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Date And Time Functions

The following table shows some of the functions that we use for date and time in C and C++.

Function Name	Function Prototype	Description
ctime	char *ctime(const time_t *time);	Returns a pointer to a string in the form weekday month date hours:minutes:seconds year.
gmtime	struct tm *gmtime(const time_t *time);	Returns pointer to the tm structure in the Coordinated Universal Time (UTC) format which is essentially Greenwich Mean Time (GMT).
localtime	struct tm *localtime(const time_t *time);	Returns pointer to tm structure representing local time.
strftime	size_t strftime();	Used to format date and time in specific format.
asctime	char * asctime (const struct tm * time);	Converts time object of type tm to string and returns a pointer to this string.
time	time_t time(time_t *time);	Returns current time.

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	time_t *time);	
localtime	struct tm *localtime(const time_t *time);	Returns pointer to tm structure representing local time.
strftime	size_t strftime();	Used to format date and time in specific format.
asctime	char * asctime (const struct tm * time);	Converts time object of type tm to string and returns a pointer to this string.
time	time_t time(time_t *time);	Returns current time.
clock	clock_t clock(void);	Returns an approximate value for the amount of time the calling program has been running. A value of 1 is returned if the time is not available.
difftime	double difftime (time_t time2, time_t time1);	Returns difference between two time objects time1 and time2.
mktime	time_t mktime(struct tm *time);	Converts tm structure to time_t format or calendar equivalent.

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```
tm *time);
```

Programming Examples

The following code Example calculates the current time in local and GMT format and displays it.

```
#include <iostream>
#include <ctime>
using namespace std;

int main( )
{
    time_t ttime = time(0);

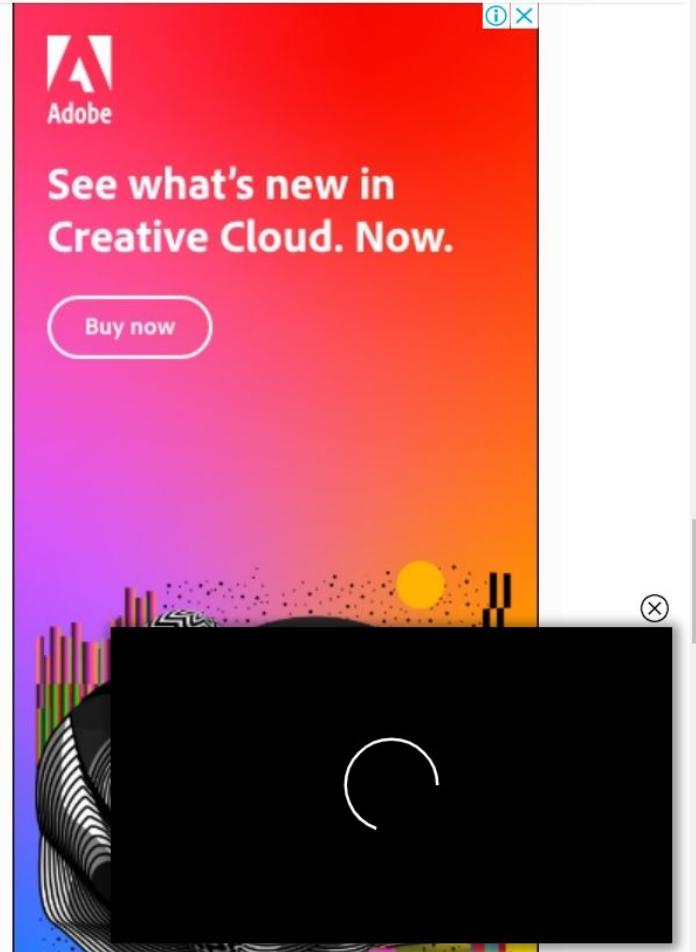
    char* dt = ctime(&ttime);
    cout << "The current local date and time is: " << dt << endl;

    tm *gmt_time = gmtime(&ttime);
    dt = asctime(gmt_time);
    cout << "The current UTC date and time is:" << dt << endl;
}
```

Output:

The current local date and time is: Fri Mar 22 03:51:20 2019

The current UTC date and time is: Fri Mar 22 03:51:20 2019



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Formatted and Unformatted Input and Output (I/O) in C

Input means to provide the program with some data to be used in the program and Output means to display data on screen or write the data to a printer or a file.

C programming language provides many built-in functions to read any given input and to display data on screen when there is a need to output the result.

C programming language has standard libraries that allow input and output in a program. The stdio.h or standard input output library in C that has methods for input and output.

Input output built-in functions in C falls into two categories, namely, formatted input output (I/O) functions and unformatted input output (I/O) functions. printf() and scanf() are examples for formatted input and output functions and getch(), getche(), getchar(), gets(), puts(), putchar() etc. are examples of unformatted input output functions.

scanf() and printf() functions

The standard input-output header file, named stdio.h contains the definition of the functions printf() and scanf(), which are used to display output on screen and to take input from user respectively.



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scanf() and printf() functions

The standard input-output header file, named stdio.h contains the definition of the functions printf() and scanf(), which are used to display output on screen and to take input from user respectively.

Format can be a simple constant string, but you can specify %s, %d, %c, %f, etc., to print or read strings, integer, character or float respectively. There are many other formatting options available which can be used based on requirements.

