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Microprocessors and Interfacing

(CSE – 3002)

LAB EXPERIMENT– 5

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Q1) a) Find the length of string.

Ans1)

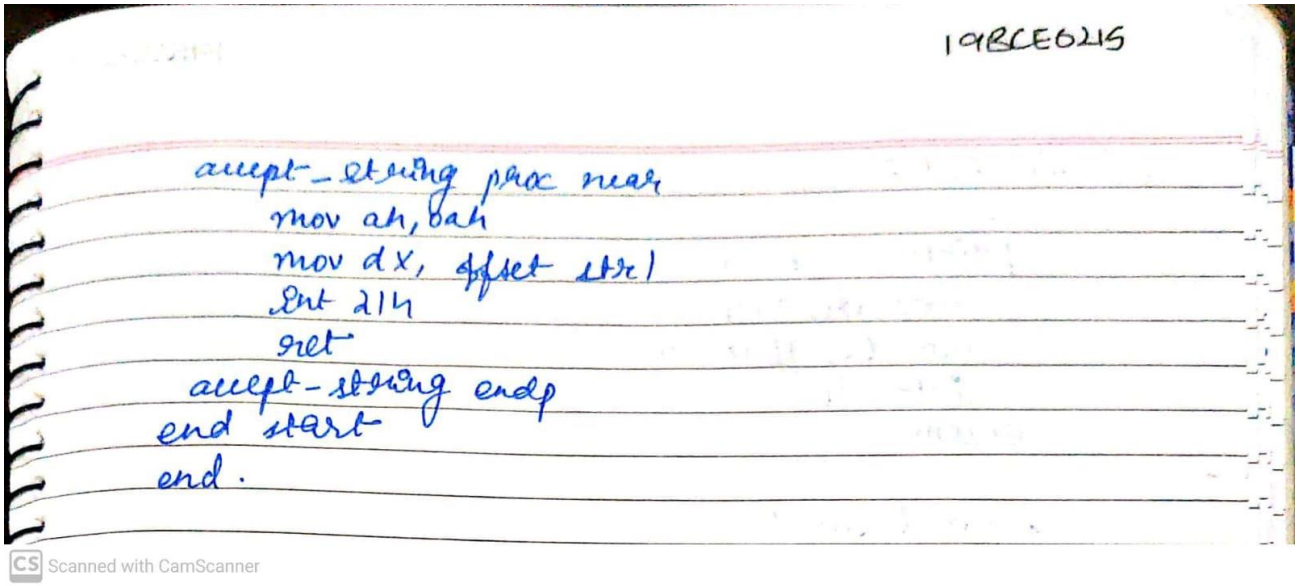
a)

19BCE0215

Q1) a) ALP:

```
print macro m
mov ah, 09h
mov dx, offset m
int 21h
endm

.modul small
.data
    msg db 10,13,"Existing the program $"
    empty db 10,13," $"
    str1 db 25,?,25 dup('$')
    len db ?
    mstring db 10,13,"Enter the string : $"
    mlength db 10,13,"Length is : $"
.code

start:
    mov dx,@data
    mov ds,ax

    print mstring
    call accept_string

    mov cl, str1+1
    mov bl, cl
    print mlength
    call display1

exit:
    mov ah,4ch
    int 21h
```

```
accept proc near
mov ah,01
int 21h
ret
accept endp

display1 proc near
    mov ah,bl
    mov bl,al
    and al,0f0h
    mov cl,04
    rol al,cl
    cmp al,09
    jbe number
    add al,07
number:
    add al,30h
    mov dl,al
    mov ah,02
    int 21h
    mov al,bl
    cmp dl,09
    jbe number2
    add al,07
number2:
    add al,30h
    mov dl,al
    mov ah,02
    int 21h
    ret
display1 endp.
```



Screenshot of ALP:

edit: C:\Users\Vibhu\OneDrive - vit.ac.in\Desktop\Fall Semester 21-22\Micro\ELA\Task-5\lengthOfString.asm

