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| **National University of Computer and Emerging Sciences, Lahore Campus** | | | | |
| C:\Users\saif\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Word\final design.jpg | **Course Name:** | **Computer Org & Assembly Lang** | **Course Code:** | **EE2003** |
| **Program:** | **BS (Computer Science)** | **Semester:** | **Spring 23** |
| **Section** | **L** | **Total Marks:** | **14** |
| **Date:** | **14-2-2023** | **Weight** | **~2.5%** |
| **Exam Type:** | **Quiz 1 a** | **CLO #:** | **1** |
| **Name: Roll No.: Section:** | | | | |

**Question 1**

Specify with reasoning if the address bus and the data bus are unidirectional or bidirectional.

[3 marks]

Address bus is unidirectional bcoz CPU uses it to select a memory location (or I/O device) for reading or writing.

Data bus is bidirectional since data has to be transferred in both directions: from CPU to memory (or I/O) and vice versa.

1.5 marks each

**Question 2**

Predict the values of the indicated flag bits after the last instruction in each of the following operations.

[7 marks]

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Operation | Overflow | Sign | Auxiliary | Parity | Carry |
| Mov ax, F024h  Add ax, 1043h | 0 | 0 | 0 | 0 | 1 |
| Mov cx, 7006h  Add cx, 2011h | 1 | 1 | 0 | 1 | 0 |
| Mov dx, 00BDh  Add dx, 0085h | 0 | 0 | 1 | 1 |  |

0.5 marks for each bit

**Question 3**

Identify the problems in the following instructions and correct them by replacing them with one or two instructions having the same effect.

[4 marks]

Mov ax, [bx-bp+3]

Can only use one base register in indirect addressing

Sub bx, bp

Mov ax, [bx+3]

And [num], 0xFF

Ambiguous size of operation

And byte [num], 0xFF

OR

And word [num], 0xFF

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
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**Question 1**

In a CPU, what is the role of following registers: (i) Program Counter (ii) Program Status Word? Also provide another commonly used name for both.

[3 marks]

Program counter, aka Instruction Pointer, holds the address of the next instruction to be fetched from memory.

PSW, aka flags register, contains a number of status bits that provide information about the most recent arithmetic operation (sign, overflow, parity etc.)

**Question 2**

Predict the values of the indicated flag bits after the last instruction in each of the following operations.

[7 marks]

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Operation | Overflow | Sign | Auxiliary | Parity | Carry |
| Mov ax, 009Ch  Add ax, 0064h | 0 | 0 | 1 | 1 |  |
| Mov cx, E006h  Add cx, 2200h | 0 | 0 | 0 | 1 | 1 |
| Mov dx, DD10h  Add dx, 0777h | 0 | 1 | 0 | 1 | 0 |

0.5 marks for each bit

**Question 3**

Identify the problems in the following instructions and correct them by replacing them with one or two instructions having the same effect.

[4 marks]

Mov [var1], [var2]

Not possible to directly move data from one mem location to another.

Mov ax, [var2]

Mov [var1], ax

Sub cx, al

Size mismatch, cx is word, al is byte

Mov ah, 0

Sub cx, ax