Philadelphia University

Faculty of Engineering

Student Name:	
Student Number:	
Serial Number:	

First Exam, Second Semester: 2018/2019
Dept. of Computer Engineering

Course Title:	Microprocessors	**Date:**	02/04/2019
Course No:	0630313	**Time Allowed:**	50 minutes
Lecturer:	Dr. Qadri Hamarsheh	**No. Of Pages:**	3

Instructions:

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

Please note:

- *This exam paper contains 5 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.*

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 basic concepts of IA-32 Processor Architecture, Assembly Language Fundamentals: Instructions, Directives, Identifiers, Defining Data, Symbolic Constants, Data Transfers, Addressing, and Arithmetic instructions.*

Question 1 Multiple Choices *(5 marks)*

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

1) During which phase of the instruction execution cycle is the program counter (**IP register**) incremented?

a) decode **b) execute**
c) operand fetch **d) fetch**

2) The size of each segment in **8086** is

a) 16kb **b) 24 kb**
c) 50 kb **d) 64 kb**

3) The **Overflow flag** is based on signed arithmetic.

a) True **b) False**

4) Which of these values is the most acceptable for the data type **REAL4**?

a) 1275 **b) 'Q'**
c) 23.26 **d) "Jennifer",0**

5) One of the following **memory models** combines the data and code parts:

a) Small **b) Tiny**
c) Meduim **d) Huge**

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 IA-32 Processor Architecture, Assembly Language Fundamentals: Instructions, Directives, Identifiers, Defining Data, Symbolic Constants, Data Transfers, Addressing, and Arithmetic instructions.*

Question 2 ***(3 marks)***

Explain the **Real-Address Mode Programming** (16-bit MS-DOS Programs): **Advantages, Disadvantages and Requirements needed in your assembly code**.

Solution

Question 3 ***(5 marks)***

Use the following data definitions:

```
byte1    BYTE     0FFh,1,2
byte2    BYTE     14h
word1    WORD     0FFFFh,1,2
word2    WORD     3
word3    SWORD    7FFFh, 8000h
```

a) For each of the following instructions, indicate whether it is **legal (L)** or **illegal (I):**

Ñ	Instruction	Answer
1)	**mov word1, byte2**	
2)	**mov word2,10000h**	
3)	**mov si, ds**	
4)	**movzx ax, byte1**	
5)	**movsx dl,al**	

b) Indicate the hexadecimal value of the destination operand next to each instruction. Use the letter **I** to indicate that a particular instruction is **illega**l:

```
mov dx,word3          DX = ----------

movsx eax,byte1       EAX = ----------

mov dh,al             DH = ----------

mov ax,[word3+2]      AX = ----------

mov eax,[word3+4]     EAX = ----------
```

Question 4 ***(3 marks)***

MASM can't assemble this program because of **some errors**. Rewrite the program to be assembled without errors.

Original Program	Your answer
INCLUDE irvine32.inc **.data** **arrayA word 4Ah, 3Ch, 2h, 5 DUP (1h)** **var1 word ffffh** **.code** **main PROC** **mov cx,4Ch** **xchg cx, arrayA+4** **mov ax, arrayA+5** **mov bl, var1** **add ax, bx** **call dumpregs** **exit** **main ENDP**	

Question 5 ***(4 marks)***

Write a complete assembly language program that:

- Declares **uninitialized** variables : Signed word integers **J, K** and **L**
- Declares **uninitialized** variables : Unsigned word integers **U1, U3** and **U3**
- Assign the following variables with values: **J=3; K= -2; U1= 254; U2= 22 (**In code segment**)**
- Compute **L = J+K** and **U3 = U1+U2**

Solution

Good Luck