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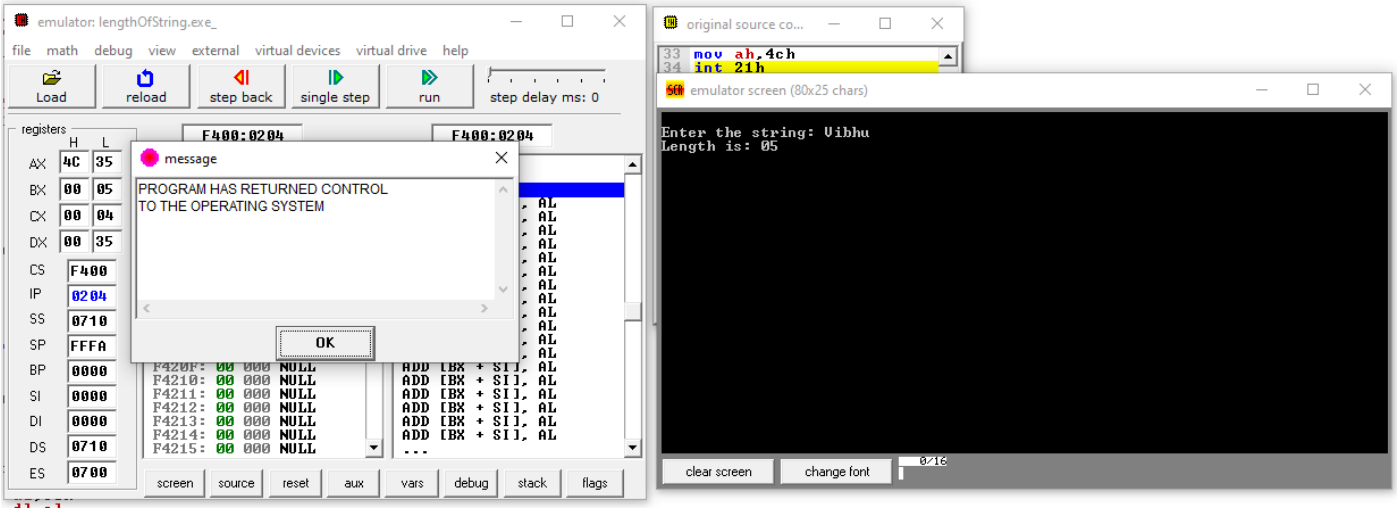
```
.data

    msg db 10,13, "Exiting the program $"
    empty db 10,13, "    $"
    str1 db 25,?,25 dup('$')
    len db ?
    mstring db 10,13, "Enter the string: $"
    mlength db 10,13, "Length is: $"

.code

start:
        mov ax,@data
        mov ds,ax

        print mstring
        call accept_string

        mov cl,str1+1
        mov bl,cl
        print mlength
        call display1

exit:
mov ah,4ch
int 21h


accept proc near

mov ah,01
int 21h
ret
accept endp

display1 proc near

   mov al,bl
   mov bl,al
   and al,0f0h
   mov cl,04
   rol al,cl

   cmp al,09
   jbe number
   add al,07
number:  add al,30h
         mov dl,al
         mov ah,02
         int 21h

         mov al,bl
         and al,00fh
         cmp al,09
         jbe number2
         add al,07
number2:  add al,30h
          mov dl,al
          mov ah,02
          int 21h
ret
display1 endp


accept_string proc near

mov ah,0ah
mov dx,offset str1
int 21h
ret
accept_string endp

end start
end
```

Output:

