UNIVERSITY OF SWAZILAND

Faculty of Science and Engineering

Department of Computer Science

MAIN EXAMINATION

May 2018

Tittle of Paper: COMPUTER ORGANISATION AND ARCHITECTURE I

Course Code: CSC 222 / CS 241

Time Allowed: 3 Hours Total Marks: 100

Instructions to Candidates:

*This Question Paper Consists of **FIVE (5)** Questions. Answer All the **FIVE (5)** Questions.*

Marks are indicated in Square Brackets.

NB: You are not allowed to open this examination paper until permission has been granted by the invigilator

QUESTION ONE [20 MARKS]

a) Define the following terms. [5*2 marks=10 marks]
   i. Computer organization
   ii. Computer architecture
   iii. Binary number
   iv. Bus
   v. Microprocessor

b) Explain **FIVE** reasons why understanding modern computer architecture can help you. [5 marks]

c) List any **FIVE** function performed by the Central Processing Unit of any computer. [5 marks]

QUESTION TWO [20 MARKS]

a) What is a Machine Cycle? Explain the **THREE** steps involved in a Machine Cycle. [4 marks]

b) With the help of a diagram briefly explain the **FIVE** basic units of a of Computer System [5*2marks= 10 marks]

c) State the difference between SRAM and DRAM [2 marks]

d) Discuss the four major types of instruction that always originate from the Control Unit. [4 marks]

QUESTION THREE [20 MARKS]

a) CPU design focuses on **SIX** main areas. List these areas. [6 marks]

b) Highlight the main difference between Small-scale integration CPUs and Large-scale integration CPUs [4 marks]

c) ROM is a digital logic device that stores data and programs which can only be read, list and briefly explain **THREE** types of ROM. [3*2marks= 6 marks]

d) Draw logic diagram for following
   i. AB+CD [2 marks]
   ii. Y=AB+(B+C) [2 marks]

QUESTION FOUR [20 MARKS]

a) What are the main differences between a multi-processor system and a multi-computer system? [2 marks]

b) Explain briefly, giving examples of three different types of peripherals that exist. [6 marks]

c) Briefly explain the following:

   i. I/O Interface [2 marks]
   ii. CPU Interface [2 marks]

d) Convert the following numbers.

i. $101011_2=?_{10}$ [2 marks]

ii. $724_8=?_{10}$ [2 marks]

iii. $ABC_{16} =>?_{10}$ [2 marks]

iv. $10AF_{16} = ?_2$ [2 marks]

QUESTION FIVE **[20 MARKS]**

a) What do you understand by :

i. Programmed I/O [2 marks]

ii. Interrupt Initiated I/O [2 marks]

b) When the buses are under the control of DMA data transfer can happen in many different ways: Briefly discuss the following

i. Burst Transfer Mode [2 marks]

ii. Cycle Stealing Mode [2 marks]

c) Explain any **FOUR** Functions of Buses in the Computer System [4 marks]

d) List **TWO** Advantages and **TWO** Disadvantages of the Cache Memory [4 marks]

e) A register is a temporary memory location that holds instructions as the CPU executes, List and explain the functions of the **FOUR** registers that are essential to instruction execution. [4 marks]