

*Tutorial & Laboratory*

Programming & Data Structure: CS11001/19001

*Section - 4/D*

**DO NOT POWER ON THE MACHINE**

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Kharagpur

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## Assignment X

Write a C program to implement the following functions on string of characters. The function `int main()` is supplied, use it **without any change**. [Marks: 4 + 4 + 5 + 4 + 4 + 4]

## String Functions

`charCount()`

`int charCount(char *x, char c):` a non-recursive function that returns the number of occurrence of the character `c` in the string `x`.  
`charCount("IIT Kharagpur", 'I')` returns 2.  
[Marks: 4]

`commonChar()`

`void commonChars(char *x, char *y):` a non-recursive function that prints the characters that are present in both `x` and `y`.  
`commonChars("iit kharagpur", "prime")` prints `p r i`. A common character is printed only once. [Marks: 4]

`ror() & rol()`

`void ror(char *x)`: a non-recursive function that rotates clock-wise (right) the string `x` by one character.

`ror("iit Kharagpur")` produces "riit Kharagpu".

Similarly, `void rol(char *y)` rotates the string `y` counter clock-wise (left) by one character.

`rol("iit Kharagpur")` produces "it Kharagpuri".

[Marks: 5]

`strCopy()`

`char *strCopy(char *x, const char *y)`: a recursive function that copies the string of `y` to `x`. It also returns `x`. Assume that sufficient memory space is available in the destination. This function is similar to the library function `strcpy()`. [Marks: 4]



```
isPrefix()
```

`int isPrefix(const char *x, const char *y):` a recursive function that returns `1` if the string of `y` is a prefix of the string of `x`; otherwise it returns `0`.

"`abrac`" is a prefix of "`abracadabra`" but "`arbad`" is not. [Marks: 4]

`substring()`

`char *substring(char *x, const char *y):`  
a recursive function behaves as follows: if the string of `y` is a substring of the string of `x`, it returns the pointer to the first match; otherwise it returns `NULL`. This function uses `isPrefix()`. The similar library function is `strstr()`.

[Marks: 4]

## Note

- Do not use the library functions for strings.
- A *string of characters* is always terminated by `'\0'`.
- Assume that the length of a string does not exceed `MAXLEN` ( $\leq 1000$ ).

```
int main()
```

Download the function `int main()` from [http](#) site and copy it to a file with a proper name (`Dmm10.c` where 'mm' is the machine number). Write one string function at a time and test.

Do not make any change in the `main()`

**main()**

```
#include <stdio.h>
#define MAXLEN (1000+1)
#define CODE    128
int main()
{
    char x[MAXLEN], c, y[MAXLEN], z[MAXLEN], *sP ;

    printf("Enter the 1st string:\n") ;
    scanf("%[^\n]", x) ;
    printf("Enter a character:\n") ;
    scanf(" %c", &c) ;
    printf("%d occurrence of %c in %s\n",
```

```
        charCount(x, c), c, x);
printf("Enter the 2nd string:\n") ;
scanf(" %[^\\n]", y) ;
commonChars(x,y);
putchar('\\n');
ror(x);
printf("right-rotated: %s\\n", x);
rol(x);
printf("left-rotated: %s\\n", x);
sP = strCopy(z, x);
printf("sP: %s, z: %s\\n", sP, z);

if((sP = substring(x, y)) == NULL)
    printf("\\\"%s\\\" is not a substring of \\\"%s\\\"\\n", y,
```

```
else {  
    printf("\"%s\" is a substring of \"%s\"", y, x) ;  
    printf(" from index %d\n", (int)(sP-x)) ;  
}  
  
return 0;  
} // assignment10.c
```

## Input/Output

Enter the 1st string:

The fringe area

Enter a character:

s

Enter the 2nd string:

ring

Common chars in "The fringe area" and "ring" are: g i n r

Right-rotated: "aThe fringe are"

Left-rotated: "The fringe area"

sP: "The fringe area", z: "The fringe area"

"ring" is a substring of "The fringe area" from index 5



## Submission by ftp

```
$ ftp 10.5.17.186
Connected to 10.5.17.186.
220----- Welcome to Pure-FTPd ----
220-You are user number 1 of 50 allowed.
220-Local time is now 07:54. .... 21.
220-IPv6 connections .....
220 ... disconnected .. inactivity.
Name (10.5.17.186:..): pds
```

## Submission by ftp

```
331 User pds OK. Password required
Password: pds04
230-User pds has group access to: pds
230 OK. Current restricted directory is /
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> cd assignment10
250 OK. Current directory is /assignment10
```

## Submission by ftp

```
ftp> put D0610.c
local: D0610.c remote: D0610.c
200 PORT command successful
150 Connecting to port 47093
226-File successfully transferred
226 0.001 seconds .. 39.00 Kbytes ..
27 bytes sent in 0.00 secs (1098.6 kB/s)
ftp> bye
21-Goodbye. ....
221 Logout.
$
```

## Assignment XI

Download the C program `matVectMult.c`, rename it properly. Rewrite the functions `void printMatrix( int x[][MAXCOL], int r, int c)` and `void matVectMult(int x[][MAXCOL], int r, int c, int v[], int p[])` as **recursive function** (no loop construct). You are free to change the interface i.e your recursive functions may take more parameters.