```
#include<stdio.h>

void main()
{
int a,b,c;
printf("Please enter any two integer numbers: \n");
scanf("%d %d", &a, &b);
c = a + b;
printf("The addition of two number is: %d", c);
}
```



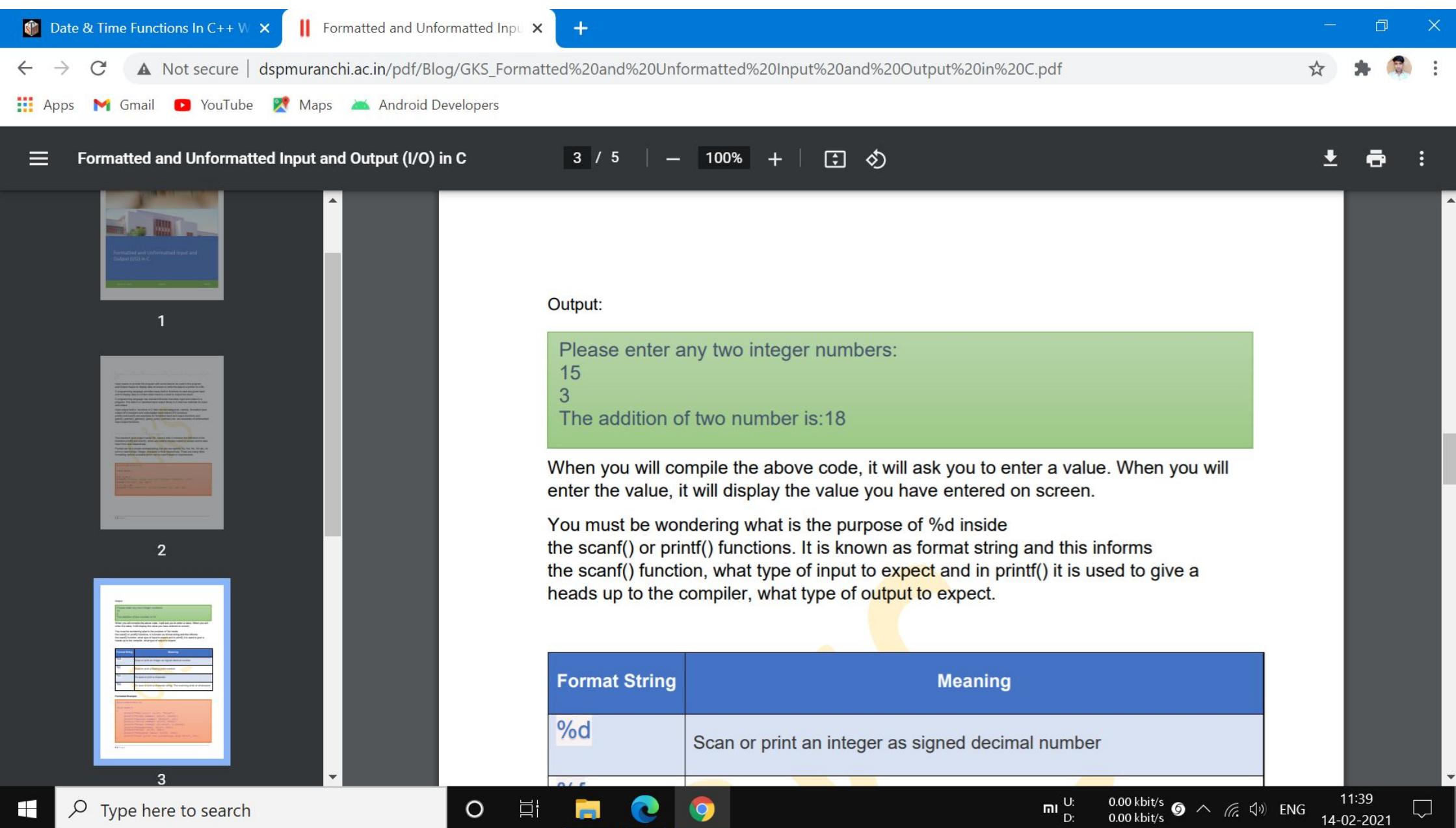
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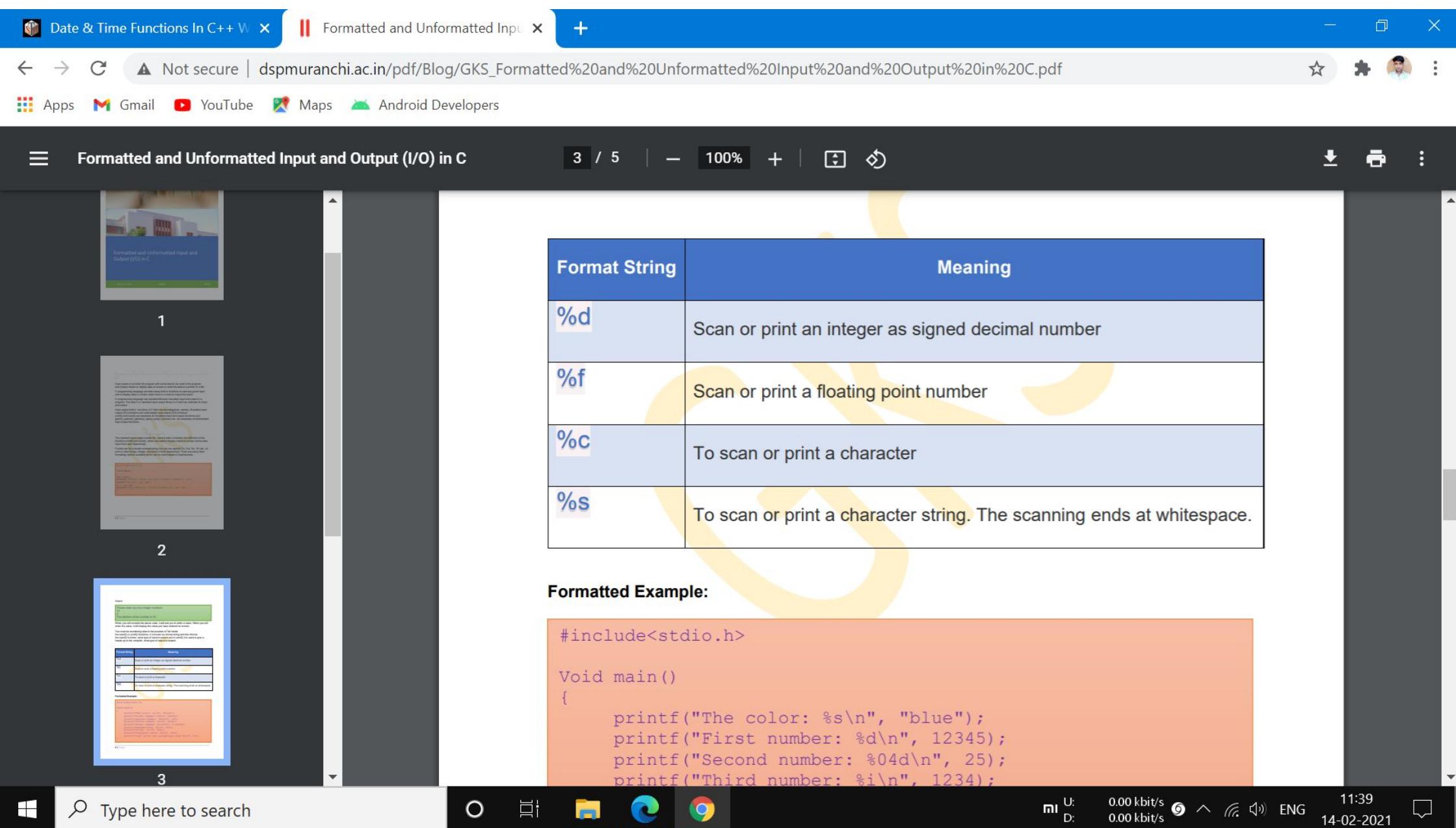


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Formatted Example:

