National University of Computer and Emerging Sciences

FAST School of Computing **Fall-2022** **Islamabad Campus**

EE-2003 Computer Organization and Assembly Language

Serial No:

Sessional Exam-I

Total Time: 1 Hour

Total Marks: 60

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Signature of Invigilator

Tuesday, 27th September, 2022.

Course Instructor

Dr. Niaz Ahmed, Ms. Sobia Rasheed, Ms. Shehr Bano, Mr. Rohail Gulbaz, Mr. Shams Farooq

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Student Name Roll No. Section Signature

DO NOT OPEN THE QUESTION BOOK OR START UNTIL INSTRUCTED.

Instructions:

1. Attempt question paper. Attempt all of them. Read the question carefully, understand the question, and then attempt it.
2. No additional sheet will be provided for rough work. Use the provided space for rough work
3. After asked to commence the exam, please verify that you have **eight (8)** different printed pages including this title page. There are a total of **6** questions.
4. Calculator sharing is strictly prohibited.
5. Use permanent ink pens only. Any part done using soft pencil will not be marked and cannot be claimed for rechecking.

	Q-1	Q-2	Q-3	Q-4	Q-5	Q-6	Total
Marks Obtained							
Total Marks	**10**	**10**	**10**	**10**	**10**	**10**	**60**

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Question 1 [10 Marks]

Convert the following as indicate. Perform Arithmetic operation and then convert. No marks for direct answer

i. $(AB.3)_{16} + (5E)_{16} = (\ ?\ )_2$

ii. $(1.000)_{16} - (0.9F1)_{16} = (\ ?\ )_8$

iii. $(1.01)_2 \times (0.1011)_2 = (\ ?\ )_{10}$

iv. $-(25)_{10} - (126)_{10}$

Perform **2's complement** subtraction

Question 2 [10 Marks]

Consider the following data declaration and fill in the given memory in hexadecimal (h).

***Note*:** *ASCII for 'A' = 041H*

```
.data
     v1 db 56h,23q,17d,1000101b,10,-1,"AB"
     v2 word 'AB','CD',0ABCDH
     v3 dd 'ABC',01234ABCDH
     v4 Qword 012345678H
```

```
4  .data
5      v1 db 56h,23q,17d,1000101b,10,-1,"AB"
6      v2 word 'AB','CD',0ABCDH
7      v3 dd 'ABC',01234ABCDH
8      v4 Qword 012345678H
```

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
0100	56	13	11	45	0A	FF	41	42	42	41	44	43	CD	AB	43	42
0110	41	00	CD	AB	34	12	78	56	34	12	00	00	00	00		
0120																
0130																

Question 3 [10 Marks]

Update the given registers after executing following code.

Note*:** *Consider starting address at* ***0x0100

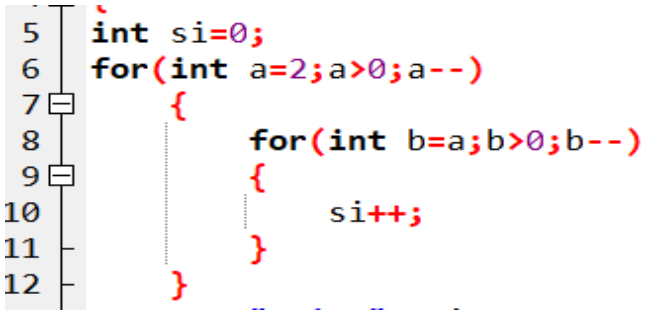
```
.data
     size=3
     ary1 db 2 dup(size
dup(1,0AH))
     size=5
     ary2 db 1 dup(size dup(2))
     ary3 dw 2,3
          dw 3
          db 2
     bary4 LABEL BYTE
     wary4 LABEL WORD
     Dary4 dd 0ABCDEF12H,1
     pary dw ary1

.code
     mov ax,@data
     mov ds,ax
     mov ax,0

     mov al,sizeof ary1
     mov ah,lengthof ary2
     mov bl,lengthof ary3
     mov si,OFFSET ary1
     mov di,pary
     mov al,bary4
     mov bx,wary4
     mov cx,WORD PTR[Dary4+4]
```

AL	02
AH	05
BL	02
SI	0100
DI	0100
BL	02
DX	EF12
AX	0001

Question 4 [10 Marks]

Implement following C++ code using **LOOP** statement. Update the final value of SI after execution of the program.

```
int si=0;
for(int a=2;a>0;a--)
      {
            for(int b=a;b>0;b--
)
            {
                  si++;
            }
      }
```




```
.code
      mov ax,@data
      mov ds,ax
      mov si,0
      mov cx,2
      outer:
            mov bx,cx
            inner:
                  inc si
            Loop inner
            mov cx,bx
      LOOP outer

mov ah,04ch
int 021h
```

Question 5 [10 Marks]

Consider the following data declaration. Copy **String** to **Stringcopy** using LOOP. You are not supposed to copy course code to the **stringcopy**.

NOTE: Your copy string should look like as following

stringcopy " Computer Organization and Assembly Language"

```
.data
     string db "EE2003-Computer Organization and Assembly Language"
     s1=($-str1)-7
     stringcopy db s1 dup("?")
.code
```

```
        mov ax,@data
        mov ds,ax
        mov ax,0

        mov cx,s1
        mov si,offset string
        add si,7
        mov di,offset stringcopy
        L1:
                mov al,[SI]
                mov byte Ptr[DI],al
                inc si
                inc di
        LOOP L1
mov ah,04ch
int 021h

end
```

Question 6 [10 Marks]

i. Update the given flags after executing following code

```
mov ax, 0FFFFH
add ax,1
```

OF	SIGN	ZF	AF	PF	CF
0	0	1	1	1	1

ii. Write a code that add **v1** with **v2** and store result in **sum**. Your code should be for X86 architecture. You are not supposed to use **movsx** command as it belongs to .386 architecture

```
.data
      v1 db -5
      v2 dw 0FFFCh
      sum dw 0

.code
      mov ax,@data
      mov ds,ax
      mov ax,0
      mov ax,0FFFFh
      mov al,v1
      add ax,v2
      mov sum,ax

mov ah,04ch
int 021h

end
```

iii. Write a code that swap **v1** with **v2**.

```
.data
      v1 db 5
      v2 db 4
.code
     mov ax,@data
     mov ds,ax
     mov ax,0

     mov al,v1
     xchg al,v2
     mov v1,al


mov ah,04ch
int 021h
```

iv. Consider the following data declaration and fill in the given memory in hexadecimal (h).

```
.data
      v1 db 1
       align WORD
       v2 word 2
       v3 byte 3
       align WORD
       v4 dw 4
```

```
v1 db 1
align WORD
v2 word 2
v3 byte 3
align WORD
v4 dw 4
```

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
0100	01	00	02	00	03	00	04	00								
0110																
0120																
0130																