UGANDA MARTYRS UNIVERSITY-NKOZI

UNIVERSITY EXAMINATION

FACULTY OF SCIENCE

DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION SYSTEMS

FIRST YEAR, END OF SEMESTER ONE FINAL ASSESSMENT FOR DIPLOMA IN COMPUTER SCIENCE & IT, BACHELOR OF SCIENCE IN IN INFORMATION TECHNOLOGY & BACHELOR OF SCIENCE IN COMPUTER SCIENCE

COMPUTER ARCHITECTURE & ORGANIZATION/ARCHITECTURE

(MASAKA & NKOZI CAMPUS)

DATE: 13th December 2022 TIME: 2:-5:00PM DURATION: 3HRS

Instructions:

1. *Carefully read through ALL the questions before attempting*
2. ***ANSWER FOUR (4) Questions .***
3. *No **names** should be written anywhere on the examination book.*
4. *Ensure that your **Registration number** is indicated on all pages of the examination answer booklet.*
5. *Ensure your work is **clear** and **readable**. Untidy work shall be penalized*
6. *Any type of examination Malpractice will lead to automatic disqualification*
7. *Do not write anything on the questions paper.*
8. *Use the exam answer booklet for all your rough work*

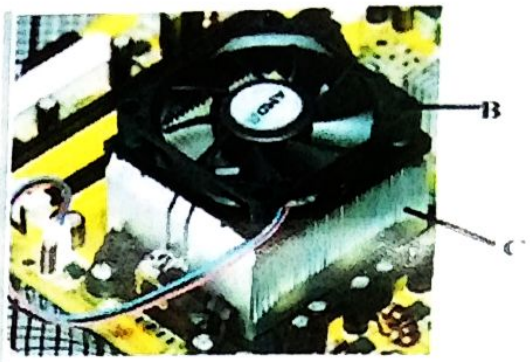
Question 1

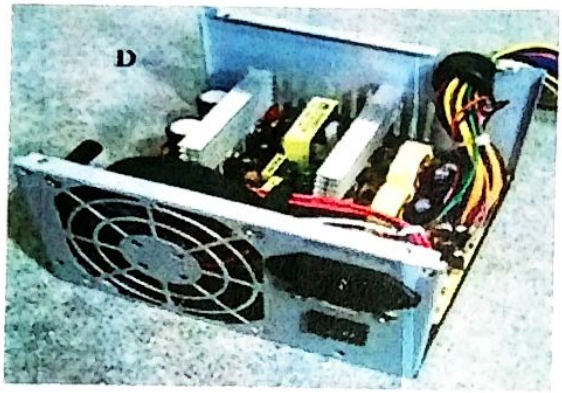
a) Distinguish between these two key terms: Computer Organization and Computer architecture. **(4 Marks)**

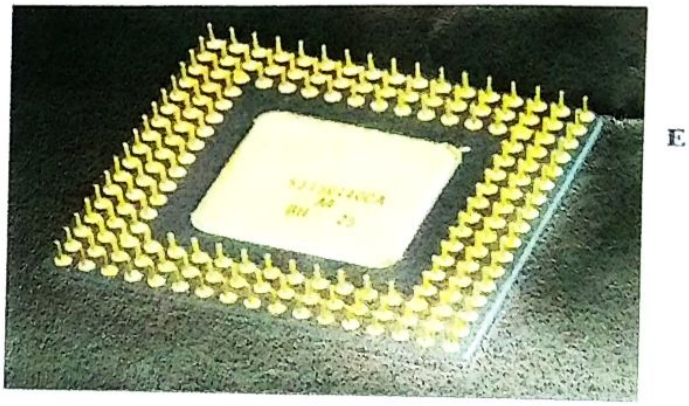
b) The computer world has evolved over the years. State the technology that differentiates the different stages a computer had gone through from generation 1 to present generation? **(5 marks)**

c) Based on the structural setup, what are the functions of the computer, giving an example of device that helps in achieving the stated function. **(8 marks)**

d) Identify and state the role of these computer internal device parts A, B, D and E as found in the systems unit. **(8 Marks)**







Question 2

a) "The width of the bus is a key determinant for performance" explain the statement **(3 Marks)**

b) Briefly explain the relevancy of a system bus in a computer system and explain the three types of system buses that interconnect the components giving scenarios in which each of them is useful. **(10 marks)**

c) With a basic illustration, explain the basic instruction cycle of a computer. **(6 Marks)**

d) Define an Interrupt? Briefly explain two approaches that are used to handle multiple interrupts **(6 marks)**