```
#include<stdio.h>

Void main()
{
    printf("The color: %s\n", "blue");
    printf("First number: %d\n", 12345);
    printf("Second number: %04d\n", 25);
    printf("Third number: %i\n", 1234);
    printf("Float number: %3.2f\n", 3.14159);
    printf("Hexadecimal: %x\n", 255);
    printf("Octal: %o\n", 255);
    printf("Unsigned value: %u\n", 150);
    printf("Just print the percentage sign %%\n", 10);
}
```

2 | Page

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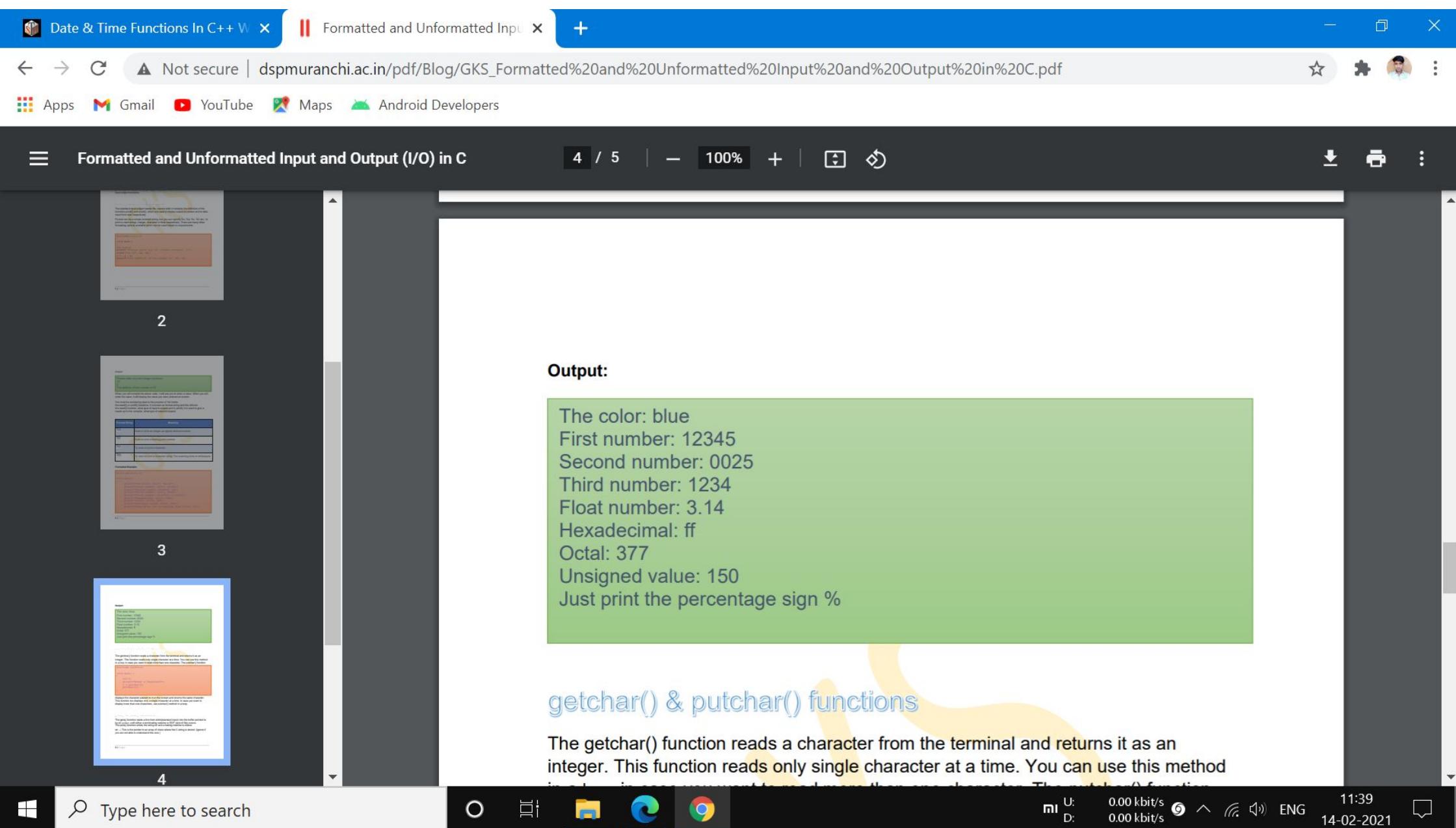


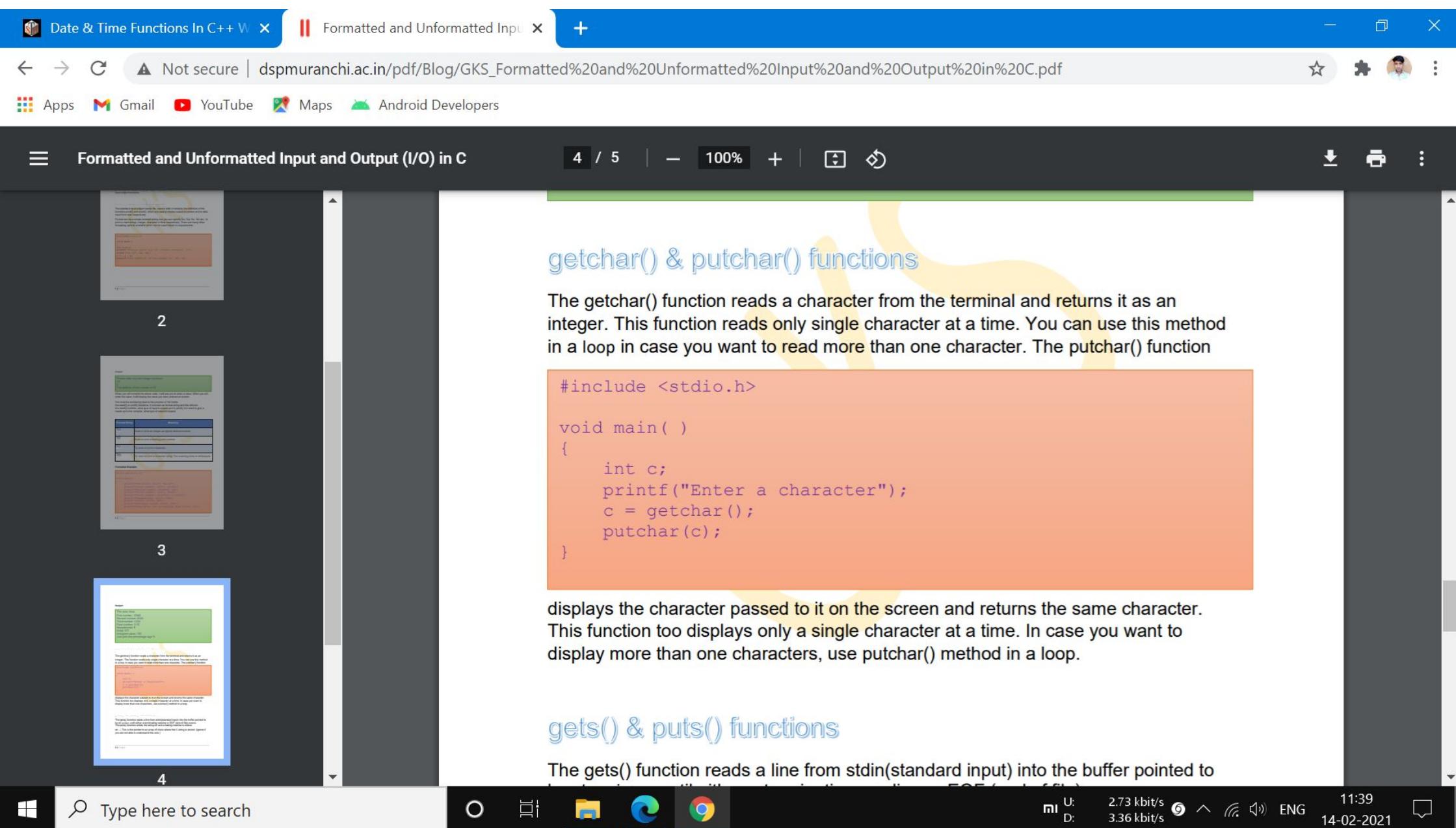
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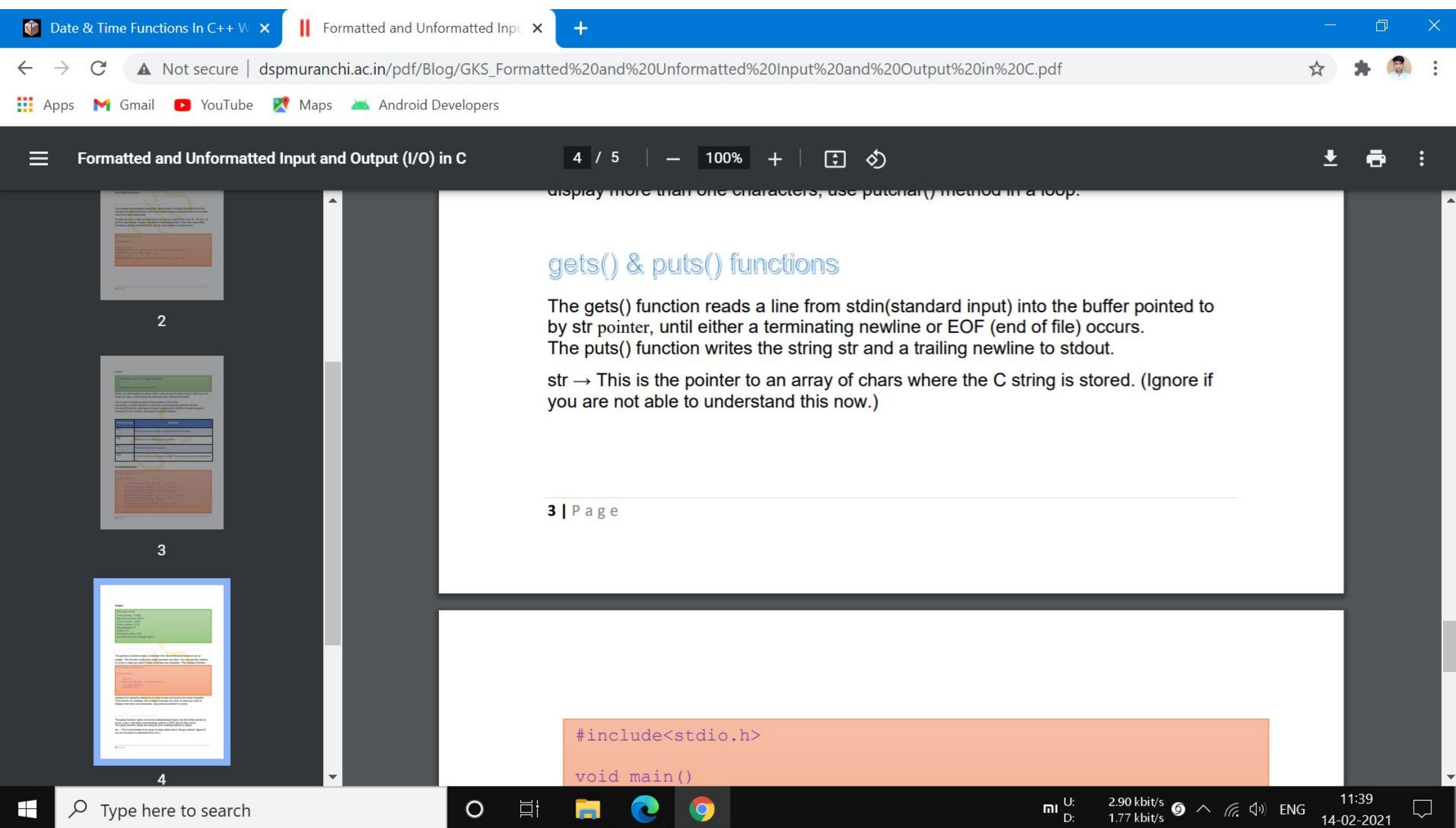
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#include<stdio.h>