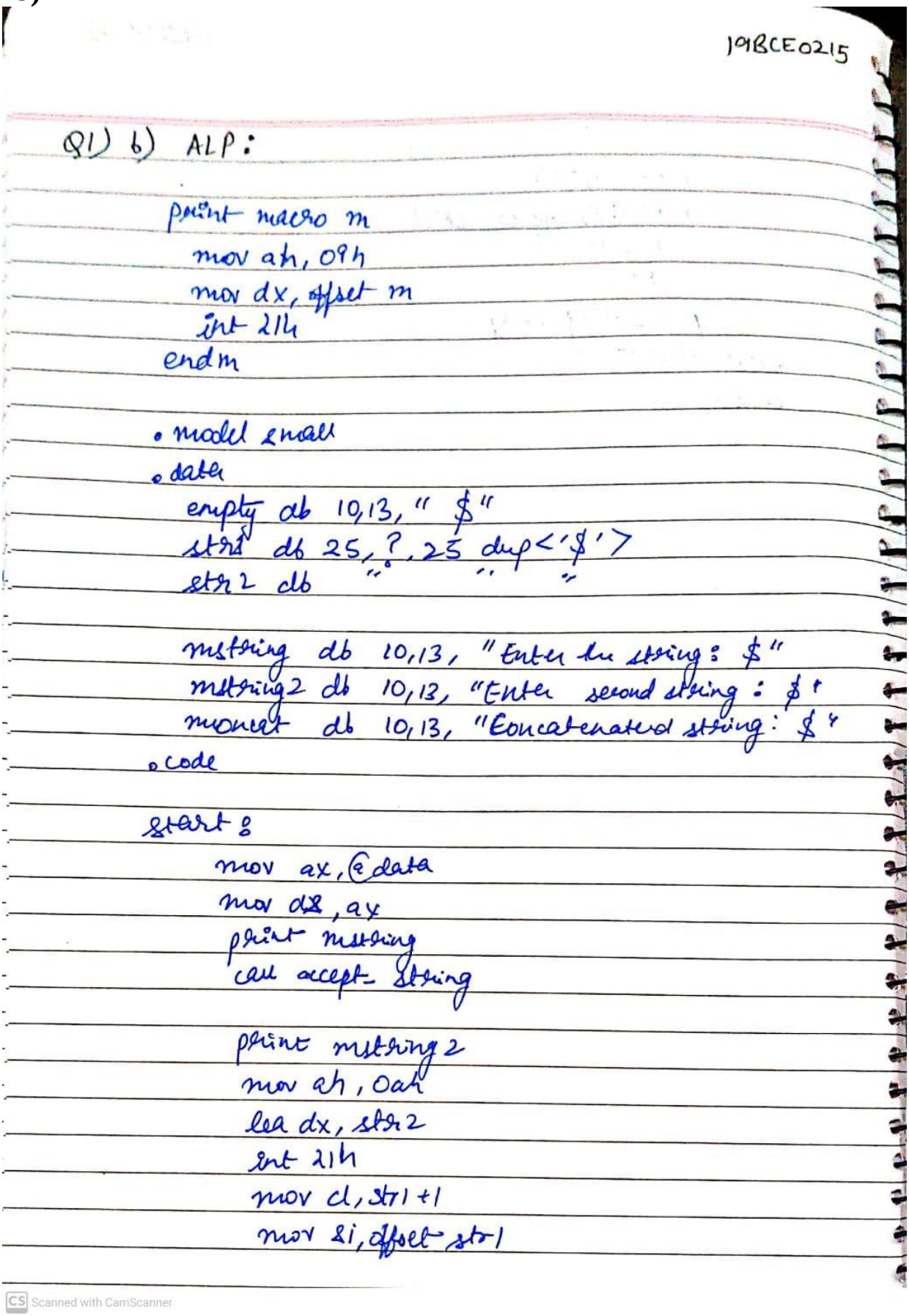

emulator: lengthOfString.exe_
file math debug view external virtual devices virtual drive help
Load reload step back single step run step delay ms: 0
registers
AX 4C 35
BX 00 05
CX 00 04
DX 00 35
CS F400
IP 0204
SS 0710
SP FFFA
BP 0000
SI 0000
DI 0000
DS 0710
ES 0700
F400:0204
F400:0204
message
PROGRAM HAS RETURNED CONTROL
TO THE OPERATING SYSTEM
OK
screen source reset aux vars debug stack flags
original source co...
33 mov ah,4ch
34 int 21h
emulator screen (80x25 chars)
Enter the string: Vibhu
Length is: 05
clear screen
change font

P.T.O.

