National University of Computer and Emerging Sciences

Laboratory Manual

for

Computer Organization and Assembly Language Programming

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OBJECTIVES:

- How to perform bit operations.
- How to perform shift with 64 bit numbers.
- How to perform addition and multiplication.

Instructions:

- Run and debug the programs, ensuring that they behave as expected.
- Document your observations and note any issues encountered during implementation in a Word document.
- Submit work in a single Word file with screenshots. No asm, lst , or com.

(Do not submit a zip folder)

Task 1: Calculate the number of one bits in BX and complement an equal number of least significant bits in AX.

Hint: Use the XOR instruction and Rotate through carry.

Sample Run:

Initial value of BX	Total No of 1 Bits in BX	Initial value of AX	AX after Complementing 7 least significant bits
1011 0001 1000 1001	7	1010 1011 **1010 0101**	1010 1 1**101 1010**

Task 2:

A) **Write a program that shifts a 64-bit number.**

B) **Write a program that adds two 64-bit numbers.**

Hint: Use dd and word as taught in class.

Task 3: Write a program to multiply two 32-bit numbers and store the answer in a 64-bit location.

Sample Run:

```
        a:      dq 0xABCDD4E1    ; dq allocates 64 bit memory space. a is 32-bit number but it
        has space allocation of 64 bits
        b:      dd 0xAB5C32      ; 32-bit space for multiplier
result: dq  0x0                  ; result should be 0x73005CB8FF6FF2 verify on calculator
programmer's view
```

You can use dd instead of dq.