Question 3

a) Why is the binary system suitable for representing data in computer systems? **(2 marks)**

b) Data is represented using various number systems in a computer system. Outline the three major number systems used in computer systems and for each, state the radix and Digits used **(8 marks)**

c) Add the following binary numbers using unsigned binary rules **(2 marks)**

$$\begin{array}{r} 10101 \\ +\ 11101 \\ \hline \end{array}$$

(8 marks)

d) Convert the following

i. 1110001100001111 to hexadecimal

ii. $5AB1_{16}$ to Base 2

iii. 2000_{10} to base Octal

iv. 10111011_2 to Octal

e) Calculate the storage space in GB that is occupied by two programs which require 20000bytes for each to be completely installed on your computer. **(2 marks)**

f) Given the ASCII Equivalence, that A= 41, B=42, C=43, D=44, E=45, F=46. indicate the bits required to give the output as **DEAD (3 marks)**

Question 4

a) Why does a computer need secondary storage **(2 marks)**?

b) Explain the importance of cache memory and show how its integrated into the computer system **(3Marks)**

c) ROM (Read Only Memory is available in a wide range of possible modes; EPROM or EEPROM. Explain how the two modes are different **(4 Mark)**

d) Computer memory system is organized in a hierarchy, with an illustration of the hierarchy explain the importance of such an arrangement. **(6 marks)**

e) Explain the relationship between access time, memory cost and capacity **(4 marks)**

f) Peripheral devices cannot directly communicate with the CPU and Memory, with (3) reasons explain why? **(6 mark)**

Question 5

a) Define a logic gate **(2 marks)**

b) Why are logic gates important to modern day electronic computers? **(3 marks)**

c) Explain the logic of the following gates **(6 marks)**

i. AND

ii. OR

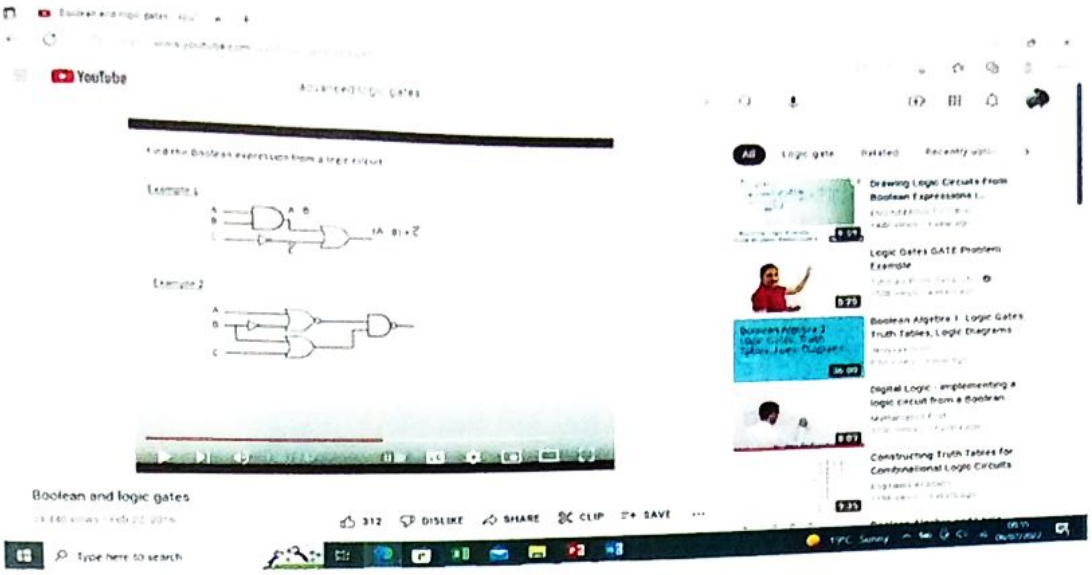
iii. NOT

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

e). Design a logic circuit diagram and generate a truth table for the following expression. NB: A' is (A-not) [8 marks]

$Z = (A'+B) + AB$

f). Refer to the circuit below and write down the expression of the circuit **(3 marks)**



Question 6.

a) ALL computer modules are linked by an interconnection. It's also noted that the input/output[peripherals] devices connect to any of the internal modules through an IO module. Why are peripherals devices not connected directly to the system bus? **(6 Marks)**

b) Giving relevant examples, explain the three main classifications of external devices **(6 Marks)**

c) Briefly explain the key functions performed by the Central Processing Unit **(8 marks)**

d) You have been tasked to buy computers that are to be used by UNICEF. As a computing students, Briefly explain what three factors you would put into consideration while making this purchase. **(5 marks)**