University Examinations 2018/2019

SECOND YEAR FIRST SEMESTER EXAMINATION FOR THE DIPLOMA IN INFORMATION TECHNOLOGY

CIT 2200: COMPUTER SYSTEMS ARCHITECTURE

DATE: AUGUST 2019   **TIME: $1^1/_2$ HOURS**

INSTRUCTIONS: *Answer question **one** and any other **two** questions*

QUESTION ONE (30 MARKS)

a) Define the following terms   (4 marks)

    i.   Computer architecture

    ii.   Computer organization

b) State three differences between computer architecture and computer organization

(6 marks)

c) Define Instruction Set Architecture   (2 marks)

d) List the three classic components of a computer   (3 marks)

e) What is a machine cycle?   (2 marks)

    i.   List any three activities involved in one machine cycle   (3 marks)

f) Explain the stored-program concept   (4 marks)

g) Mention at least four elements of the von Neumann model of a digital computer

(4 marks)

h) State the functions of each of the following registers   (2 marks)

    i.   Program counter

ii. Current instruction register

QUESTION TWO (20 MARKS)

a) Using a diagrammatic representation, illustrate the computer system   (6 marks)

b) Describe the basic operation of a digital computer system   (7 marks)

c) Prove the following Boolean identify $A + \bar{A}B = A + B$ (4 marks)

d) State three tasks performed by input devices   (3 marks)

QUESTION THREE (20 MARKS)

a) Von-Neumann architecture was proposed in 1945 and is based on the stored-program computer concept. This design is still used in most computers produced today

    i. Describe the Von-Neumann model   (4 marks)

    ii. What are the characteristics of a Von-Neumann-based computer   (2 marks)

b) Describe the three categories of computer architecture   (6 marks)

c) Diagrammatically, illustrate an AND gate   (2 marks)

d) Determine the output X of a logic circuit shown below. Simplify the output expression using Boolean Laws and theorems. Redraw the logic circuit with the simplified expression   (6 marks)

QUESTION FOUR (20 MARKS)

a) 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 and Output F is true only if all three inputs are true

    i. Show the truth table for these three functions   (3 marks)

A	B	C	D	E	F

ii. Show the Boolean equations for these three functions (3 marks)

iii. Show an implementation consisting of gates (invertors, AND,OR,NOR,etc).

Connect your circuit to the provided feeds (input and output) (3 marks)

Input	Output
A	D
B	E
C	F

b) Write down two functions of each of the following CPU components (4 marks)

  i. Arithmetic logic unit

  ii. Control unit

c) State the categories in each of the following general system architecture

  i. Store program control concept (3 marks)

  ii. Flynn's classification of computers (4 marks)