National University

of Computer & Emerging Sciences-Islamabad
Chiniot-Faisalabad Campus

Department of Computer Science

EE213 Computer Organization and Assembly Language

Mid-Term 1 (Fall 2015) **SOLUTION**

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Q1: **(4+4)**

(a) You are given three (8bit) signed binary numbers A, B and C. Evaluate D by using the equation **D = A – B – C** and then convert D into **decimal** where

A = 0011 1110
B = 1101 0101
C = 1101 1011

```
        0011 1110
+       0010 1011
A-B=    01101 001

        00100101
A-B-C= 100 011 10
      D=01110010
       = -114
```

(b) Assign address to the following variables while considering the ALIGN operator.

```
bVal BYTE ?          ; 00000000
ALIGN 2
wVal WORD ?          ; 00000002

bVal2 BYTE ?         ; 00000004
ALIGN 4
dVal DWORD ?         ; 00000008
dVal2 DWORD ?        ; 0000000C
```

P2- (b) Assign address to the following variables while considering the ALIGN operator. (DWORD= double word)

```
bVal DWORD ?     ; 00000000
ALIGN 2
wVal WORD ?      ; 00000004
bVal2 BYTE ?     ; 00000006
ALIGN 8
dVal WORD ?      ; 00000008
dVal2 DWORD ?    ; 0000000A
```

Q2: **(5+5)**

(a) In the following x 86 assembly language codes, **underline** the errors in **Wrong Code** and write the corrected version in **Corrected Code**. Marks will be awarded only if the **underlined** error is corrected in the corrected code.

Given Code	Corrected Code

.DaTa
a DW 0FFFFh
b DW 0ABCDh
c DD 1234h
d DW 0AF040h
.CodE
MOV AX, a
ADD AX, c
MOV AL, 127+128
MOV AL, DW PTR c
SUB 89, 78
INC A
MOV CS, 10h
	d DD 0AF040h or/ d DW 0F040h….
	
	ADD EAX,C…….
	
	MOV AX,DW PTR C
	MOV AL,DB PTR C…….
	
	SUB AL,78…… ……
	
	MOV AX,10h…….

(b) Use the following variable definitions for the remaining questions in this section:

.data
var1 SBYTE -4,-2,3,1
var2 WORD 1000h,2000h,3000h,4000h
var3 SWORD -16,-42
var4 DWORD 1,2,3,4,5

What will be the value of the destination operand after each of the following instructions execution?

mov ax,[var2+4] ;	a. 3000h
mov ax,[var3-2] ;	b. 4000h
movzx edx,var2 ;	c. 00001000h
mov edx,[var4+4] ;	d. 00000002h
movsx edx,var1	e. FFFFFFFCh

Q3: **(10+2)**

(a) You are given the following program which is coded to run on x86 architecture. What will be the contents of register **AL** after the loop ends? Write your answer in decimal notation. (No marks will be awarded without explained work & calculations)

```
org 100h
.MODEL small
.STACK 100h
.DATA
        var DW 9988h, 7051h, 1134h, 4567h, 8815h,7711h,5511h
.CODE
MAIN PROC
        MOV CX, 6
        MOV SI, OFFSET var
        MOV AX, 6+9
        L1:
                ADD AX, [SI]
                INC SI
                LOOP L1
MAIN ENDP
END MAIN
RET
```

```
   000F h
+  9988h
-------
   9997h
+  5199h
-------
   EB30h
+  7051
-------
carry1)5B81h
+  3470h
-------
   8FF1h
+  1134h
-------
   A125h
```

```
   A165h
+  6711h
-------
carry 1)0836h
```

AL=36h

AL= 54d

AX=0836

(b) Declare a 32-bit signed integer variable and initialize it with the smallest possible negative decimal value.

var SDWORD -2147483648

P2 Q3

(a) You are given the following program which is coded to run on x86 architecture. What will be the contents of register **AL** after the loop ends? Write your answer in decimal notation. (No marks will be awarded without explained work & calculations)

```
org 100h
.MODEL small
.STACK 100h
.DATA
        var DW 5511h, 7711h, 1134h, 4567h, 8815h,7051h,8899h
.CODE
MAIN PROC
        MOV CX, 6
        MOV SI, OFFSET var
        MOV AX, 6+9
        L1:
                ADD AX, [SI]
                INC SI
                LOOP L1
MAIN ENDP
END MAIN
RET
```

AL=42h
AL=66d

```
   000Fh
+  5511h
   5520h
+  1155h
   6675h
+  7711h
   DD86h
+  3477h
   1)11FDh
+  1134 h
   2331h
+  6711h
   8A42h
```