Microprocessor & Assembly Language

Program: BS(CS)
Course Code: CSC-304
EDP Codes: 102007054
Instructor: Muhammad Amin
Examination: Final-Term
Semester: Summer 2020
Duration: 4 Hours
Date: Sep. 26, 2020
Time: 9:00 am

Question No.	Q.1	Q.2	Q.3	Q.4	Q.5	Q.6	
Total Marks	12	4	7+2+2=11	6	2x3=6	2+2+3+4=11	50

Note: Attempt all questions.

Q.1 Use the following variable definitions for the coming question:

```
.data
wVal1       WORD 3000h
wVal2       WORD 7000h
listB       BYTE 50h, 40h, 30h, 20h, 10h
listW       WORD 3000h, 2000h, 1000h
listD       DWORD 30000000h, 20000000h, 10000000h
.code
main PROC
```

What will be the value of the destination operand after each of the following instructions execute in sequence?

```
mov bx, 0ABCDh
movzx eax, bx           ; (a) EAX   =
mov bx, 0DCBAh
movsx eax, bx           ; (b) EAX   =
mov ax, wVal1           ; (c) AX    =
xchg ax, wVal2          ; (d) AX    =          , (e)  val2    =
mov wVal1, ax           ; (f) val1  =
mov al, listB           ; (g) AL    =
mov al, [listB+4]       ; (h) AL    =
mov ax, listW           ; (i) AX    =
mov ax, [listW+4]       ; (j) AX    =
mov eax, listD          ; (k) EAX   =
mov eax, [listD+8]      ; (l) EAX   =
```

Q.2 Write down the values of the Carry, Sign, Zero, and Overflow flags after each instruction has executed:

```
mov ax, 7FF0h
add al, 10h        ; (a) CF =     SF =     ZF =     OF =
add ah, 1          ; (b) CF =     SF =     ZF =     OF =
add ax, 2          ; (c) CF =     SF =     ZF =     OF =
mov al, 1
sub al, 2          ; (d) CF =     SF =     ZF =     OF =
```

Q.3 Use the following data definitions for the coming question:

```
.data
listB      BYTE 60h, 50h, 40h, 30h, 20h, 10h
listW      WORD 4 DUP(?), 1000h
string1    BYTE "Assembly Language", 0
```

(i) What will be the value of EAX after each of the following instructions execute?

```
mov eax, TYPE listB          ; (a) EAX =
mov eax, LENGTHOF listB      ; (b) EAX =
mov eax, SIZEOF listB        ; (c) EAX =
mov eax, TYPE listW          ; (d) EAX =
mov eax, LENGTHOF listW      ; (e) EAX =
mov eax, SIZEOF listW        ; (f) EAX =
mov eax, SIZEOF string1      ; (g) EAX =
```

(ii) Write an instruction that moves all four bytes in listB to the EAX register.

(iii) Insert a LABEL directive in the given data that permits listB to be moved directly to EAX register.

Q.4 Use the following data definitions for coming question:

```
listB      BYTE 10h, 20h, 30h, 40h
listW      WORD 8Ah, 3Bh, 72h, 44h, 66h
listD      DWORD 1, 2, 3, 4, 5
pointer1   DWORD listD
```

What will be the value of the destination operand after each of the following instructions execute in sequence?

```
mov esi, OFFSET listB
mov al, [esi]                ; (a) AL =
mov al, [esi+3]              ; (b) AL =
mov esi, OFFSET listW + 2
mov ax, [esi]                ; (c) AX =
mov edi, 8
mov edx, [listD + edi]          ; (d) EDX =
mov edx, listD [edi]            ; (e) EDX =
mov ebx, pointer1
mov eax, [ebx+4]                ; (f) EAX =
```

Q.5 Implement the following pseudocode in assembly language:

(i)
```
if( var1 <= var2 )
        var3 = 15;
else
{
        var3 = 10;
        var4 = 30;
}
```

(ii)
```
if ( val1 > ecx ) AND ( ecx > edx ) then
A = 12
else
B = 6;
```

(iii)
```
while( ebx < eax)
  ebx = ebx + 1;
```

Q.6 (i) What will be the final value of EAX in this example?

```
    mov eax, 0
    mov ecx, 10
L1: mov eax, 3
    mov ecx, 5
L2: add eax, 5
    loop L2
    loop L1
```

(ii) Write a program that calculates the following expression, using registers:

A = (A + B) – (C + D)

(iii) Write a program that uses a loop to copy all the elements from an unsigned Word array into an unsigned doubleword array.

(iv) Write a program that displays a string in all possible combinations of foreground and background colors (16 x 16 =256). The colors are numbered from 0 to 15, so you can use a nested loop to generate all possible combinations. Also use a delay of 1s in each foreground color change.

*********End of Exam*********