INTI
International College Subang
LAUREATE INTERNATIONAL UNIVERSITIES®

FINAL
Examination Paper

(COVER PAGE)

Session	:	**August 2014**
Programme	:	Diploma In Information And Communication Technology (DICTN/DICTI)
Course	:	**ICT2101 /CSC2101 : Computer Organisation**
Date of Examination	:	December 9, 2014
Time	:	8:00am – 10:00am Reading Time: Nil
Duration	:	2 Hours
Special Instructions	:	

Answer any **FOUR (4)** questions.

Materials permitted : Nil

Materials provided : Nil

Examiner (s)	:	**Mr. Ang Chee Huei,** Steven Khoo Boo Tap.
Moderator	:	Mr. Mohammad Faizal Bin Alias

This paper consists of 6 printed pages, including the cover page.

INTI INTERNATIONAL COLLEGE SUBANG

DIPLOMA IN INFORMATION AND COMMUNICATIONS TECHNOLOGY PROGRAMME (DICTN/DICTI)
ICT2101/CSC2101: COMPUTER ORGANISATION
FINAL EXAMINATION: AUGUST 2014 SESSION

Instructions: This paper consists of **SIX (6)** questions. Answer any **FOUR (4)** questions in the answer booklet provided. All questions carry equal marks.

Question 1

(a) The initial contents of registers of an 8086 processor are shown below:

$AX=56AB_H$, $BX=AABB_H$, $CX=A205_H$, $DX=0100_H$, $SI=7788_H$,
$DS=4000_H$, $SS=5000_H$, $BP=4567_H$, $SP=0108_H$, $DI=1234_H$

Assume the memory location contains the data 45_H for 8-bit operation and the data 4545_H for 16-bit operation. With the aid of a diagram, show the actual physical address and the affected register content after the execution of the instruction below.

```
MOV  CL, [BX+SI+12H]
```

(8 marks)

(b) Name and briefly describe the function of each of the **THREE (3)** system bus.

(6 marks)

(c) Show the 20-bit 2's complement binary representation of the following decimals:

(i) 1,288

(3 marks)

(ii) -16,384

(4 marks)

(iii) 524,288

(4 marks)

Question 2

(a) 8086 microprocessor was designed to have two separate working unit: Execution Unit (EU) and Bus Interface Unit (BIU), so that both unit can work concurrently and increase the efficiency of the processor. Describe **THREE (3)** situations in which either of the unit is forced to be idle waiting for the other unit.

(9 marks)

(b) For the following program, determine the value of register AX when the program terminates. Explain your answer.

```
      MOV CL, 00H
      MOV AX, 1H
A2:   ADD AX, 1H
      DEC CL
      JNZ A2
```

(5 marks)

(c) Write assembly codes that will calculate the average of the ten 16-bit numbers store at the data segment starting from address 0000_H. Store the answer in register AX.

(11 marks)

Question 3

(a) Show all workings clearly for the following:

(i) Convert 2014_{10} to binary

(3 marks)

(ii) Convert 2014_8 to hexadecimal

(3 marks)

(iii) Convert 2014_{16} to BCD (Binary Coded Decimal)

(3 marks)

(b) Modern CPUs have build-in cache to improve the performance of the computer system. Explain **TWO (2)** characteristics of computer programs that justified the inclusion of cache.

(8 marks)

(c) Explain the working principle of interrupt-driven I/O.

(8 marks)

Question 4

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

(i) `ADC CL, [BX]`

(ii) `IN 49H, AL`

(iii) `INC [2014H]`

(iv) `XCHG [13H], [25H]`

(v) `MOV DS, 0700H`

(10 marks)

(b) The following is output from the -r **DEBUG** commands after a certain 8086 program has run with a breakpoint set. All values are in hexadecimal.

```
-r
AX=C846  BX=D184  CX=0020  DX=017C  SP=0215  BP=0403  SI=7000  DI=8000
DS=2617  ES=12E4  SS=5487  CS=3C1A  IP=0108   NV UP EI PL NZ NA PO NC
5B4A:010D 30D7          ADC     BH, DL
```

Answer the following questions:

(i) The logical address of the next instruction to be executed.

(1 mark)

(ii) The physical address of the next instruction to be executed.

(3 marks)

(iii) Identify the next instruction. Find the value of register `BX` and `IP` after the next instruction has been executed.

(6 marks)

(iv) Provide the status flags (Carry, Auxiliary Carry, Zero, Sign and Parity) condition after next instruction being executed according to output from -t **DEBUG** command.

(5 marks)

Question 5

(a) The following assembly instructions were executed in an 8086 computer:

```
      MOV AX, 02H
      MOV DL, 03H
      MOV CX, 04H
A5:   MUL DL
      LOOP A5
```

(i) What is the content of register AX and CX (in Hexadecimal)?

(3 marks)

(ii) What is the status of overflow flag, carry flag, auxiliary carry flag, sign flag and parity flag?

(5 marks)

(b) Explain the differences between a near procedure call and a far procedure call in the microprocessor's point of view.

(8 marks)

(c) Give ONLY one line alternative instruction that will perform the same outcome for each of the following instructions:

(i)
```
MOV BL, 02H
MUL BL
```

(3 marks)

(ii)
```
MOV AL, [0800H]
ADD AL, 01H
MOV [0800H], AL
```

(3 marks)

(iii)
```
XOR AL, AL
```

(3 marks)

Question 6

(a) Name and discuss **THREE (3)** types of hazards that can happen in a pipelined processor.

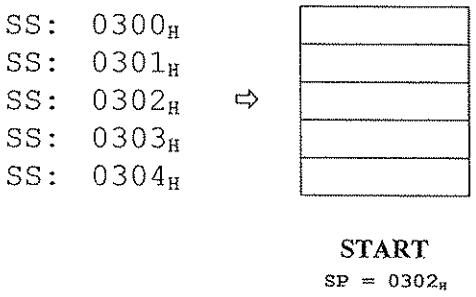
(10 marks)

(b) Suppose that AX=3024_H, BX=$20CC_H$, CX=8250_H and SP=0302_H. Determine the value of SP and the values of the data in the registers concerned as we progress through the following instructions. By using diagram, show the content of the stack memory after each instruction being executed.

(15 marks)

```
PUSH CX
PUSH BX
PUSH BX
PUSH AX
POP  AX
POP  BX
POP  CX
PUSH AX
POP  BX
POP  CX
```

Stack Memory



– THE END –

ICT2101/CSC2101(F)/Aug14