Q: 4 What is a user-defined-function and list out need of functions.

Every C program must have a **main** function to indicate where the program has to begin its execution. While it is possible to code any program utilizing only main function, it leads to a number of problems. The program may become too large and complex and as a result the task of debugging, testing and maintaining becomes difficult. If a program is divided into functional parts, then each part may be independently coded and later combined into a single unit. These independently coded programs are called subprograms that are much easier to understand, debug, and test. In C, such subprograms are referred to as **Function.**

A function is a group of statements that together perform a task. Every C program has at least one function, which is **main()**, and all the most trivial programs can define additional functions.

You can divide up your code into separate functions. How you divide up your code among different functions is up to you, but logically the division is such that each function performs a specific task.

Need of user defined functions :

1. The subprogram are easier to write, understand and debug.
2. In C, a function can call itself again. It is called a **recursive function**. Many calculations can be done easily by using recursive functions such as calculation of factorial of a number, etc.
3. Reduction in size of program due to program code of a function can be used again and again, by calling it.
4. The complexity of the entire program can be divided into simple subtask and then function subprograms can be written for each subtask.
5. A library of a function can be designed and tested for use of every programmer.

Library functions

Library functions are built-in functions that are grouped together and placed in a common location called library.

Each function here performs a specific operation. We can use this library functions to get the pre-defined output.

All C standard library functions are declared by using many header files. These library functions are created at the time of designing the compilers.

We include the header files in our C program by using **#include<filename.h>**. Whenever the program is run and executed, the related files are included in the C program.

Header File Functions

Some of the header file functions are as follows −

- **stdio.h** − It is a standard i/o header file in which Input/output functions are declared
- **conio.h** − This is a console input/output header file.
- **string.h** − All string related functions are in this header file.
- **stdlib.h** − This file contains common functions which are used in the C programs.
- **math.h** − All functions related to mathematics are in this header file.
- **time.h** − This file contains time and clock related functions.Built functions in stdio.h

Advantages of Using C library functions

1. They work

One of the most important reasons you should use library functions is simply because they work. These functions have gone through multiple rigorous testing and are easy to use.

2. The functions are optimized for performance

Since, the functions are "standard library" functions, a dedicated group of developers constantly make them better. In the process, they are able to create the most efficient code optimized for maximum performance.

3. It saves considerable development time

Since the general functions like printing to a screen, calculating the square root, and many more are already written. You shouldn't worry about creating them once again.

4. The functions are portable

With ever-changing real-world needs, your application is expected to work every time, everywhere. And, these library functions help you in that they do the same thing on every computer.

Q 1 : To calculate a square root of a given number using user-defined function.

```c
#include <math.h>
#include <stdio.h>

main()
 {
   int num;
   float root;
   float sqroot(int); && Function Declaration

   printf("Enter a number: ");
   scanf("%d", &num);

   // function call
   Root = sqroot(num); && Function Called
   printf("Square root of %d =  %f", num, root);
   return 0;
}
```

```
/* ---- Function Program ------*/

Float sqroot(int x)

{

  Float z;

  Z=sqrt(x);

 Return z;

}
```

Q 2 : Develop a program to calculate power of a given number using user-defined function..

```
#include <stdio.h>

main()
 {
   int x,y;
   float result;
   float power(int,int);    && Function Declaration

   printf("Enter value for X and Y: ");
   scanf("%d %d", &x,&y);

   result = power(x,y);     && Function Called

   printf("\n %d to power %d = %f \n", x,y,result);
  }
```

/* ---- Function Program ------*/

```
float power(int a, int b )
{
   float p;
   p = 1.0;

   if (b>=0)
   {
       While(b--)
          p = p*a ;
    }
    else
    {
       While(b++)
          p = p/a ;
    }
    return(p);
 }
```