Q1) b) Concatenate two strings.

Ans1)

b)



19BCE0215

Q1) b) ALP:

```
print macro m
 mov ah, 09h
 mov dx, offset m
 int 21h
endm

.model small
.data
 empty db 10,13," $"
 str1 db 25,?,25 dup('$')
 str2 db "  "  "  "

 mstring db 10,13, "Enter the string: $"
 mstring2 db 10,13, "Enter second string : $"
 mconcat db 10,13, "Concatenated string: $"
.code

start:
 mov ax,@data
 mov ds,ax
 print mstring
 call accept_string

 print mstring2
 mov ah,0ah
 lea dx,str2
 int 21h
 mov cl,str1+1
 mov si,offset str1
```

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```
next: int si
      dec cl
      jnz next
      int si
      inc si
      mov di, offset str2
      inc di
      inc di
      mov cl, str2+1
move_next:
      mov al, [di]
      mov [si], al
      inc si
      ind di
      dec cl
      jnz move_next
      print mconcat
      print str1+2
exit:
      mov ah, 4ch
      int 21h
end start
end.
```

Screenshot of ALP:

edit: C:\Users\Vibhu\OneDrive - vit.ac.in\Desktop\Fall Semester 21-22\Micro\ELA\Task-5\concatenate.asm

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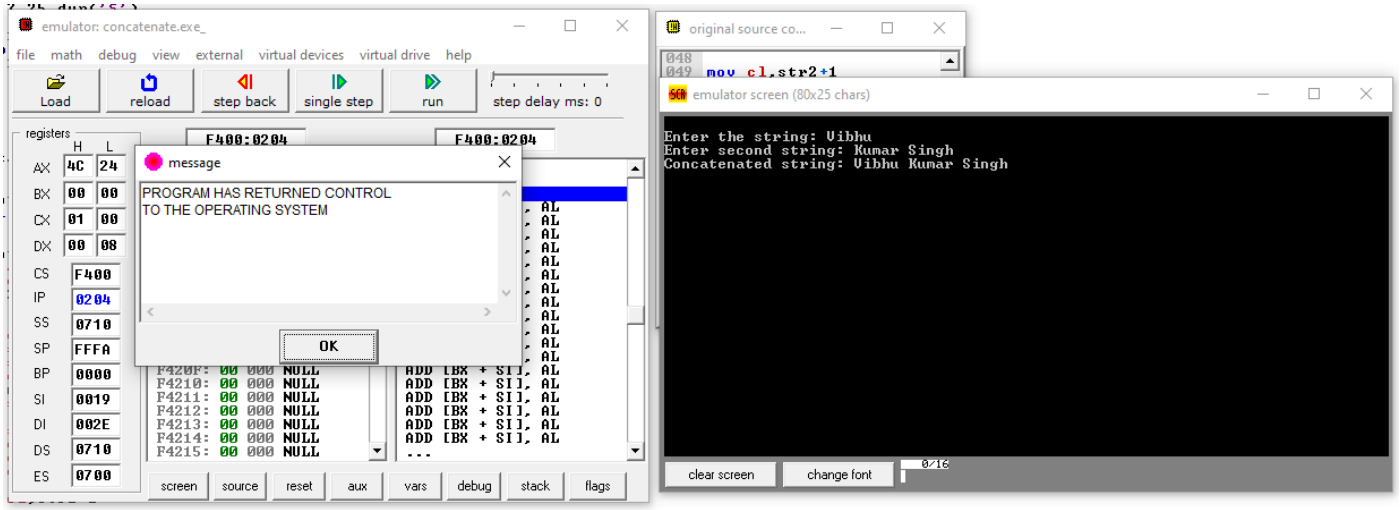
```
001 print macro m
002 mov ah,09h
003 mov dx,offset m
004 int 21h
005 endm
006
007 .model small
008
009 .data
010
011 empty db 10,13, "   $"
012 str1 db 25,?,25 dup('$')
013 str2 db 25,?,25 dup('$')
014
015 mstring db 10,13, "Enter the string: $"
016 mstring2 db 10,13, "Enter second string: $"
