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| **Course Name:** | **Microprocessors and Peripherals (2UXC404)** | **Semester:** | **IV** |
| **Date of Performance:** | 28/04/2021 | **Batch No:** | **B2** |
| **Faculty Name:** | KCS | **Roll No:** | 1912052 |
| **Faculty Sign & Date:** |  | **Grade/Marks:** | \_\_\_/25 |

**Experiment No: 8**

**Title:** Counting characters in string

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| **Aim and Objective of the Experiment:** |
| **Aim:** Write an 8086 based ALP to   1. Count how many times a given character appears in a given string. Display the same on port 110. Also indicate with the message ”Number of time character appears = ”, “Sorry, the character is absent in a given string”   **Objectives:**   1. To study string instruction. 2. To study I/O instructions. 3. To study DOS interrupts   This experiment covers  1. String instructions and I/O instructions  2. DOS interrupts for taking input from keyboard and displaying strings on screen. |

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| **COs to be achieved:** |
| **CO 2.** Develop 8086 based assembly language programs for various applications. |

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| **Useful links** |
| NASM Assembler <https://www.tutorialspoint.com/compile_assembly_online.php>  Simulator/Emulator:  <https://emu8086-microprocessor-emulator.en.softonic.com/download>  DOSBox x86 emulator  <https://sourceforge.net/projects/dosbox/> |

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| **Work to be done** |
| 1. Upload image of handwritten algorithm/flowchart and list file of the program with comments and output screenshots . Also upload results for post lab questions.   data segment  msg1 db 10,13,'ENTER ANY STRING :- $'  str db 10H dup('$')  strlen db $-str  msg2 db 10,13,'ENTER ANY CHARACTER :- $'  msg3 db 10,13,' $'  msg4 db 10,13,' Sorry, the character is absent in a given string$'  msg5 db ' FOUND IN THE GIVEN STRING $'    count db 00h  data ends  code segment  assume cs:code, ds=data  start: mov ax,data  mov ds,ax  mov es,ax    mov ah,09  lea dx,msg1  int 21h    mov ah,0Ah  lea dx,str  int 21h    lea si,str  mov cl,1Ah  mov dl,00h  repeat:mov bl,[si]  cmp bl,'a'  jnz next  inc dl  next:inc si  loop repeat  mov count,dl  mov al,dl  out 199,al      cmp dl,00h  jnz down    mov ah,09  lea dx,msg4  int 21h  jmp bye    down:      mov ah,09  lea dx,msg5  int 21h      mov ah,09  lea dx,count  int 21h          bye:  mov ah,4ch  int 21h  code ends  end start |

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| **Post Lab Subjective/Objective type Questions:** |
| Q1.What is the difference between cmpsb and scasb  **SCAS(/B/W)**compares a byte in AL or a word in AX with a byte or word pointed to by DI in ES. The direction flag determines the direction of scan.  Used with the REP prefix to find the first occurrence of a specified byte(word) in a string.  The **CMPSB(W)**instruction can be used to compare a byte(word) in one string (DS:offset in SI) with a byte (word) in another string (ES:offset in DI). The comparison is executed by subtracting the byte (word) in DI from the byte (word) in SI.  Q2. Write about dos interrupts which you have used for inputting a string or a character and also for printing a message or a single character.  **For taking input we use the procedure as follows**  Load 0Ah in ah  Load effective address(where the i/p needs to be stored) in dx  int 21h  **For printing out we use the procedure as follows**  Load 09h in ah  Load effective address(of the msg that needs to printed out) in dx  int 21h   1. INT 21h is provided by DOS. When MS-DOS is loaded into the computer, INT 21H can be invoked to perform some extremely useful functions. These functions are commonly referred to as DOS INT 21H function calls. Data input and output through the keyboard and monitor are the most commonly used functions. Below are two examples that use DOS interrupts. 1. Display the message defined with variable DATA\_ASC DB ‘the earth is but one country’,’$’ MOV AH,09 ;option 9 to display string of data MOV DX, OFFSET DATA\_ASC ;DX= offset address of data INT 21H ; invoke the interrupt 2. Inputting a single character, with echo. MOV AH, 01 ;option 01 to input one character INT 21H ;invoke the interrupt DOS interrupts |

**Signature of faculty in-charge with Date:**

**Conclusion:** We wrote an ALP for counting the number of character ‘a’ in the given string. The string is taken as an input from the user and the number of characters found are sent to the port 110.