



Microprocessors Final Exam

Student Name: -

ID: -

Question 1:- Chose the correct answer for the following

10 points

1- A 64 bit data type can be defined as:

- a). WORD b). DWORD **c). QWORD** d). TBYTE

2- the size of addressable memory in real addressing mode is

- a). 1 MB** b). 2 MB c). 4 MB d). 8 MB

3- the content of ECX register after executing the following code will be

```
.data
Array1      DWORD      10DUP(?)
.code
MOV    ECX , SIZEOF Array1
```

- a). 10 b). 20 c). 30 **d). 40**

4- Which of the following is an illegal 80x86 instruction?

- a) ADD AX , [ESI] b) MOV AX, [BX] **c) INC [ESI]** d) ADD DX, [EDI]

5- the content of AX register after executing the following code will be

```
MOV    AL , 87h
CBW
```

- a). 0087h b). 0F87h c). 87FFh **d). 0FF87h**

6- the size of addressable memory in protected addressing mode is

- a). 1 GB b). 2 GB **c). 4 GB** d). 8 GB

7- to jump to a label if unsigned value X larger than unsigned value Y you can use

- a). JA** b). JG c). JAE d). JC

8- the LOOP instruction will continue repeat as long as

- a). ECX > 0 b). ECX < 0 c). ECX == 0 **d). ECX <> 0**

9- the instruction (XOR AL , 0FFh) will cause the value of AL register to be

- a). set b). clear c). no change **d). invert**

10- The flag that indicates whether or not the upper half of the product contains significant digits.

- a). OF b). ZF **c). CF** d).PF

Question 2:- Determine the content of the required registers after executing the following segments of code. 10 points

```
MOV    DX , 0
MOV    AX , 222h
MOV    CX , 100h
MUL    CX                DX= 02h          AX= 2200h          CF= 1
MOV    EDX , 0
MOV    EAX , C478A677h
MOV    EBX , 100h
IDIV   BX                EDX= 77h          EAX= 0C478A6h
```

```
MOV    AL , 0D4h
SHR    AL , 2            AL= 35h
MOV    AH , C3h
SAR    AH , 2            AH= 0F0h
```

```
MOV    CH , 0A6h
ROR    CH , 3            CH= 0D4h
RCL    CH , 2            CH= 53h
```

```
MOV    AX , 6Fh
AND    AX , 10h
JZ     L1
MOV    BX , 0
JMP    L2
L1:    MOV    BX , 7Fh
L2:    EXIT                BX= 7Fh
```

```
MOV    AX , 87h
MOV    BX , 7Fh
CMP    AX , BX
JG     L1
MOV    CX , 0FFh
JMP    L2
L1:    MOV    CX , 0
L2:    EXIT                CX= 0FFh
```

Question 3:- Write the instructions that perform the following operation

5 points

$$\text{var3} = ((\text{var1} * -\text{var2}) \% \text{var4}) / (\text{var3} - \text{var1})$$

```
MOV     EAX , var2
NEG     EAX
MOV     EBX, var1
IMUL   EBX
MOV     EBX , var4
IDIV   EBX
MOV     EAX , EDX
CDQ
MOV     EBX , var3
SUB     EBX , var1
IDIV   EBX
MOV     var3 , EAX
```

Question 4:- perform the following multiplication operation using shift operations, use the appropriate registers to avoid overflow.

2.5 points

$$37\text{h} * 10\text{h}$$

```
MOV     AX , 37h
MOV     CL , 4
SHL    AX , CL
```

Question 5:- After performing the following sequence of instructions what will be the values stored in Flage. 2.5 points

MOV AX, 0C24h

SUB AL, 25h CF= 1 ZF= 0 SF= 1 OF= 0

ADD AH, 0F3h CF= 0 ZF= 0 SF= 1 OF= 0

MOV BX, 3h

IMUL BX SF= 1 OF= 0

Question 6:- Write a complete program that define four signed double word variables A , B , C and D and initialize them of your choice your program should perform the following operation. 5 points

$$D = \begin{cases} 0Ah & A > B \text{ \& } B \langle \rangle C \\ 0Dh & A > C \text{ \& } C > 0 \\ 0Fh & \textit{otherwise} \end{cases}$$

.data

A DWORD 5
B DWORD 10
C DWORD -1
D DWORD

.code

```
MAIN    PROC  
MOV    EAX, A  
MOV    EBX, B  
MOV    ECX, C  
CMP    EAX, EBX  
JLE    L1  
CMP    EBX, ECX  
JE     L1  
MOV    EDX, 0Ah  
JMP    L3  
L1:    CMP    EAX, ECX  
JLE    L2  
CMP    ECX, 0  
JLE    L2  
MOV    EDX, 0Dh  
JMP    L3  
L2:    MOV    EDX, 0Fh  
L3:    MOV    D, EDX  
EXIT  
MAIN    ENDP  
END    MAIN
```

Question 7:- Write a complete program that defines an array of 10 unsigned double word integer values and initialize it by numbers of your choice and define two double word integer values called MAX (which will contain the maximum value in the array) and MIN (which will contain the minimum value in the array), your program should define 2 procedures one of them will find the maximum value in the array and store it in MAX variable and the second procedure will find the minimum value and store it in MIN variable.

5 points

```
.data
ARRAY    DWORD    1,5,7,10,12,0,3,5,7,11    ;OR ANY NUMBERS THE STUDENT CHOSE
MAX      DWORD
MIN      DWORD
```

```
.code
MAIN      PROC
MOV       ESI, OFFSET    ARRAY
MOV       ECX, LENGTHOF ARRAY
CALL     find_min
MOV       MIN, EBX
MOV       ESI, OFFSET    ARRAY
MOV       ECX, LENGTHOF ARRAY
CALL     find_max
MOV       MAX, EBX
MAIN      ENDP
```

```

find_min  PROC
MOV       EBX, [ESI]
L2: MOV    EAX, [ESI]
    CMP    EBX, EAX
    JLE    L1
    MOV    EBX, EAX
    ADD    ESI, 4
    LOOP  L2
find_min  ENDP
```

```

find_max  PROC
MOV       EBX, [ESI]
L2: MOV    EAX, [ESI]
    CMP    EBX, EAX
    JG     L1
    MOV    EBX, EAX
    ADD    ESI, 4
    LOOP  L2
find_max  ENDP
END       MAIN
```