```
void main()
{
    char str[100];
    printf("Enter a string");
    gets( str );
    puts( str );
    getch();
}
```

Difference between scanf() and gets()

The main difference between these two functions is that scanf() stops reading characters when it encounters a space, but gets() reads space as character too.

If you enter name as sanjay kumar using scanf() it will only read and store sanjay and will leave the part after space. But gets() function will read it completely.

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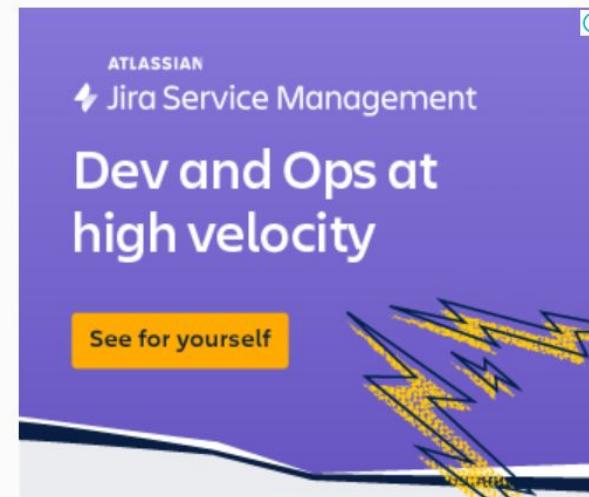
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getc(), putc() functions in C

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getc(), putc() functions in C:



getc(), putc() functions are file handling function in C programming language which is used to read a character from a file (getc) and display on standard output or write into a file (putc). Please find below the description and syntax for above file handling functions.

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output or write into a file (putc). Please find below the description and syntax for above file handling functions.

File operation	Declaration & Description
getc()	<p>Declaration: int getc(FILE *fp)</p> <p>getc function is used to read a character from a file. In a C program, we read a character as below.</p> <pre>getc(fp);</pre>
putc()	<p>Declaration: int putc(int char, FILE *fp)</p> <p>putc function is used to display a character on standard output or is used to write into a file. In a C program, we can use putc as below.</p> <pre>putc(char, stdout); putc(char, fp);</pre>

EXAMPLE PROGRAM FOR GETC(), PUTC() FUNCTIONS IN C PROGRAMMING LANGUAGE:

This file handling C program illustrates how to read the contents of a file.

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EXAMPLE PROGRAM FOR GETC(), PUTC() FUNCTIONS IN C PROGRAMMING LANGUAGE:

This file handling C program illustrates how to read the contents of a file. Assume that, a file called "test.c" contains the following data "Hi, How are you?". Let's read this data using following C program using getc() and putc() functions.

Please note that putc() function can be used to write a character into a file also instead of stdout. For that, please use putc(char, fp).

