



Second Exam, Second Semester: 2018/2019

Dept. of Computer Engineering

Course Title:	Microprocessors	Date:	09/05/2019
Course No:	0630313	Time Allowed:	50 minutes
Lecturer:	Dr. Qadri Hamarsheh	No. Of Pages:	4

Instructions:

- **ALLOWED:** pens and drawing tools (**no red color**).
- **NOT ALLOWED:** Papers, calculators, literatures and any handouts. Otherwise, it will lead to the non-approval of your examination.
- **Shut down** Telephones, and other communication devices.

Please note:

- This exam paper contains 4 questions totaling 20 marks
- Write your name and your matriculation number on every page of the solution sheets.
- All solutions together with solution methods (explanatory statement) must be inserted in the labelled position on the solution sheets.
- You can submit your exam after the first hour.

Basic notions: The aim of the questions in this part is to evaluate the required minimal student knowledge and skills. Answers in the pass category represent the minimum understanding of Assembly Language Fundamentals: Instructions, Directives, Addressing Modes, and Conditional and Unconditional instructions, Pointers, and Arrays.

Question 1 Multiple Choices

(6 marks)

Identify the choice that best completes the statement or answers the question.

1) What is the value of **EAX** after the execution of the code below?

```
array WORD 100, 200,
        300, 3 DUP(350),
        400, 500, 700
MOV EAX, SIZEOF array
```

- | | |
|-------|------|
| a) 2 | b) 9 |
| c) 18 | d) 4 |

2) Given that the **BL** register contains '**B**', the effect of the following instruction

```
OR BL, 0010 0000b
```

is to

- | | |
|------------------------------------|---------------------------------|
| a) clear BL | b) store 0010 0000 in BL |
| c) store ' b ' in BL | d) leave BL unchanged |

3) What is the result in **AL** after executing the following instructions?

```
XOR AL, AL
OR AL, 80H
```

- | | |
|--------|----------------------|
| a) 80H | b) 88H |
| c) 00H | d) None of the above |

4) What is the value of **AX** register after executing,

```
MOV AX, 456h
CMP AX, 456h
```

- | | |
|---------|------------|
| a) Zero | c) 456h |
| b) FFFh | d) Unknown |

5) What will be the final value in **EDX** after this code executes?

```
mov edx, 1
mov eax, 7FFFh
cmp eax, 8000h
jb L1
mov edx, 0
L1:
```

- a) 0
- b) 1
- c) 10
- d) None of above

6) How many times will the following loop execute?

```
X2: mov cx,0
    inc ax
    loop X2
```

- a) 0
- b) 1
- c) FFFF
- d) forever

Familiar and Unfamiliar problems solving: the aim of the questions in this part is to evaluate that the student has some basic knowledge of the key aspects of the lecture material and can attempt to solve familiar and unfamiliar problems of Assembly Language Fundamentals: Instructions, Directives, Addressing Modes, Conditional and Unconditional instructions, Pointers, and Arrays.

Question 2

(2 marks)

List four types of the **memory addressing modes** used in Intel Microprocessor.

Solution

Question 3

(6 marks)

a) Use the following data declarations

```
.data
Xbyte      Byte      1, 2, 3,4
Yword      Word      1000h, 2000h, 3000h, 4000h
```

Indicate whether or not each of the following instructions is **valid**:

N	instruction	answer
a)	mov ax, Xbyte [si]	
b)	add dx, [cx+ Yword]	
c)	mov ax, [bx+4]	
d)	mov [bx],[si]	

b) Write down the value of each destination operand:

```
.data
varB      Byte      65h, 31h, 02h, 05h
varW      Word      6543h, 1202h
varD      DWord     12345678h

.code
mov ax, WORD PTR [varB+2] ;    ax = -----
mov BL, BYTE PTR varD ;      BL = -----
mov BL, BYTE PTR [varW+2] ;   BL = -----
```

c) Use the following data declarations. Assume that the offset of **X** is **00000000h**, and that code runs in **Protected** mode.

```
.data
X          BYTE      10, 20, 30, 40
Y          WORD      7777h, 2222h, 3333h, 4444h
MSG       BYTE      "ABCDEFGH", 0
```

Indicate the hexadecimal value moved to the destination operand by each of the following MOV instructions (If any instruction is **invalid**, indicate "I" as the answer.)

N	Instruction	Answer
[1]	mov eax, offset X +3	
[2]	mov dx, Y+4	
[3]	mov esi, offset MSG-1	

d) What will be the values of the **Overflow** and **Sign** flags after the following instructions have executed?

Instructions	Answer
mov BL,-127 dec BL	OF= ----- SF= -----

Question 4

(6 marks)

Write a complete program to

- Compare each element in two arrays **X** and **Y**, write the result of this comparison in array **Z** according to the following relation:

$$Z[i] = \begin{cases} 0 & X[i] \leq Y[i] \\ 1 & \textit{otherwise} \end{cases}$$

Where *i* is the index of the arrays.

- Arrays contain 32-bit signed numbers.
- Check that the arrays have the same size, if not exit from the program.
- Use **Irvine32.inc** library' procedures.
- Assume that the **FLAT** memory model is used.

Use a **loop** with **indexed** addressing mode.

Solution

Good Luck