017 mconcat db 10,13, "Concatenated string: $"
018
019
020
021 .code
022
023 start:
024 mov ax,@data
025 mov ds,ax
026
027         print mstring
028         call accept_string
029
030
031         print mstring2
032         mov ah,0ah
033         lea dx,str2
034         int 21h
035
036
037         mov cl,str1+1
038         mov si,offset str1
039 next:   inc si
040         dec cl
041         jnz next
042         inc si
043
044         inc si
045         mov di,offset str2
046         inc di
047         inc di
048
049         mov cl,str2+1
050 move_next:
051
052             mov al,[di]
053             mov [si],al
054             inc si
055             inc di
056             dec cl
057             jnz move_next
058
059             print mconcat
060             print str1+2
061
062
063 exit:
064 mov ah,4ch
065 int 21h
066
067
068
069
070 accept proc near
071
072 mov ah,01
073 int 21h
074 ret
075 accept endp
076
077 display1 proc near
```

Output:


emulator: concatenate.exe_
file math debug view external virtual devices virtual drive help
Load reload step back single step run step delay ms: 0
registers
message
PROGRAM HAS RETURNED CONTROL
TO THE OPERATING SYSTEM
OK
screen source reset aux vars debug stack flags
original source co...
mov cl,str2+1
emulator screen (80x25 chars)
Enter the string: Vibhu
Enter second string: Kumar Singh
Concatenated string: Vibhu Kumar Singh
clear screen
change font

P.T.O.

Q1) c) Check a substring in another string.

Ans1)

c)

