# Lab # 03

# Data Types

## 3.1 Objective:

Learn the Problem Solving and Basics C Language

## 3.2 Scope:

The student should know the following:

- Problem Solving
- Different data types of C and their Use.
- Declaring Variables
- Standard Input and Output
- Writing Complete Programs

## 3.3 Useful Concept:

An useful List of basic data type of C , number of bytes used to store these data types in memory of computer system:

| ***Data Type*** | ***Bytes*** |
|---|---|
| Signed char | 1 |
| unsigned char | 1 |
| sort signed int | 2 |
| short unsigned int | 2 |
| long signed int | 4 |
| long unsigned int | 4 |
| float | 4 |
| double | 8 |
| long double | 10 |

## Variables

- C variable is a named location in a memory where a program can manipulate the data. This location is used to hold the value of the variable.
- The value of the C variable may get change in the program.

- C variable might be belonging to any of the data type like int, float, char etc.

Rules for naming C variable:

1. Variable name must begin with letter or underscore.
2. Variables are case sensitive
3. They can be constructed with digits, letters.
4. No special symbols are allowed other than underscore.
5. sum, height, _value are some examples for variable name

Declaring & initializing C variable:

- Variables should be declared in the C program before to use.
- Memory space is not allocated for a variable while declaration. It happens only on variable definition.
- Variable initialization means assigning a value to the variable.

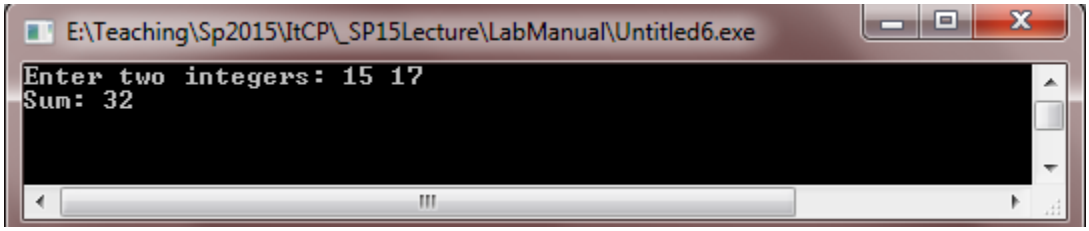
| S.No | Type | Syntax | Example |
|---|---|---|---|
| 1 | Variable declaration | data_type variable_name; | int x, y, z; char flat, ch; |
| 2 | Variable initialization | data_type variable_name = value; | int x = 50, y = 30; char flag = 'x', ch='l'; |

## 3.4 Examples:

**Example-1:- This program illustrates integer addition. Also note the syntax necessary for the use of scanf().**

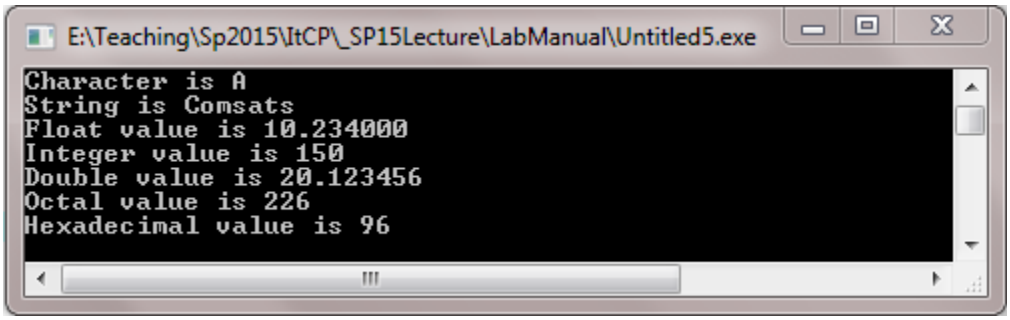
```
#include <stdio.h>
void main( )
{
   int num1, num2, sum;
   printf("Enter two integers: ");
   scanf("%d %d",&num1,&num2); /* Stores the two integer entered by user in variable num1 and num2 */

   sum=num1+num2;     /* Performs addition and stores it in variable sum */
   printf("Sum: %d",sum);  /* Displays sum */
   getch();

}
```

Here's the program's output:



