Chapter 3
Functions

What is Modular Programming?

- The process of breaking large program into smaller sub-programs is called as **modular programming or modularization**.
- C++ use **functions** to implement modular programming

What are the merits and demerits of modular programming?

- **Merits of modular programming**:
- a). Reduces the size of the program
- b). Less chance of error occurrence
- c). Reduces programming complexity
- d). Improves reusability
- **Demerits of modular programming**:
- a). Proper breaking down of the problem is a challenging task.
- b). Each sub problem must be independent of others. Careful about order of execution

What is a Function?

- Function is a named unit of statements in a program to perform a specific task as part of the solution.
- There are two types of functions in C++:
- a). **Predefined functions or Built in Functions** : Functions that are already written , compiled and their definitions are grouped and stored in header files.
  Eg. sqrt(), toupper()
- b). **User Defined Functions**: Functions that are written by the user to carry on some task.
  Eg. main( )

Predefined functions or Built in Functions

- Predefined functions or Built in Functions are classified into:

1)**Console functions for character I/O**

2)**Stream functions for I/O operations**

3)**String functions**

4)**Mathematical functions**

5)**Character functions**

What is Console function?

- Console functions allows to input and output character data. **cstdio** header file required

1)**getchar()** : This function returns the character that is input through the keyboard. Eg: char ch = getchar();

2)**putchar()** : This function displays the character given as the argument on the standard output unit (monitor).

```
char ch = 'B';
putchar(ch);
putchar( 97 );
```

Output

```
B
a
```

What is Stream functions?

- Stream Functions is used to perform input/output operations on character and strings.
- It allow a stream of bytes (data) to flow between memory and objects like Keyboard or Monitor. **iostream** header file required.

i. **get()** : It can accept a single character or multiple characters (string) through the keyboard. Eg cin.get(str,10)

ii. **getline()** : It accepts a string through the keyboard. Eg cin.getline(str,len);

iii. **put()** : It is used to display a character constant or the content of a character variable given as argument. Eg. cout.put('B');

iv. **write()** : This function displays the string contained in the argument. Eg. cout.write(str,10);

What is String Function?

- String functions allow manipulation of strings.
- **cstring** header file required.

i. **strlen()** : used to find the length of a string(Number of characters). Its return value is an integer.

ii. **strcpy()** : used to copy one string into another. The function will copy string2 to string1.
Syntax : strcpy(string1, string2);

iii **strcat()** : used to append one string to another string.
Syntax: strcat(string1, string2);

iv **strcmp()** : used to compare two strings. In this comparison, the alphabetical order of characters in the strings is considered. Syntax: strcmp(string1, string2);

v. **strcmpi()**:used to compare two strings ignoring cases (both the upper case and lower case letters are treated as same). syntax is same as strcmp.

What is Mathematical Function?

- Mathematical functions are used to perform mathematical operations.
- These functions require the inclusion of header file cmath

1)**abs()** : It is used to find the absolute value of an integer. It takes an integer as the argument (+ve or –ve) and returns the absolute value.

2)**fabs()** : it is used to find the absolute value of a floating point number. It will return the floating point value.

3)**sqrt()** : It is used to find the square root of a number.The function returns the non-negative square root of the argument.

4)**pow()** : This function is used to find the power of a number. It takes two arguments, the number and power value

What is Character Function?

- These functions are used to perform various operations on characters.
- These functions require the inclusion of header file cctype

1)**isupper()** : This function is used to check whether a character is in upper case(capital letter) or not. The function returns 1 if the given character is in uppercase, and 0 otherwise.

2)**islower()** : This function is used to check whether a character is in lower case (small letter) or not. The function returns 1 if the given character is lower case, and 0 otherwise.

3)**isalpha()** : This function is used to check whether the given character is an alphabet or not. The function returns 1 if the given character is an alphabet, and 0 otherwise.

4)**isdigit()** : This function is used to check whether the given character is a digit or not. The function Output: 1 returns 1 if the given character is a digit, and 0 otherwise.

5)**isalnum()** : This function is used to check whether a character is alphanumeric or not. The function returns 1 if the given character is alphanumeric, and 0 otherwise.

6)**toupper()** : This function is used to convert the given character into its uppercase. The function returns the upper case of the given character. If the given character is in upper case, the output will be the same.

7)**tolower()** : This function is used to convert the given character into its lower case. The function returns the lower case of the given character. If the given character is in lowercase, the output will be the same.

What is user defined function?

- A user defined function is a group of code to perform a specific task.
- Syntax:

```
data_type function_name(argument_list)
{
    statements ;
}
```

FUNCTION HEADER

FUNCTION BODY

- The result of a function is called **return value**.
- A set of values passed to a function is called **arguments**.

Compare Call by Value and Call by Reference or
What are function calls?

Call by Value Method	Call by Reference Method
Ordinary variables are used as formal parameters.	Reference variables are used as formal parameters.
Actual parameters may be constants, variables or expressions.	Actual parameters will be variables only.
The changes made in the formal arguments do not reflect in actual arguments.	The changes made in the formal arguments do reflect in actual arguments.
Exclusive memory allocation is required for the formal arguments.	Memory of actual arguments is shared by formal arguments.

- **1) What are formal and actual parameters?**
- The arguments given at the calling of a function is called actual (original) arguments or **actual parameters** since they are the actual data passed to the function for processing.
- The arguments used in the function definition are known as **formal parameter**.
- **2) What is default arguments?**
- Default arguments are arguments to which initial values given at function definition. So a function can be invoked without specifying all its arguments.

- **3) What is mean by scope or life time of a function/ variable?**
- Scope of a variable or function is that part of the program in which it is used. The life of a variable, declared within a function, ends with the execution of the last instruction of the function because its memory location of all the variables declared within it will be freed.
- **4) What is a local variable?**
- A local variable is one that declared within a function or a block of statements. It is available only within that function or block.

- **5) What is global variable? How can we make a variable as global?**
- If a variable is declared before the main() function then it can be used at any place in the program. This scope is known as global scope.
- **6) How a local function differs from a global function?**
- A function which is declared inside the function body of another function is called a **local function**
- A function declared outside the function body of any other function is called a **global function** and its scope is the entire program

Previous Questions

- **Q1)** Name the mathematical function which returns the absolute value of an integer number
- abs()
- **Q2)** Explain any two built-in functions in C++ that are used for string manipulation
- **Q3)** Define built-in functions. Give two examples?
- **Q4)** The process of breaking large program into smaller sub-programs is called........
- Modularization
- **Q5)** Define modular programming.
- **Q6)** Explain the merits of modular programming

Previous Questions

- **Q7)** Identify the built in C++ functions for the following cases
- i) to convert -25 to 25
- abs()
- ii) compare ‘computer’ and “COMPUTER” ignoring cases
- strcmpi()
- iii) to check the given character is digit or not
- isdigit()
- iv) to convert the character ‘B’ to ‘b’
- tolower()
- v) to find square root of 64 or a number
- sqrt()

- **Q8)** Explain any three stream functions for I/O operation.
- **Q9)** .... Function is used to check whether a character is alphanumeric.

  (a) isdigit( ) [✓ (b) isalnum( )] (c) isupper( ) (d) islower( )
- **Q10)** .Explain any three string function with example
- **Q11)** Consider the following code :
  char s1[ ]=”program”
  char s2[ ]=”PROGRAM”
  int n;
  n=strcmpi(S1,S2)
  What is the value of n ?
  [✓ (a) n=0] (b) n=1 (c) n>1 (d) n< 0

- **Q12)** Compare call-by-value and call-by-reference methods for calling functions