Course Title: Computer Organization and Assembly Language

Task: Assignment 1

Section: BCS-3A, BCS-3B

Date: 17th Sep, 2022

Weightage: 2%

**Q1.** Give the value of the zero flag, the carry flag, the sign flag, and the overflow flag after each of the following instructions are executed. Assume that AX = 0x334A, BX = 0x45F1, and CX = 0x8934. (3)

1. add ax, bx
2. add cx, bx
3. sub bx, 6

**Q2.** For each of the following words, identify the byte that is stored at lower memory address and the byte that is stored at higher memory address in big endian format: (3)

1. 0xb900
2. 0x4567
3. 0xAA99

**Q3.** Calculate the physical address that is generated by the following segment offset pairs:

(3)

1. FFFF:4312
2. 1DEF:0001
3. 14FF:1111

**Q4.** Write a program in assembly language that calculates the product of the conents of ax and bx registers and stores the resut in ax. You can only use addition or subtraction operations to get the result. (3)

**Q5.** What is the effective address generated by the following combinations if they are valid. If not give reason. Initially BX=0x0034, SI=0x0110, DI=0x1101, BP=0x0220, and SP=0xFFFF. (3)

a. bp-di

b. bp+si

c. bx-0x12

d. bx+bp

e. bx+ip

f. bx+di

**Q6.** The value of Code Segment (CS) and Stack Segment (SS) Register is 4582H while the value of different registers is as follows:

BX: 0x22AA, IP: 0x0580, DI: 0x4247, BP: 0x4700, SI: 0xFEEF

Write the physical address of the following memory locations. Also point out which type of wraparound is there if occurred, segment or whole memory? (4)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Memory Location | Physical Address in hex | Wraparound Type if occurred |
| a. | [cs:bx + si] |  |  |
| b. | [bp + di + 10] |  |  |

**Q7.** Identify the problems in the following instructions and correct them by replacing them with one or two instruction having the same effect. (2)

a. mov ip, bx

b. mov byte bx, [ip]

c. mov si, al

d. mov ax, [bx+bp+100]

**Q8.** What are the values of the overflow flag, the sign flag, the carry flag, and the parity flag after the execution of the following instructions? (2)

|  |  |
| --- | --- |
| [org 0x100]  jmp start  num1: db -2, -4, -5, 1, 3  start:  mov al,[num1]  mov bl,[ num1+1]  add al, bl  mov bl, [num1+2]  add al, bl  mov bl, [num1+3]  add al, bl  mov [num1+4], al  cmp byte [num1+4], 4  jg end  mov byte [num1+4], 2  end: mov ax, 0x4c00  int 0x21 |  |

**Q9.** Identify the logical error in the code given in Q8. Our aim is to add the first four numbers of the array. If the result is greater than 4, then do nothing. Otherwise, copy 2 at the memory address num1+4. Assembling and running the code will help you identify the problem. (3)

**Q10.** Complete the following code, instructions are given in comments. (4)

[org 0x0100]

;write your code here to swap the contents of even index with the odd ones

;that is, swap 1 & 2, 3 & 4

mov ax, 0x4c00 ; terminate program

int 0x21

num1: db 1, 2, 3, 4

**Q11.** Write a program in assembly to find the maximum number from a signed array1, and write that number in memory label max. The basic structure of code is given write you code where specified. (5)

[org 0x0100]

; your code should start here

; your code ends here

mov ax, 0x4C00

array1: dw 5, 3, -8, 2, 5

max: dw 0