National University of Computer and Emerging Sciences, Lahore Campus

Course Name:	Computer Organization and Assembly Language	Course Code:	EE213
Program:	BS(Computer Science)	Semester:	Spring 2019
Duration:	60 Minutes	Total Marks:	35
Paper Date:	12th April, 2019	Weight	15%
Section:	ALL	Page(s):	4
Exam Type:	Mid-2		

Student : Name:_____ Roll No._____ Section:_____

Instruction/Notes:

1. Exam is Open book, Open notes.
2. Properly comment your code.
3. Syntax error will result in **negative** marking.
4. Write your answer in the space provided. You **can take extra sheets BUT they WONT BE ATTACHED WITH THE QUESTION PAPER OR MARKED.**

Q1. Short questions.

Part A) MCQs. Tick one answer only. NO CUTTING/OVER WRITING. AMBIGOUS ANSWERS WILL NOT BE CONSIDERED. **[5X1 Marks]**

1. Which of the following is not a valid jump instruction?
   a. Jcxz
   b. Jne
   c. Jncxz
2. When we set direction flag to 1, it will decrease the indexes for:
   a. Only the immediate one string instruction after it
   b. For all string instructions after it
   c. For all string instructions before and after it
3. When an interrupt occurs, the following are push on the stack in this order:
   a. Flags, CS, IP
   b. IP, CS, Flags
   c. IP, Flags, CS
4. Ret 4 results in the following
   a. Decreases sp by 4 bytes
   b. Increases sp by 4 bytes
   c. None of the above
5. A "Division by Zero" interrupt is generated only:
   a. when the operand of the "DIV" instruction has a value of zero.
   b. when the quotient cannot fit in the destination register(s).
   c. when the "DIV" instruction produces a quotient equal to zero.

Part B) True/False. **[1x2 Marks]**

1. loop l1 is equivalent to the these two instructions:
   DEC CX
   JNZ L1

True	False

2. Total size of IVT is 1MB.

True	False

Part C) Short questions. **[8+5 Marks]**

1. A memory location has an address 0xB8B7C. It represents a location on video screen. By showing complete calculation, determine, the row and column number on video memory that this location represents?

0xB8B7C= 0xB8B7C-0xB8000
= 0xB7C
=2940
=2940/160
=18th row
=remainder: 2940- (18*160)
=60
=60/2=30th column

So 18th Row and 30th Column

2. Write a fragment of code to hook interrupt 0xA1 with your service myISR, which is in your current CS.

```
Mov [es:0xA1*4], myISR
Mov [es:0xA1*4+2], CS
```

Q2. [15 Marks] Write a subroutine **Compress Data** that takes (row, col) coordinates of a cell of video memory as parameters. The function reads character from that cell, removes all the consecutive occurrences of that character horizontally, and shifts the remaining data left (leaving spaces at the end). Assume that attribute byte is identical throughout the video memory. **You have to solve it using string instructions only.**
Sample run on a video memory of 5x5 cells:

(row,col) = (2,1) Character at (Row 2, Col 1) = 'a'	**After removing consecutive occurrences of 'a' and shifting remaining data**
b l n g ! h E l l o b **A** a b z a P p l e m A n g o	b i n g ! h e l l o b **b** **z** a p p l e m a n g o

Solution:

```
;Driver code is given below
[org 0x0100]
;Passing Parameters (row, col)
push 8              ;row number
push 2              ;column number
call CompressData

mov ax, 0x4c00
int 21h


CompressData:
push bp
mov bp, sp
push ax                    ;saving all registers on stack
push bx
push cx
push dx
push si
push di
push es
push ds
;---------- WRITE YOUR CODE AFTER THIS LINE----------


push 0xb800
pop es
mov al, 80
mov bl, [bp+6]          ;row
mul bl
add ax, [bp+4]          ;col where the char is
shl ax, 1               ;mul by 2 convert to byte
mov di, ax              ;di=ax

push di                  ;saving the index

mov cx, 80
sub cx, [bp+4]          ;calculating remaining columns on screen to search
mov ax, [es:di]         ;the ascii and attribute

repe scasw
sub di, 2
mov si, di
pop di

add cx, 1
mov bx, cx              ;saving value of cx
push 0xb800
pop ds
rep movsw
```

```
mov cx, bx
mov ax, 0x0720
rep stosw                ;putting spaces



pop ds
pop es
pop di
pop si
pop dx
pop cx
pop bx
pop ax
pop bp
ret 4            ;End of Subroutine
```

Best of luck ☺