INTI International University & Colleges

FINAL
ALTERNATIVE ASSESSMENT

(COVER PAGE)

Session	:	**April 2021**
Programme	:	Diploma in Computer Science (DCS)
Course	:	**DCS1102: Computer Architecture**
Date of Examination	:	29 July 2021 (Thursday)
Time	:	12.00noon – 2.30pm Reading Time : Nil
Duration	:	2 Hours 30 Minutes

Special Instructions :

This paper consists of **FOUR (4)** structured questions. Answer **ALL** the questions. All questions carry equal marks.

Material permitted :
Non-Programmable Scientific Calculator

Materials provided :
Nil

Examiner(s)	:	**Asvhini Subramaniam,** Lusiana Syaiful
Chief Moderator	:	Ryan Tee Ah Ann

*This paper consists of **4** printed pages, including the cover page*

DIPLOMA IN COMPUTER SCIENCE PROGRAMME (DCS)
DCS1102: COMPUTER ARCHITECTURE
FINAL ALTERNATIVE ASSESSMENT: APRIL 2021 SESSION

Instructions: This paper consists of **FOUR (4)** structured questions. Answer **ALL** the questions. All questions carry equal marks.

Question 1

a) Convert $\mathbf{-109_{10}}$ and $\mathbf{-82_{10}}$ to 8 bits binary value, and add them using the 2's complement form. (*keep your answer in the 2's complement form, and indicate if an overflow occurs; status of carry and sum*):

(4 marks)

b) Solve the following questions by showing necessary workflow.

i) Express the decimal number, **-87** in the 2's complement form.
ii) Express the decimal number, **+105** in the 2's complement form.
iii) Express the decimal number, **-121** in binary using 8-bit signed magnitude, 1's complement and 2's complement forms.
iv) The binary number, **11110001** is in the 2's complement form. Convert it to a decimal number.
v) Perform the arithmetic operation: $\mathbf{1000101_2 - 101100_2} =$

(10 marks)

c) State the condition in which overflow occurs in case of addition and subtraction of two signed 2's complement numbers. Explain how overflow occurs and detected with an appropriate example(s).

(6 marks)

d) Briefly state the main function of a **Bus Interface Unit (BIU)** and an **Execution Unit (EU)**.

(5 marks)

[Total : 25 Marks]

Question 2

a) State and describe any **THREE (3)** significant of scheduling in multiprogramming.

(9 marks)

b) Explain the following typical assembly language statements:

i) ADD NUMBER, 25
ii) MOV DATA, 89
iii) ADD AX, BX
iv) AND STD, 67

(8 marks)

c) State the need for memory protection and describe the implementation of memory protection in the memory paging system.

(5 marks)

d) List the hazards presented by instruction level parallelism.

(3 marks)

[Total : 25 Marks]

Question 3

a) State and briefly explain **FOUR (4)** different types of segment registers.

(12 marks)

b) The process of dividing total memory size into segments of various sizes is called segmentation. Briefly explain **THREE (3)** advantages of segmented memory.

(9 marks)

c) Comment on the error if any, in the following assembly language mnemonics. Otherwise, explain the outcome of the operation.

i) ADD DL, [BX]
ii) MOV [7AH], [5CH]

(4 marks)

[Total : 25 Marks]

Question 4

a) The register content for an Intel 8086 microprocessor is as follows:

CS = 1000H, DS = 2000H, SS = 3000H, SI = 4000H, DI = 5000H
BX = 6083H, BP = 7000H, AX = 25FFH, CX = 8793H, DX = 1297H

Calculate the physical address of the memory where the operand is stored and the contents of the memory locations in each of the addresses shown below:

i) MOV [SI], AL
ii) MOV [DI+6H], BX
iii) MOV [SI+BX–11], AX
iv) MOV [DI][BX]+28H, CX
v) MOV [BP][SI]+17, DX

(10 marks)

b) Differentiate **Isolated I/O** with **Memory Mapped I/O**.

(10 marks)

c) Develop an assembly language program to perform the arithmetic operations below by only using registers AX and BX.

$$\mathbf{46_{10} * (243_{10} + 87_{10}) - 189_{10}}$$

(5 marks)
[Total : 25 Marks]

~THE END~