0228

National University of Computer and Emerging Sciences

FAST School of Computing **Fall-2023** **Islamabad Campus**

EE-2003 Computer Organization and Assembly Language

CS

Tuesday, 26th September 2023.

Serial No:

Sessional Exam-I

Total Time: 1 Hour

Total Marks: 60

Signature of Invigilator

Course Instructor

Mr. Farrukh Bashir, Mr. Aqib Rehman, Dr. Waseem Abbas, Mr. Shams Farooq, Mr. Obaid Ullah

Aneeq Malik 22i-1167 B

Student Name Roll No. Section Signature

DO NOT OPEN THE QUESTION BOOK OR START UNTIL INSTRUCTED.

Instructions:

1. Attempt all questions on the question-book. 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 **SIX (6)** different printed pages including this title page. There are a total of **5** 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	Total
Marks Obtained	10	10	10	8+2	20	58
Total Marks	10	10	10	10	20	60

Good.

Question 1 [10 Marks]

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

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

```
.data
        quard Qword 'ABCD',0ABCDABCDH
   doubleword dd 'ABC',01234ABCDH
              word 'AB','CD',0ABCDH
       mybyte db "AB",0ABh,23q,17t,1000101b
       byte2  sbyte -1,255,'A'+2*4
```

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
0100	44	43	42	41	00	00	00	00	CD	AB	CD	AB	00	00	00	00
0110	43	42	41	00	CD	AB	34	12	42	41	44	43	CD	AB	41	42
0120	AB	13	11	45	FF	FF	49									
0130																

Question 2 [10 Marks]

Update the given registers after executing following code. ***Note:*** *Consider starting address at 0x0100*

```
.data
     size1=3
     ary1 db 1,2 dup(size1 dup(1,0AH))
     size1=5
     ary2 byte 2,1 dup(size1 dup(2))
     ary3 dw 2,3,
             7,8,9
          word 3
          sbyte 2
     bary4 LABEL BYTE
     wary5 LABEL WORD
     Dary6 dd 0ABCDEF12H,1
     Pary7 dd ary1
.code
     mov ax,0
     mov al,SIZEOF ary1
     mov ah,LENGTHOF ary2
     mov bl,LENGTHOF ary3
     mov esi,OFFSET ary1
     mov edi,pary
     mov al,bary4
     mov bx,wary4
     mov cx,WORD PTR[Dary4+4]
```

	Hexa
AL	0D
AH	06
BL	05
SI	0X0100
DI	0X0100
AL	12
BX	EF12
CX	0001

Question 3 [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 al=3;al>=0;al--)
{
    for(int bl=2;bl>=0;bl--)
    {
        for(int ecx=1;ecx>=0;ecx--)
        {
            cout<<si++;
        }
    }
}
```

(2)

SI= 24 ✓

```
mov si, 0
mov ecx, 4
firstloop:
    mov ebx, ecx
    mov ecx, 3
    secondloop:
        mov eax, ecx
        mov ecx, 2
        thirdloop:
            inc si
        Loop thirdloop
    mov ecx, eax
    Loop secondloop
mov ecx, ebx
Loop firstloop.
```

Question 4 [8+2 Marks]

Consider the following data declaration. Copy **String** to **Stringcopy** using LOOP.

```
.data
string db "Encircle your course instructor name to score
the bonus"
size1=$-string
stringcopy dw s1 dup("?")
```

```
mov edi, offset string
mov esi, offset stringcopy

mov ecx, size1
Looooop:
    mov [esi], [edi]
    mov eax, [edi]
    mov [esi], eax
    inc edi
    add esi, TYPE stringcopy

Loop looooop
```

5

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Question 5 [20 Marks]

i. Update the given flags after executing the following code? No marks for direct answer perform operation in rough work.

```
mov ax, 0FA12H
add ax, 05EEH
```

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

ROUGH WORK:

FA12 → 1111 1010 0001 0010

05EE → 0000 0101 1110 1110

0000 0000 0000 0000 0

5

ii. Write a code that add **v1** with **v2** and store result in **sum**. Your code should be for X86 architecture.

```
.data
        v1 sbyte -5
        v2 dw 0FABCh
        sum dw 0

.code
      mov ax,0
```

mov ax, 0FFFFh

mov al, v1

add ax, v2

mov sum, ax

5

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

```
.data
      v1 db 5
      v2 db 4
.code
    mov ax,0
    mov al, v1
    xchg al, v2
    xchg al, v1
```

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

```
.data
      v1 db 1
      align WORD
      v2 word 12EFH
      v3 byte 3
      align DWORD
      v4 db 4
      align 2
      v5 dw 0ABCDH
```

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
0100	01	00	EF	12	03	00	00	00	04	00	CD	AB	00	00	00	00
0130																