```
1 #include <stdio.h>
2 int main()
3 {
4     char ch;
5     FILE *fp;
6     if (fp = fopen("test.c", "r"))
7     {
8         ch = getc(fp);
9         while (ch != EOF)
10        {
11            putc(ch, stdout);
12            ch = getc(fp);
13        }
14        fclose(fp);
15        return 0;
16    }
17    return 1;
18 }
```

OUTPUT:

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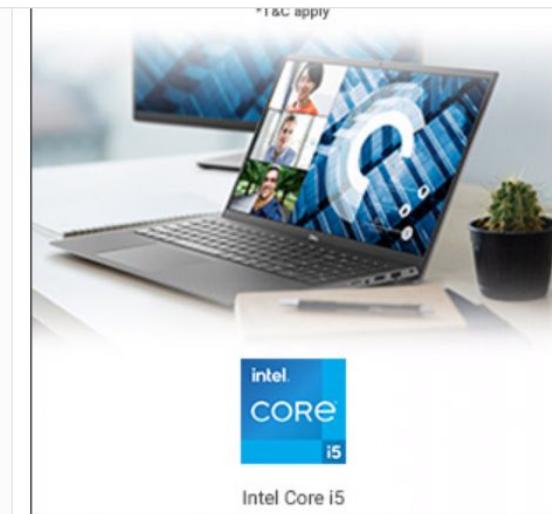
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Please note that putc() function can be used to write a character into a file also instead of stdout. For that, please use putc(char, fp).

```
1 #include <stdio.h>
2 int main()
3 {
4     char ch;
5     FILE *fp;
6     if (fp = fopen("test.c", "r"))
7     {
8         ch = getc(fp);
9         while (ch != EOF)
10        {
11            putc(ch, stdout);
12            ch = getc(fp);
13        }
14        fclose(fp);
15        return 0;
16    }
17    return 1;
18 }
```

OUTPUT:

Hi, How are you?



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ungetc() in C/C++

Difficulty Level : Easy • Last Updated : 25 Oct, 2018

The **ungetc()** function takes a single character and shoves it back onto an input stream. It is the opposite of the **getc()** function, which reads a single character from an input stream. Also, ungetc() is an input function, not an output function.

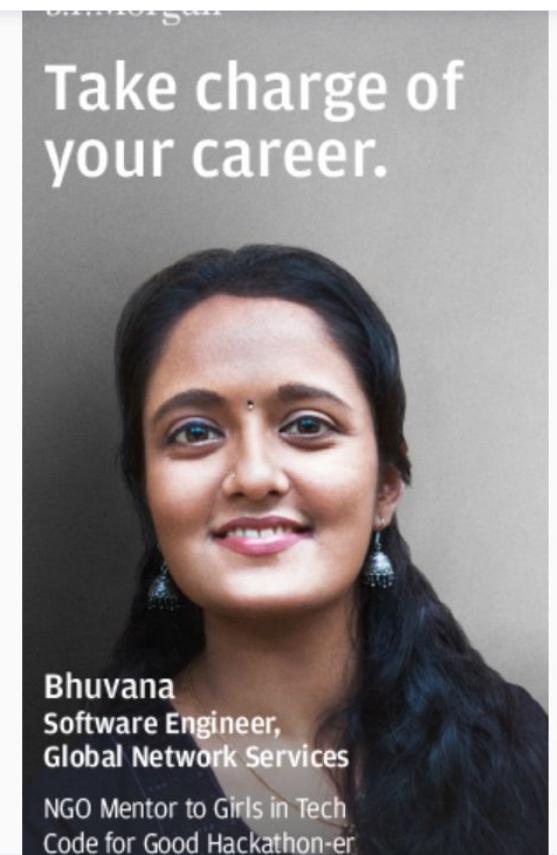
Syntax:

```
int ungetc(int char, FILE *stream)
```

Parameters:

- **char**: specifies the int promotion of the character to be put back. The value is internally converted to an unsigned char when put back.
- **stream**: specifies the pointer to a FILE object that identifies an input stream.

Return Value: The function returns two kind of values.



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Return Value: The function returns two kind of values.

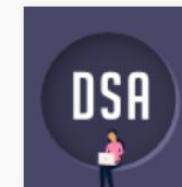
- On success, the ungetc() function returns the character ch.
- On failure, EOF is returned without changing the stream.

Important points about the function:

1. The ungetc() function pushes the byte specified by char (converted to an unsigned char) back onto the input stream pointed to by stream.
2. The pushed-back bytes is returned by subsequent reads on that stream in the reverse order of their pushing.
3. A successful intervening call (with the stream pointed to by stream) to a file-positioning function (fseek(), fsetpos(), or rewind()) discards any pushed-back bytes for the stream.
4. The external storage corresponding to the stream shall be unchanged.
5. A successful call to ungetc() clears the end-of-file indicator for the stream.
6. The value of the file-position indicator for the stream after reading or discarding all pushed-back bytes shall be the same as it was before the bytes were pushed back.



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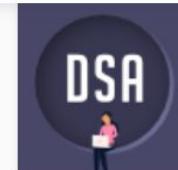


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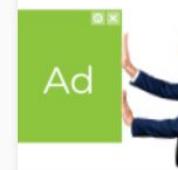
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- unsigned char) back onto the input stream pointed to by stream.
2. The pushed-back bytes is returned by subsequent reads on that stream in the reverse order of their pushing.
 3. A successful intervening call (with the stream pointed to by stream) to a file-positioning function (fseek(), fsetpos(), or rewind()) discards any pushed-back bytes for the stream.
 4. The external storage corresponding to the stream shall be unchanged.
 5. A successful call to ungetc() clears the end-of-file indicator for the stream.
 6. The value of the file-position indicator for the stream after reading or discarding all pushed-back bytes shall be the same as it was before the bytes were pushed back.
 7. The file-position indicator is decremented by each successful call to ungetc(), if its value was 0 before a call, its value is unspecified after the call.



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Program 1:

