01

National University of Computer and Emerging Sciences

FAST School of Computing Spring-2024 Islamabad Campus

Question 1 [15 Marks]

Write the values of different registers in **Hexadecimal** and also fill memory.

```
                          C    D
myBytes BYTE 10h,'A',11001101b,40h ✓ (1)
myWords WORD 1Ah,3Bh,72h,44h,66h ✓ (1)
myDoubles DWORD 1,2,3,4,5 ✓ (1)
varD LABEL DWORD
varW LABEL WORD
myBytes3 SBYTE -4,-2,3,1 ✓ (1)
myBytes2 BYTE 54, 67, 80, 0ABh ✓ (1)
myWords2 WORD 3 DUP(?),2000h ✓ (1)
             8                    4
myString db sizeof myWords2 DUP(type myDoubles DUP(1)) ✓ (1)   (32)
```

(7)

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
0000	10	41h	CD 40	1A	00	3B	00	72	00	44	00	66	00	01	00	00
0010	00	02	00	00	00	03	00	00	00	04	00	00	00	05	00	00
0020	00	FC	FE	03	01	36	43	50	AB	?	?	?	?	?	?	00
0030	20	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
0040	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
0050	1															

```
mov esi,OFFSET myBytes
mov al,[esi]                        ;a. AL = 10
mov esi,OFFSET myDoubles
mov al,[esi-3]                      ;b. AL = 00
mov esi,OFFSET myWords + 2
mov ax,[esi]                        ;c. AX = 003B
mov edi,8
mov esi,2                    2
mov edx,[VarD + esi]                ;d. EDX =   43360103
                               8
mov edx,myDoubles[edi]              ;e. EDX =        00 00 00 03
mov ax, WORD PTR[MyBytes2+1]        ;f. AX= 5043
mov ax, VarW                        ;g. AX= FE FC
mov bx, SIZEOF myString             ;h. BX= 00 32
```

(8)

1 each

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0118

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Question 2 [15 Marks]

Update flags after each arithmetic statement. Also write updated values of register at each point.

```
MOV AX, -66
Sub al, 0ECh
mov bx,137
add al,bl
inc Ax
mov ax,16
sub al,10h
add bx,0EBh
```

1 mark for conversion

1 mark for value

1

1

	Values	OF	CF	AC	SF	ZF	PF
AX	FFBE 2		0.5		0.5		0.5
AL	D2 1	0	1	0	1	0	1
BX	0089 1	0.5	0.5				
AL	5B 1	1	1	0	0	0	0
AX	5C	0	1	0	1	0	1
AX	0010		0.5		0.5	0.5	0.5
AL	00	0	0	0	0	1	1
BX	0174	0	0	1	0	0	1
	9			0.5			0.5

2nd [1 marks for converting -|66| into hex

1 mark for 16's complement and stored in rg] 2 marks

rest values in register → 1 mark each.

each set flag = 0.5 mark each.

-0.5 if wrong flag is on

01

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Question 3 [8+6=14 Marks]

Write short answers:

a) Identify syntax errors in the following code and rewrite it.

1 each

0.5 for reason

0.5 for rewriting

```
.data
        Bval1 BYTE 256        out of range      255
        Bval2 SBYTE -129      "                 -128
        Wval WORD 0
        Result WORD ?
        Vard DWORD ?
.code        al
        Mov ax, Bval1          size mismatch
               bx
        Mov bl, Wval                "
mov al, bval1
        Add Bval1, Bval2       no memory to memory
add al, bval2
        Mov ax,Vard            size mismatch
             al
        Mov eax,bval2          "
        Mov ax,Result vard     ✓
        Mov eax,DWORD          ×
        Mov cl,bval bval1      no variable named bval
        Mov result, cl cx      ×
```

b) Find the values of SizeOf, LengthOf and Type operators. [6 marks] (0.5 each)

.data	SizeOf	LengthOf	Type
V1 byte 11,22,33,44,55,66	6	6	1
V2 word 15 Dup(0),5,7,10	36	18	2
V3 dword 4 Dup(10 Dup(4))	160	40	4
V4 word 1,2,3,4,5,6, 7,8,8,7 Word 7,8,6,9,8,9	20	10	2

Question 4 [6 marks]

Implement following C++ code in **Assembly language in 16-bit. Update the final value of SUM** *after execution of the program* **IN HEXADECIMAL.**

Hint: the values in array are in decimal number system.

```
int array []={10,22,21,14,50};
int sum =0;
int main() {
  sum = sum+array[0];
  sum = sum+array[1];
  sum = sum-array[2];
  sum = sum+array[3];
  sum = sum+array[4];
  sum++;
  return 0;
}
```

.data

```
array dw 10,22,21,14,50
sum dw 0
```

] 1 marks

• code

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

mov si,offset array
mov ax,sum

add ax,[si]
add ax, [si+2]
sub ax, [si+4]
add ax, [si+6]
add ax, [si+8]
inc ax

mov sum,ax

mov ah,4ch
int 21h
end
```

4 marks

Sum = 004C

1 mark for value of sum