```
print macro m
 mov ah, 09h
 mov dx, offset m
 int 21h
endm

.model small
.data
 empty db 10,13," $"
 str1 db 25,?,25 dup('$')
 str2 db 25,?,25 dup('$')

 mstring db 10,13, "Enter the string: $"
 mstring2 db 10,13, "Enter second string : $"
 mconcat db 10,13, "Concatenated string: $"
.code

start:
 mov ax,@data
 mov ds,ax
 print mstring
 call accept_string

 print mstring2
 mov ah,0ah
 lea dx, str2
 int 21h
 mov cl, str1+1
 mov si, offset str1
```

```
next: int si
      dec cl
      jnz next
      inc si
      inc si
      mov di, offset str2
      inc di
      inc di
      mov cl, str2+1
move_next:
      mov al, [di]
      mov [si], al
      inc si
      ind di
      dec cl
      jnz move_next
      print mconcat
      print str1+2
exit:
      mov ah, 4ch
      int 21h
end start
end.
```

Screenshot of ALP:

edit: C:\Users\Vibhu\OneDrive - vit.ac.in\Desktop\Fall Semester 21-22\Micro\ELA\Task-5\substring.asm

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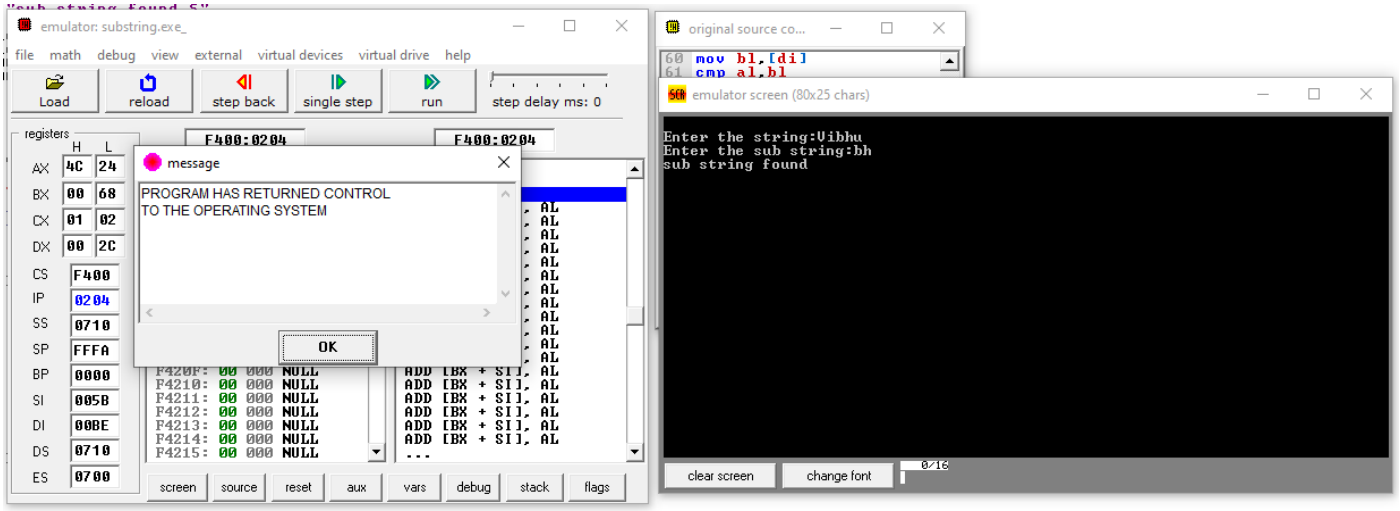
```
print macro arg
lea dx,arg
mov ah,09h
int 21h
endm

data segment

cr equ 0dh
lf equ 0ah
m1 db cr,lf,"Enter the string:$"
m2 db cr,lf,"Enter the sub string:$"
m3 db cr,lf,"sub string found $"
m4 db cr,lf,"sub string not found $"
str db 100 dup(?)
rev db 100 dup(?)
count1 db 0000h
count2 db 0000h

data ends

code segment

assume cs:code,ds:data

start:  mov ax,data
mov ds,ax
mov si,offset str
mov di,offset rev
mov cl,00h
print m1

l0:mov ah,01h
int 21h
cmp al,0dh
je l1
mov [si],al
inc si
inc cl
mov count1,cl
jmp l0

l1:print m2
mov cl,00h

l2:mov ah,01h
int 21h
cmp al,0dh
je l3
mov [di],al
inc di
inc cl
mov count2,cl
jmp l2

l3:mov si,offset str
mov di,offset rev

lpag:mov al,[si]
mov bl,[di]
cmp al,bl
jne lpne
inc di
dec count2
jnz lpne
print m3
jmp lpend1

