



# **MACHAKOS UNIVERSITY**

**University Examinations for 2022/2023**

**SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY**

**FIRST YEAR FIRST SEMESTER EXAMINATION FOR**

**BACHELOR SCIENCE (INFORMATION TECHNOLOGY)**

**SCO 104: COMPUTER ORGANIZATION AND ARCHITECTURE 1**

**DATE:**

**TIME:**

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**INSTRUCTIONS: ANSWER QUESTION ONE AND ANY OTHER TWO**

**QUESTION ONE (COMPULSORY) (30 MARKS)**

- a) Define the following terms:
- (i) Memory (1 mark)
  - (ii) Cache (1 mark)
  - (iii) Computer Program (1 mark)
  - (iv) Machine Language (1 mark)
  - (v) Registers (1 mark)
- b) Distinguish between – adjust the question to CPU operations
- (i) RISC and CISC (2 marks)
  - (ii) Random and Sequential access (2 marks)
- c) With relevant examples distinguish between computer architecture and computer organization (4 marks)
- d) Using an illustration,
- i. describe the structure of CPU and
  - ii. explain the function of its components (8 marks)
- e) Briefly describe bus arbitration and explain two types of arbitration schemes. (5 marks)
- f) In regards to CPU performance distinguish between programed i/o and interrupt driven i/o (4 marks)

## QUESTION TWO (20 MARKS)

- a) Describe how the magnetic disk is organized internally clearly illustrating your answer using diagrams (4 marks)
- b) Showing your working, Convert the binary number 110010101001111 to:
  - i. Octal (2 marks)
  - ii. Decimal (2 marks)
  - iii. Hexadecimal (2 marks)
- c) Explain **FOUR** cases which can result to generation of an interrupt during execution of a program. (8 marks)
- d) State two areas where Hexadecimal numbers are used and why (2 marks)

## QUESTION THREE (20 MARKS)

- a) With the aid of a diagram
  - i. describe the steps taken in a single instruction cycle during processing (9 marks)
  - ii. Explain the hierarchical Bus Architecture found in a computer system (9 marks)
- b) Explain the over – flow rule (2 marks)

## QUESTION FOUR (20 MARKS)

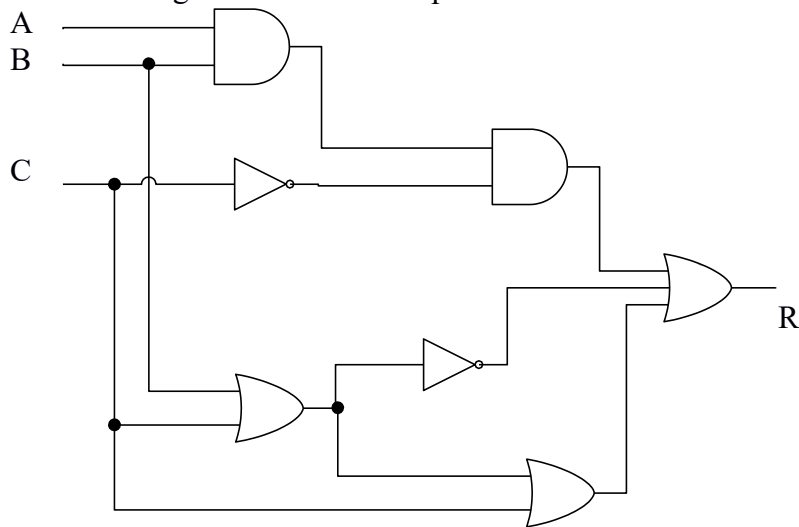
- a) When data is being sent to a printer an interrupt may occur. Define the term interrupt and state two reasons why an interrupt may occur in this case. (4 marks)
- b) Differentiate between machine language and high-level language (2 marks)
- c) With the aid of a diagram explain the Memory hierarchy in a computer System (8 marks)
- d) Explain the following memory concepts
  - i. Swapping (2 marks)
  - ii. Partitioning (2 marks)
  - iii. Paging (2 marks)

## QUESTION FIVE (20 MARKS)

- a) A given computer system includes a hard disk with direct memory access (DMA). Suppose a user application needs to change a single byte within a disk block. Explain, in order all communications that must take place between the processor and the hard drive to complete this operation. (5 marks)

b) Write the Logic statement that represents this circuit

(6 marks)



c) Come with a circuit representation of the below Boolean expression

$$A'B'C' + A'B'C + ABC' + AB'C'$$

(3 marks)

i. Simplify the above expression using Karnaugh maps

(3 marks)

ii. Draw the representation of the resulting circuit

(2 marks)