National University of Computer & Emerging Sciences, Karachi.

FAST School of Computing,

Mid Term II, Fall 2021.

November 24, 2021, 8:30 am – 9:30 am

Course Code: EE 2003	**Course Name:** Computer Organization and Assembly Language
Instructors: Dr. Nouman M Durrani, Shoaib Rauf, Aashir Mahboob, Aamir Ali, and Qurat ul Ain	
Student's Roll No:	**Section:**

Instructions:

- Except for your Roll No and Section, DO NOT SOLVE anything on this paper.
- Return the question paper.
- Read each question completely before answering it. There are **4 questions on 2 pages.**
- In case of any ambiguity, you may make an assumption. But your assumption should not contradict any statement in the question paper.
- All the answers must be solved according to the SEQUENCE given in the question paper, otherwise, points will be deducted.
- This paper is subjective.
- Where asked for values, only provide the **hex-decimal** values.
- Problems needing iterations should be coded using iterative instructions. No points will be awarded otherwise.

Time Allowed: 60 minutes. **Maximum Points**: 25 points

========== Q. No. 1

Briefly answer each of the following: [5 x 2 = 10 points]

(i) Differentiate between the arithmetic and logical shifts with one example instruction each.

(ii) Using shift and add instructions, multiply a number X_{10} by 43_{10}.

(iii) What will happen, if immediately upon entering a subroutine you execute a "POP" instruction? (iv) How the stack pointer is affected when a: (i) **Ret** and (ii) **Ret n** instruction is executed? Draw a stack frame to support your answer.

(v) When does a divide overflow occur at the machine level? Give example instructions to illustrate.

Q. No. 2 Consider a CNIC consists of 13 hexadecimal digits as shown below: [5 points] **xxxxx-yyyyyyy-z ; For Example:**

12345-6789123-4

For reference, also consider the following data definition:

CNIC DWORD 67891234h, 00012345h

The last digit 'z' represents gender of an individual, the 7 'y' digits indicate family number and the initial 5 'x' digits refer to the information regarding the residence. Write an assembly language program to extract the

family and gender information from the CNIC, and store it into the memory.

Q. No. 3 Write an assembly code for a procedure named geometric sequence, that takes three arguments a, r, and b stored on the stack, and display the sequence on the console window: [5 points] ��, �� ∗ ��, �� ∗ ��^{2}, �� ∗ ��^{3}, �� ∗ ��^{4}, ... , ��

$$3, 6, 12, 24, 48, 96, 192, 384,$$

Here a =3 is the starting number of a sequence, b = 750 is the upper bound (the sequence does not cross the limit and may or not be the part of the sequence) and r = 2 is the ratio between two consecutive terms. The procedure should be flexible for all kinds of parameters. Here, you are also supposed to draw the stack frame.

Q. No. 4 Write an equivalent assembly language code for the following High Level Language code: [5 points]

```
int main()
{
     char array[] = "Assembly language is fun";
    int arraySize = sizeof(array)/ sizeof(array[0]);
     char iSearch = '\0';
     int searchCount=0;

     cout<<"Enter a char = ";
     cin>>iSearh;

     while(arraySize>0)
 {
 if (iSearch == array[i])
 { searchCount++; }
 arraySize --;
 }

     cout<<"Char count = "<<searchCount;
}
```

Best of Luck