lpne: inc si
dec count1
mov dl,count1
cmp dl,00h
jnz lpag
print m4

lpend1:mov ah,4ch
int 21h
```

Output:


emulator: substring.exe_
file math debug view external virtual devices virtual drive help
Load reload step back single step run step delay ms: 0
registers
message
PROGRAM HAS RETURNED CONTROL
TO THE OPERATING SYSTEM
OK
screen source reset aux vars debug stack flags
original source co...
mov bl,[di]
cmp al,bl
emulator screen (80x25 chars)
Enter the string:Vibhu
Enter the sub string:bh
sub string found
clear screen
change font

P.T.O.

Q1) d) Compare two strings.

Ans1)

d)

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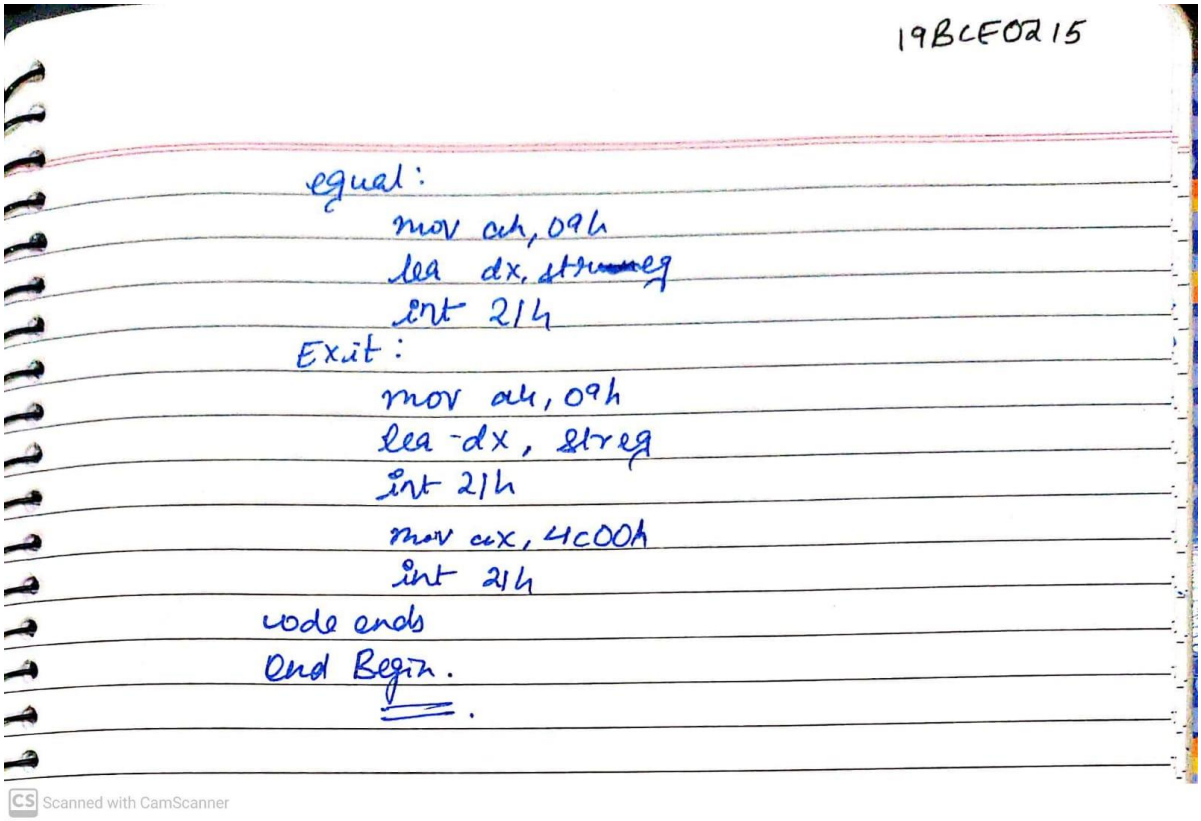
Q1) d) ALP:

```
data segment
    str1 db "Hello", "$"
    strlen1 db $-str1
    str2 db 'Not hello','$'
    strlen2 db $-str2
    streq db 'Strings are equal','$'
    strneq db 'Strings are unequal','$'
data ends

