

# Microprocessor & Assembly Language

Examination: Final-Term

Instructor: Muhammad Amin

Program: BS (CS)

Semester: Spring 2020

Course Codes: CSC-304

EDP Codes: 102002094

Total marks: 50

Date: June 29, 2020

Timing: 12:00pm to 6:00pm

Note: Attempt all questions.

Q.1 What will be the value of the destination operand after each of the following instructions execute in sequence?

```
.data
val1  WORD 1000h
val2  WORD 2000h
arrayB BYTE 10h, 20h, 30h, 40h, 50h
arrayW WORD 100h, 200h, 300h
arrayD DWORD 10000h, 20000h
.code
mov   bx,0A69Bh
movzx cx, bl           ; (a) CX = ?
movsx cx, bl           ; (b) CX = ?
mov   ax, val1
xchg  val2, ax         ; (c) val2 = ?
mov   al, [arrayB+1]   ; (d) AL = ?
mov   ax, [arrayW+2]   ; (e) AX = ?
mov   eax, [arrayD+4]  ; (f) EAX = ?
```

Q.2 Write down the values of destination operands and flags after the execution of each instruction:

```
.code
mov   cx, 1
sub   cx, 1           ; (a) CX = ?           ZF = ?
```

```

mov  cx, 0
sub  cx, 1          ; (b) CX = ?          SF = ?
mov  al, 0FFh
add  al, 1          ; (c) AL = ?          CF = ?
mov  al, 0
sub  al, 1          ; (d) AL = ?          CF = ?
mov  al, 7Fh
add  al, 1          ; (e) AL = ?          OF = ?
mov  al, -128
neg  al             ; (f) CF = ?          OF = ?

```

**Q.3** What will be the value of EAX after each of the following instruction execute?

```

.data
myBytes    BYTE 10h, 20h, 30h, 40h
myWords    WORD 3 DUP(?), 2000h
myString    BYTE "ABCDE"
.code
mov  eax, TYPE myBytes      ; (a) EAX = ?
mov  eax, LENGTHOF myBytes  ; (b) EAX = ?
mov  eax, SIZEOF myBytes    ; (c) EAX = ?
mov  eax, TYPE myWords     ; (d) EAX = ?
mov  eax, LENGTHOF myWords  ; (e) EAX = ?
mov  eax, SIZEOF myWords    ; (f) EAX = ?
mov  eax, SIZEOF myString   ; (g) EAX = ?

```

**Q.4** Write down the value of each destination operand:

```

.data
Val32 LABEL DWORD
varB   BYTE 78h, 56h, 34h, 12h
val8   LABEL BYTE
varD   DWORD 12345678h
.code
mov  bl, BYTE PTR varD      ; (a) BL = ?
mov  eax, DWORD PTR varB    ; (b) EAX = ?
mov  al, val8                ; (c) AL = ?
mov  eax, val32              ; (d) EAX = ?

```

**Q.5** What will be the value of the destination operand after each of the following instructions execute in sequence?

```
.data
myBytes    BYTE 10h, 20h, 30h, 40h
myWords    WORD 8Ah, 3Bh, 72h, 44h, 66h
myDoubles  DWORD 1, 2, 3, 4, 5
.code
mov  esi, OFFSET myBytes
mov  al, [esi+3]           ; (a) AL = ?
mov  esi, OFFSET myWords + 2
mov  ax, [esi]            ; (b) AX = ?
mov  edi, 8
mov  edx, myDoubles [edi] ; (c) EDX = ?
```

**Q.6** Write assembly language code for each of the following:

- (a) Convert the character in AL to upper case.
- (b) Convert a binary decimal byte into its equivalent ASCII decimal digit.
- (c) Jump to label L1 if bits 0, 1, and 3 in AL are all set.

**Q.7** Write each of the following pseudocode in assembly language and explain:

- (a) 

```
if( var1 <= var2 )
    var3 = 128;
else
{
    var3 = 110;
    var4 = 90;
}
```
- (b) 

```
if ( val1 > ecx ) Or ( ecx > edx ) then
X = 30
else
X = 40;
```
- (c) 

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

- Q.8**
- (a) Write a sequence of statements that use only PUSH and POP instructions to exchange the values in the EAX and EBX registers.
  - (b) Write a program with a loop and indirect addressing that copies a string from source to target, reversing the character order in the process. Use the following variables:  
source BYTE " This is the source string ", 0  
target BYTE SIZEOF source DUP ('#')
  - (c) 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*\*\*\*\*\*