**Assembly Language (G, H)**

**Fall 2023**

**Assignment-3**

**Total Marks:60**

**Submission: Submit 4 .asm files on google classroom. The name of your file should be your roll number [underscore] question number e.g., 20l1234\_1.asm Deadline 5th November 2023 11:59 pm.**

**Question 1: [15 marks]**

Write a subroutine ‘flip’ that creates a flipped image of the upper half of the screen on the lower half such that the top left character appears as the bottom right character in the flipped image (see example below. Left image is original image while Right image is flipped one). Note that the subroutine will override the original lower half.

Note: You have to write a generic code for any screen. Marks will be deducted if you write code for printing anything new on the screen.

|  |  |
| --- | --- |
| Abcdef  ghijk  qrstuv | Abcdef  ghijk  fedcbA |

**Question 2: [15 marks]**

Write a subroutine to copy a given area on the screen at the center of the screen. The routine will be passed top, left, bottom, and right in that order through the stack. The parameters passed will always be within range the height will be odd and the width will be even so that it can be exactly centered.

**Question 3: [15 marks]**

Consider your video screen is divided in four equal parts, each part with 12 rows and 40 columns. (skip the last row of the screen) Whenever user press ‘1’, memory area 1 is swapped with memory area 4. And when user press ‘2’, memory area 2 is swapped with memory area 3. Write complete program using string instructions.

|  |  |
| --- | --- |
| Memory area 1 | Memory area 2 |
| Memory area 3 | Memory area 4 |

**Question 4: [15 marks]**

Write an assembly program that takes a 4-digit decimal number as input from user and calculates whether the number is a happy number or unhappy. If the number is a happy number, display ‘Happy’ on the screen else display ‘UnHappy’. A happy number is defined by the following process:

Starting with the given number, replace that number by the sum of the squares of its digits. Repeat the process on the replaced number until the number either equals 1 within 256 iterations of the process. The number for which this process ends in 1 within 256 iterations is called a happy number, otherwise it is called an unhappy number.