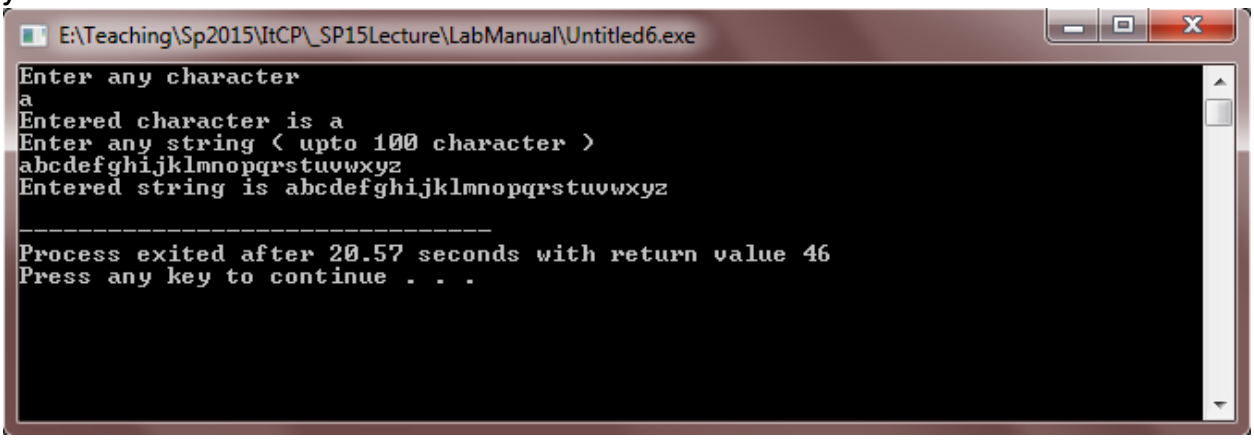

**Example-2:- This program illustrates different format conversion in printf statement.**

```
#include <stdio.h>
void main()
{
char ch = 'A';
char str[20] = "Comsats";
float flt = 10.234;
int no = 150;
double dbl = 20.123456;
printf("Character is %c \n", ch);
printf("String is %s \n" , str);
printf("Float value is %f \n", flt);
printf("Integer value is %d\n" , no);
printf("Double value is %lf \n", dbl);
printf("Octal value is %o \n", no);
printf("Hexadecimal value is %x \n", no);
getch();
}
```



**Example-3:- This program illustrates different format conversion in scanf statement.**

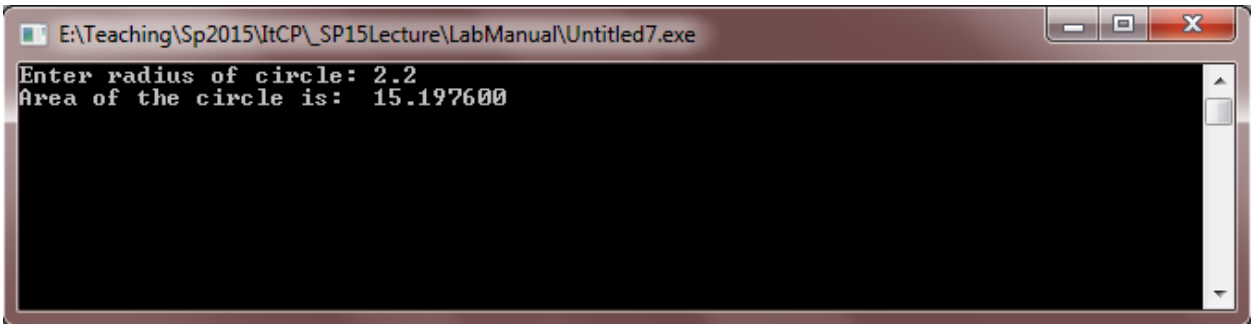
```
#include <stdio.h>
int main()
{
char ch;
char str[100];
printf("Enter any character \n");
scanf("%c", &ch);
printf("Entered character is %c \n", ch);
printf("Enter any string ( upto 100 character ) \n");
scanf("%s", &str);
printf("Entered string is %s \n", str);
}
```




**Example - 4:-** This program calculates the area of the circle. The area of the circle is $\Pi r^2$. $\Pi$ value is constant that is 3.14 but radius can change so this program gets the value of radius variable form user and calculate the area on that value.

