draw a truth table for the NAND logic gate below. (3marks)



- e) Give the three main differences between Combinational circuits and Sequential circuits. (3marks)
- f) Given a Boolean SUM of PRODUCTS expression:

$$AB + ((A + B) \cdot AC)$$

Derive the corresponding

- i. Logic circuit for this expression (4 marks)
- ii. A truth table (4 marks)

**END**