National University of Computer and Emerging Sciences, Lahore Campus

	Course:	**COAL**	**Course Code:**	**EE2003**
	Program:	**BS(CS,DS)**	**Semester:**	**Fall 2022**
	Duration:	**1 Hour**	**Total Marks:**	**30**
	Paper Date:	**27-09-2022**	**Page(s):**	**5**
	Section:	**All**	**Roll No.**	
	Exam:	**Midterm-I**	**Your Section:**	

Instruction/Notes: **This is an open notes/book exam. Sharing notes and calculators is NOT ALLOWED.** All the answers should be written in provided space on this paper. Rough sheets can be used but will not be collected and checked. In case of any ambiguity, make reasonable assumptions. Questions during exams are not allowed.

Question 1 [CLO 1] [3x5 = 15 Marks]: Short questions

i) For each of the instructions given below, **identify whether the instruction is valid or invalid:**

Instruction	Valid/Invalid
mov [Bp-si],2	
mov [bl], 2	
mov word[bx],2	
mov [bp+bx+si],2	
mov word[bx+ax],3	
mov word[num1], word[num2]	

ii) Given the following jump statements and their opcodes, **identify the type of jump (near or short) and the offset (value of IP) to which the jump will take place.** Show your complete working to get credit**.**

Offset of Opcode	Opcode	Type of Jump	Offset
011D	76E1 ;76 is opcode of jump		
0100	E9FF1E ; E9 is opcode of jump		

Show your working here:

iii) Given the following values of cs, ds, ss, bp, bx, si and di in **hexadecimal**. **What would be the value of ax register after executing the instruction given below?** Show your working to get full marks.
CS: 0x1E0A, DS: 0x1EED, SS: 0xFFEF, BP: 0x011F, SI: 0x0114, DI: 0x0112, BX: 0x0115

Instruction: Mov ax, [bp+si+15]

Value of AX after Execution of above instruction: _____

Physical Memory Addresses	Memory Content
0x1F112	0A00
0x1E2E2	0500
0x00132	0900
0x00138	0700
0x1F118	0600

Show your working here:

iv) Write assembly language code that checks if the contents of two registers **AX** and **BX** are equal and jumps to LabelXYZ (if contents are equal). You are NOT ALLOWED to use ***cmp, sub*** and ***sbb*** instructions. No credit will be given if your code exceeds two lines.

v) For the code snippet given below, write the byte sized data value that is stored in memory label lab2 after the execution of the program. Briefly explain the working of this program.

Value of Lab2 after execution of program: _____

Write values of following flags after instruction "cmp dl, [bx+lab1]" (highlighted in code) for <u>first iteration only</u>.

SF = _____ OF= _____ CF= _____ ZF=_____

Code Snippet:	**Show your working here (for flag values):**

[org 0x100]
jmp start
 	
lab1: db -3, -1, 4
lab2: db 0
 	
start: mov bx, 1
mov dl, [lab1]
 	
loop1: cmp dl, [bx+lab1]
jae C1
 	
mov dl, [bx+lab1]
 	
C1: add bx, 1
cmp bx, 3
jne loop1
 	
mov [lab2], dl
 	
mov ax, 0x4c00
int 0x21	

What is above code doing? Describe in one line only.

Question 2 [CLO 3] [15 Marks]: Difference of two sets (Set1 – Set2) is a set having elements of Set 1 which are NOT Present in Set 2, see following examples for detail**. Your task is to write a program in Assembly Language that finds Difference of two sets (Set1-Set2).** Note that both the sets are sorted and have distinct elements only.

Example 1	Example 2
Set1: -3, -1, 2, 5, 6, 8, 9 Set2: -2, 2, 6, 7, 9 Difference: -3, -1, 5, 8	Set1: -3, -1, 2, 5, 6, 8, 9 Set2: 1, 3, 7 Difference: -3, -1, 2, 5, 6, 8, 9

Solution:

```
[org 0x100]
                    jmp start
sizeSet1:           db 7 ; There are 7 elements in Set 1
sizeSet2:           db 5 ; Set 2 contains 5 Elements
sizeSetDiff:        db 7 ; Maximum 7 elements' space
Set1:               db -3, -1, 2, 5, 6, 8, 9 ; Elements of Set1
Set2:              db -2, 2, 6, 7, 9; Elements of Set2
Difference:         db 0, 0, 0, 0, 0, 0,0 ; Max 7 elements' space available
start:
```