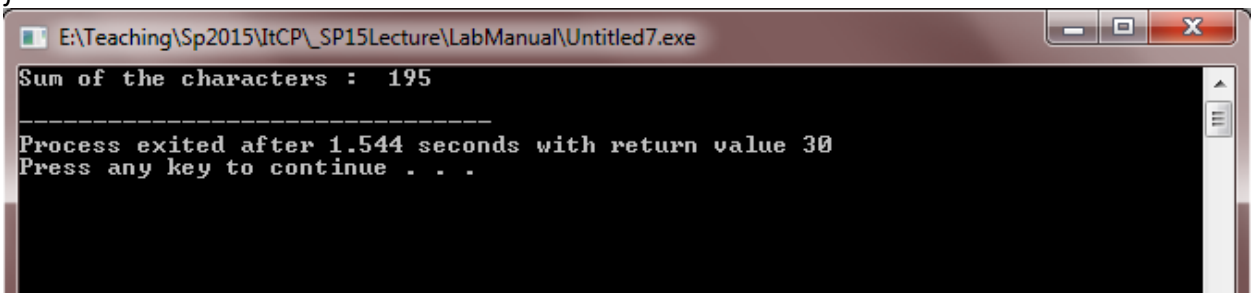
```
# include <conio.h>
void main()
{
  float radius,area;
  printf( "Enter radius of circle: ");
```

```
  scanf( "%f", &radius) ;
  area = 3.14*radius*radius;
  printf( "Area of the circle is:  %f \n", area);
  getch();
}
```




**Example - 5:-** This program illustrates the addition on charter values.

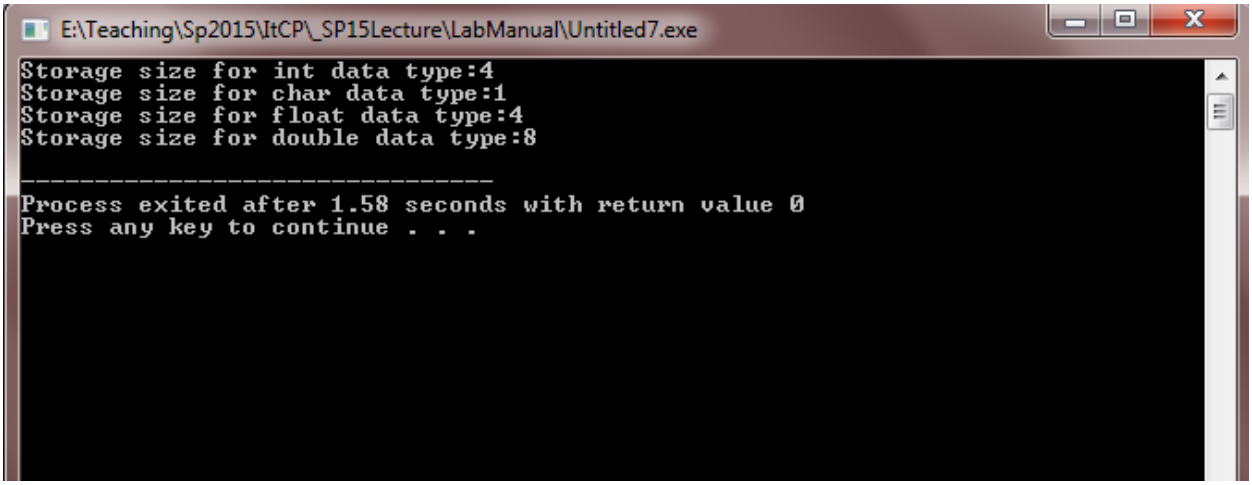
```
# include <conio.h>
void main()
{
char x, y ;
int z ;
x = 'a' ;
y = 'b' ;
z = x + y ;        //Add the assci value of 'a' with assci value of 'b' and store in z.
printf("Sum of the characters :  %d \n", z);
}
```




**Example** - 6:- This program illustrates the use of sizeof() function which is used to find the memory space allocated for each C data types.

```
#include <stdio.h>

#include <limits.h>
```

```
int main()
{
int a;
char b;
float c;
double d;
printf("Storage size for int data type:%d \n",sizeof(a));
printf("Storage size for char data type:%d \n",sizeof(b));
printf("Storage size for float data type:%d \n",sizeof(c));
printf("Storage size for double data type:%d\n",sizeof(d));
return 0;
}
```




## 3.5 Exercises for lab

Exercise 1:- Write a program to compute circumference of a circle.

Exercise 2:-Write a program that takes any ASCII value from user and display next five char after that ASCII value.

Hints: - if user enters 95, your program should display the char against the ASSCII value 96,97,98,99 and 100.

## 3.6 Task

1. Write a program converts a temperature from Celsius to Fahrenheit. Use the following formula: F = 1.8 x C + 32 .
2. Write a program that reads three integers representing hours, minutes, and seconds of a time. Then it calculates the equivalent time in seconds.