code segment
    assume cs:code, ds:data
    begin:
        mov ax, data
        mov ds, ax
        mov es, ax
        lea si, str1
        lea di, str2
        mov cx, 6
        mov al, strlen1
        mov bl, strlen2
        cmp al, bl
        jne Not_equal
        repe cmpsb
        jne Not_equal
        jmp equal
    Not_equal:
        mov ah, 09h
        lea dx, strneq
        int 21h
        jmp exit
```



Screenshot of ALP:

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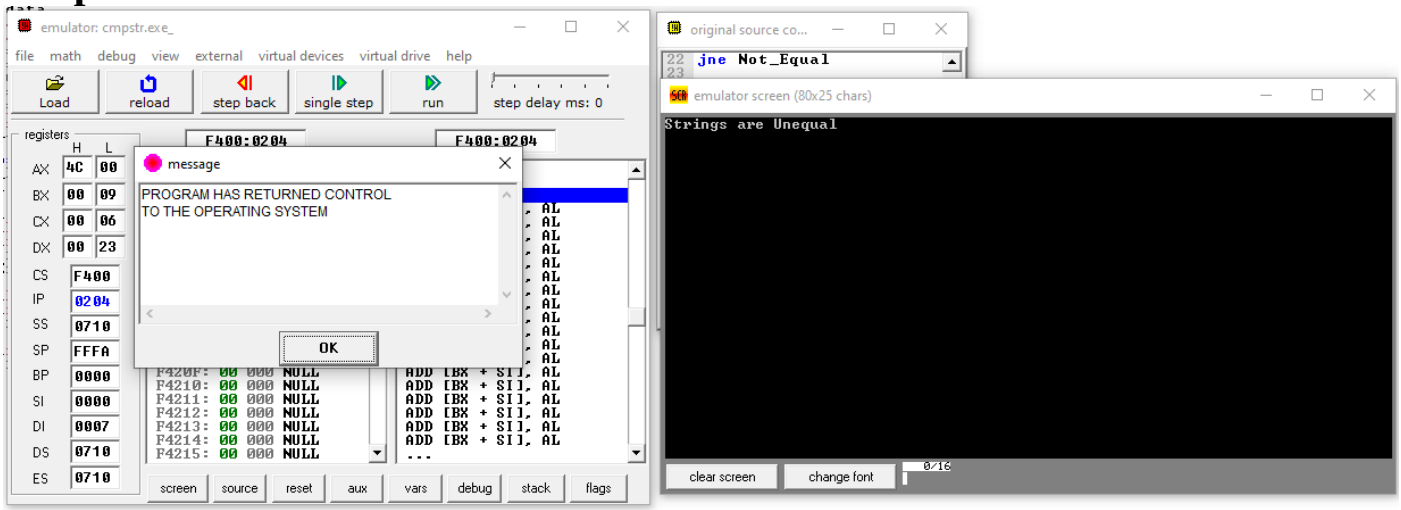
```
01 Data Segment
02   str1 db 'Hello','$'
03   strlen1 db $-str1
04   str2 db 'NotHello','$'
05   strlen2 db $-str2
06   streq db 'Strings are Equal','$'
07   struneq db 'Strings are Unequal','$'
08 Data Ends
09
10 Code Segment
11   Assume cs:code, ds:data
12   Begin:
13     mov ax, data
14     mov ds, ax
15     mov es, ax
16     lea si, str1
17     lea di, str2
18     mov cx, 6
19     mov al, strlen1
20     mov bl, strlen2
21     cmp al, bl
22     jne Not_Equal
23
24     repe cmpsb
25     jne Not_Equal
26     jmp Equal
27
28     Not_Equal:
29        mov ah, 09h
30        lea dx, struneq
31        int 21h
32        jmp Exit
33     Equal:
34        mov ah, 09h
35        lea dx, streq
36        int 21h
37     Exit:
38        mov ax, 4c00h
39        int 21h
40 Code Ends
41 End Begin
```

Output:


emulator: cmpstr.exe_
file math debug view external virtual devices virtual drive help
Load reload step back single step run step delay ms: 0
registers
message
PROGRAM HAS RETURNED CONTROL
TO THE OPERATING SYSTEM
OK
original source co...
jne Not_Equal
emulator screen (80x25 chars)
Strings are Unequal
clear screen
change font
screen source reset aux vars debug stack flags