```
#include <stdio.h>
int main()
{
    FILE* f;
    int char;
    char buffer[256];

    // read a file
    f = fopen("use1.txt", "r");

    // when no data
    if (f == NULL) {
        printf("Error in opening file");
        return (-1);
    }

    // read lines till end
    while (!feof(f)) {
```

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```
// read lines till end
while (!feof(f)) {

    // get line
    char = getc(f);
    // replace ! with +
    if (char == '!') {
        ungetc('+', f);
    }
    // if not
    else {
        ungetc(c, f);
    }
    fgets(buffer, 255, f);
    fputs(buffer, stdout);
}
return 0;
}
```

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Program for Sum of the digits of a given number

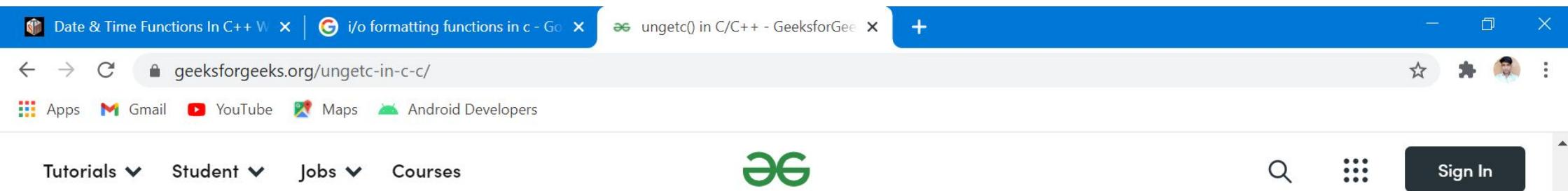
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Let us assume, we have a text file use1.txt, which contains the following data.
This file will be used as an input for our example program, then the input and

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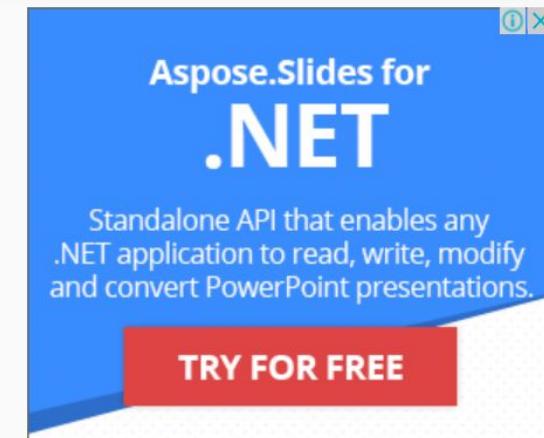
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```
        ungetc(c, f);
    }
    fgets(buffer, 255, f);
    fputs(buffer, stdout);
}
return 0;
}
```

Let us assume, we have a text file `use1.txt`, which contains the following data. This file will be used as an input for our example program, then the input and output are shown below:

```
Input: !c standard library
        !library function stdio.h-ungetc()
Output: +c standard library
        +library function stdio.h-ungetc()
```



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Program 2:

```
// C program for taking input till we
// get 1 at the input
#include <stdio.h>
int main()
{
    int ch;

    // reads characters from the stdin and show
    // them on stdout until encounters '1'
    while ((ch = getchar()) != '1')
        putchar(ch);

    // ungetc() returns '1' previously
    // read back to stdin
    ungetc(ch, stdin);

    // getchar() attempts to read
    // next character from stdin
    // and reads character '1' returned
    // back to the stdin by ungetc()
    ch = getchar();
```

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```
// ungetc() returns '1' previously  
// read back to stdin  
ungetc(ch, stdin);  
  
// getchar() attempts to read  
// next character from stdin  
// and reads character '1' returned  
// back to the stdin by ungetc()  
ch = getchar();  
  
// putchar() displays character  
putchar(ch);  
return 0;  
}
```

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