National University

Of Computer & Emerging Sciences Faisalabad-Chiniot Campus

Assignment # 4
EE 229 – Computer Organization and Assembly Language
Fall 2021
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Submission Guidelines:

- ✓ Submit Word Document and PDF.
- ✓ Attempt all questions.
- ✓ Late Submissions won't be accepted in any case.
- ✓ Do not use cover page or any file.
- ✓ Comment your code where needed.
- ✓ Not a Handwritten Assignment.
- ✓ Incase Copied:

```
If (checkPlagiarism () == true )
        setMarks(0);
```

- ✓ Add appropriate screenshots of executed code, Assembly codes would be submitted in .asm file. Format – RollNo_AssignmentNo_Name

Question No.1. Write a program that takes a digit input (0-F) from the user using the procedure inputProcedure. Convert the input into decimal using the procedure convertDecimalProcedure. Display the output using the outputProcedure. Note: You have to implement all the operations by yourself. You can't use Irvine functions to convert the numbers.

Question No.2. Write a procedure named BitwiseMultiply that multiplies any unsigned 32-bit integer by EAX, using only shifting and addition. Pass the integer to the procedure in the EBX register and return the product in the EAX register. Write a short test program that calls the procedure and displays the product. (We will assume that the product is never larger than 32 bits.) This is a fairly challenging program to write. One possible approach is to use a loop to shift the multiplier to the right, keeping track of the number of shifts that occur before the Carry flag is set. The resulting shift count can then be applied to the SHR instruction, using the multiplicand as the destination operand. Then, the same process must be repeated until you find the next highest bit in the multiplier

Question No.3.

The following program is supposed to subtract val2 from val1. Find and correct all logic errors:

```
.data
   val1 QWORD 204030043620047A1h
   val2 QWORD 055210304A2630B2h
   result QWORD 0
.code
   mov cx,8                ; loop counter
   mov esi,val1            ; set index to start
   mov edi,val2
   clc                  ; clear Carry flag
   top:
      mov al,BYTE PTR[esi]     ; get first number
      sbb al,BYTE PTR[edi]     ; subtract second
      mov BYTE PTR[esi],al     ; store the result
      dec esi
      dec edi
      loop top
```

Question No.4.

Write a program to add two 256-bit (32-byte) integers. Take two 32-byte hex input from the user and display the sum of these two 32-byte numbers. Make procedures to do specific tasks.

Question No.5.

Write a program that multiplies each element of a doubleword array by a constant value using LODSD and STOSD.

Question No.6.

Write a procedure names Str find that searches for the first matching occurrence of a source string inside a target string and returns the matching position. The input parameters should be an address of the source string and the address of the target strings. If a match is found, the procedure sets the Zero flag and EAX points to the matching position in the target String. Otherwise, the Zero flag is clear and EAX is undefined. e.g.,

For example, in the following example after the execution of the procedure, the EAX contains the value 3 and the Zero flag is set.

```
.data
    target BYTE "123ABC342432",0
    source BYTE "ABC",0

```

GOOD LUCK