



MURANG'A UNIVERSITY OF TECHNOLOGY

SCHOOL OF COMPUTING AND INFORMATION TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE

UNIVERSITY ORDINARY EXAMINATION

2020/2021 ACADEMIC YEAR

**FIRST YEAR FIRST SEMESTER EXAMINATION FOR BACHELOR OF SCIENCE
IN SOFTWARE ENGINEERING AND BACHELOR OF SCIENCE IN COMPUTER
SCIENCE**

SCS 100 – COMPUTER ARCHITECTURE

DURATION: 2 HOURS

Instructions to candidates:

1. Answer question One and Any Other Two questions.
2. Mobile phones are not allowed in the examination room.
3. You are not allowed to write on this examination question paper.

SECTION A: ANSWER ALL QUESTIONS IN THIS SECTION

QUESTION ONE (30 MARKS)

- a) Explain any two main components of a motherboard. (4 marks)
- b) Draw symbol for exclusive OR (XOR) gate, truth table and write its Boolean expression. (4 marks)
- c) Highlight four disadvantages of using K-maps. (2 marks)
- d) Discuss two classification of computer based on function. (4 marks)
- e) Explain any three features that affect the performance of the computer. (6 marks)
- f) Discuss the benefits of using a multiple-bus architecture compared to a single-bus architecture. (4 marks)
- g) Use a table to express the values of the Boolean function
 $F(X, Y, Z) = (x + y)(xy^1)$
 $F(x, y, z) = (x + y)(x + y^1)$ (6 marks)

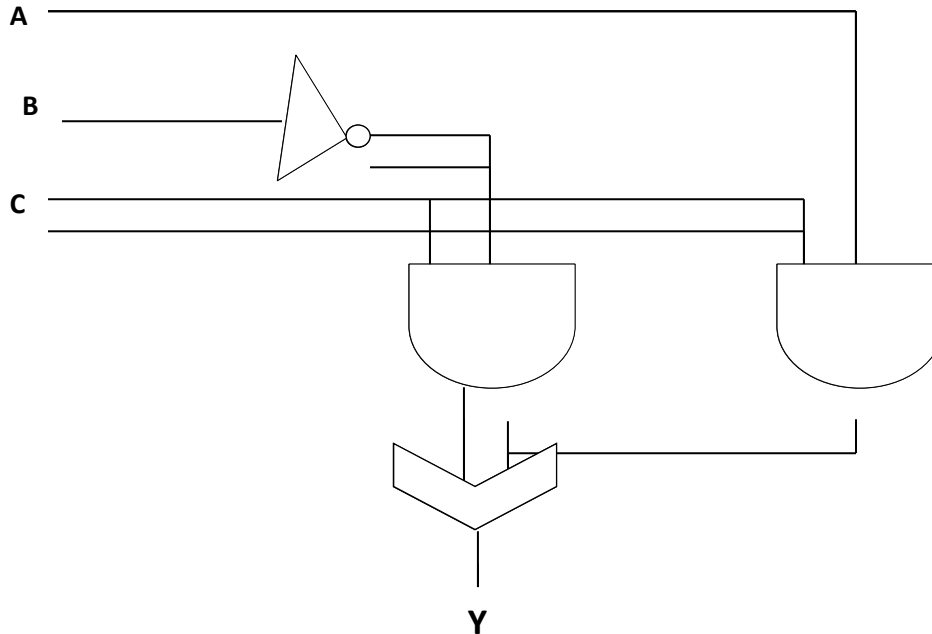
SECTION B – ANSWER ANY TWO QUESTIONS IN THIS SECTION

QUESTION TWO (20 MARKS)

- a) Explain any two types of system buses clearly showing their function. (4 marks)
- b) Differentiate third and fourth computer generation clearly showing at least two characteristics. (4 marks)
- c) Consider the logic function with three inputs A, B, and C.
Output D is true if at least one input is true
Output E is true if exactly two inputs are true
Output F is true only if all three inputs are true
 - i. Show the truth table for these three functions A, B, C, D, E, F (3 marks)
 - ii. Show the Boolean equations for these three functions. (3 marks)
- d) Explain the purpose of the processing unit and the program counter in a computer system. (4 marks)
- e) Represent the following in a logic circuit $F = X + y^1z$ (2 marks)

QUESTION THREE (20 MARKS)

- a) Highlight two advantages of using virtual memory. (2marks)
 b) What is the output of the following combinational circuit? (6 marks)



- c) Differentiate serial and parallel port as used in computer architecture. (4 marks)
 d) Convert the decimal number 3.14579 to binary number correct to 6 decimal places. (4 marks)
 e) Find 2⁰s compliment of binary number 10001.001 (4 marks)

QUESTION FOUR (20 MARKS)

- a) Consider a digital logic alarm system in which the alarm should go off when the door opens or when the door is closed and the motion detector goes off. (4 marks)
 i. Define the input variables and give the output logic expression. (2 marks)
 ii. Draw the logic circuit for the alarm output expression in (a) above. (4 marks)
 b) Distinguish between synchronous and asynchronous sequential logic circuits. (4 marks)
 c) Discuss the two types of processors. (4 marks)
 d) Given the function $F(x, y, z) = xy^1z + x^1y^1z + xyz$, simplify the expression using Boolean algebra and identities and draw the logic diagram for the simplified expression. (6 marks)