Introduction to C Programming

Basic Programming using Input And Output Operators And Expressions

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Developing a program

- To write a program for any task, we need to identify the steps and their execution sequence
- Every program consists of mainly three parts:
  1. Input
  2. Processing
  3. Output

- Steps to solve a problem are
  1. Identify the input
  2. Identify its output
  3. Conversion of input to output defines the steps for the processing

- These three steps have been written in English language and are called as Algorithm
- When the algorithm is written in a specific high level language, then it becomes a program

1. Data type

Data types in General	Example	Data type	How to specify in program?	Format specifier
Numeric	10	integer	int	%d or %i
Fractional value	10.2	float	float	%f
Character	e	Character	char	%c

2. Arithmetic operators

Operator	Description	Example
+	Adds two operands.	A + B
−	Subtracts second operand from the first.	A − B
*	Multiplies both operands.	A * B
/	Divides numerator by de-numerator.	B / A
%	Modulus Operator and remainder of after an integer division.	B % A

3. Variable

- A variable is a name assigned to a memory space that may be used to store a data value

- Example:

    total, avg, sum, x, count, y, …

4. Variable Declaration

- Syntax:

  datatype v1, v2, v3, ... vn ;

- Examples:

  int age;

  int a,b,c;

  float avg;

  float avg, price;

  char gender;

5. Assignment of a value to a variable

- To assign a value use assignment operator (=)

Examples:

- int age=10;

or

- int age;

- age=10;

- **//assigning more than one variable in the same declaration statement**

    int age=10,x=5,y=2;

- float price=101.8;

 or

- float price;

- price=101.8;

- char gender='M';

or

- char gender;

- gender='M';

6. Read a value from the keyboard

- scanf():
  - To read input from the standard input device
- **Syntax:**

  scanf("%X", &variableOfXType);

  where %X is the format specifier in C. It is a way to tell the compiler what type of data is in a variable and & is the address operator in C, which tells the compiler to change the real value of variableOfXType, stored at this address in the memory

- Examples:

  scanf("%d", &age);
  scanf("%f", &price);
  scanf("%c", &gender);
  scanf("%d %f %c", &age, &price, &gender);

7. Display the value

- printf():
  - To display output to the standard output device
- **Syntax:**

  printf("%X", variableOfXType);

  where %X is the format specifier in C. It is a way to tell the compiler what type of data is in a variable and variableOfXType is the variable to be printed
- Examples:

  printf("%d", age);
  printf("%f", price);
  printf("%c", gender);
  printf("%d %f %c", age, price, gender);

8. Take input and output

- Input: scanf("%d", &intVariable);
- Output: printf("%d", intVariable);

9. Multiply two numbers

- Input : a and b
- Processing : c= a*b
- Output   : c
- Program statements of the above 3 are:
    int a=10, b=5;
    int c=a*b;
    printf("%d", c);

10.

- Line is a pre-processor directive

- Processed by the C/C++ preprocessor before the actual compilation of the code begins

- # tells the preprocessor to:

  - ✓ **Locate the specified file:** Searches for the header file named "filename"

  - ✓ **Insert its content:** It then effectively copies and pastes the entire content of that header file into the current source file at the point where the #include directive is located

10. #include

- To integrate any external files (header files) into a program

- #include is used for file inclusion and read by the pre-processor

- Instructs it to insert the contents of a user-defined or system header file into our C program

- Including using <>: To access pre-existing system header files

    #include <header_file>

- Including using " ": To access any header files of the user's program or user-defined files

    #include "user-defined_file"

10. #include

#include <filename> // Standard library header

#include "filename" // User defined header

11.Program structure and example

#include<stdio.h>
void main()
{

      Declaration(local variable) part
      Executable part

}

#include<stdio.h>
void main()
{
      int a=10, b=5;
      c=a*b;
      printf("%d", c);

}

stdio.h — Standard input and output
➢ *A header file that contains the information needed to include input/output routines in the program*
➢ *For instance, printf, scanf, and so on*
➢ *stdio.h header file should be included in our source code if we intend to utilise the printf or scanf*

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scanf()

Program

```
#include<stdio.h>
void main()
    {
        int a;
        printf("Enter value for a");
        scanf("%d", &a);
        printf("value of a is %d", a);
}
```

Input/Output:

Enter value for a 10

value of a is 10

scanf("%3d",&a);
here the maximum field width for the integer variable a is specified as 3

int main

- main() defines the entry or the starting point of the C/C++ program code

- "int" in the int main() suggests that the "main()" function would return the integer type as an output to the operating system when the program is terminated

- Indicates the success or failure of program execution

- When the integer value is returned, it means that the program has been completed

- If the return value is 0, it indicates that the program has terminated successfully, while any value other than 0 indicates an error

int main

```
#include <stdio.h>

int main()
{
    while (printf("Hello World"))
        return 0;
}
```

Hello World

void main

- void main() function returns no return value when the program is successfully terminated

- There is an empty data type

- Used when one doesn't want to return any value to the main function

- Or doesn't want to indicate the success or failure of program execution

- Used in embedded systems

```c
#include<stdio.h>
void main()
{
printf("Hello World! \n");
}
```

void main

```
#include <stdio.h>
void main()
{
    while (printf("Hello")) {
    }
}
```

infinite time Hello

getch()

- Sometimes the compiler exit to the program tab as soon as we give some input value, for the result

- Such type of issues will disable us to wait until the output is shown

- Need to define a "holding" function to hold the compiler until we have satisfied our need

- get character

getch()

- getch() satisfies this holding property

- Defined in the header file conio.h

- To receive a character as input from the user

- getch() function reads character from keyboard

- When we give inputs like "Enter" then it will make compiler to make an exit

clrscr()

- Clear screen

- To clear the terminal/console screen

Conio.h

#include<conio.h>

- console input ouput
- It takes input from keyboard and displays it on screen
- A header file used in c and cpp and it includes inbuilt functions like getch() and clrscr()

Procedure to execute a C program in TurboC++

Step 1:
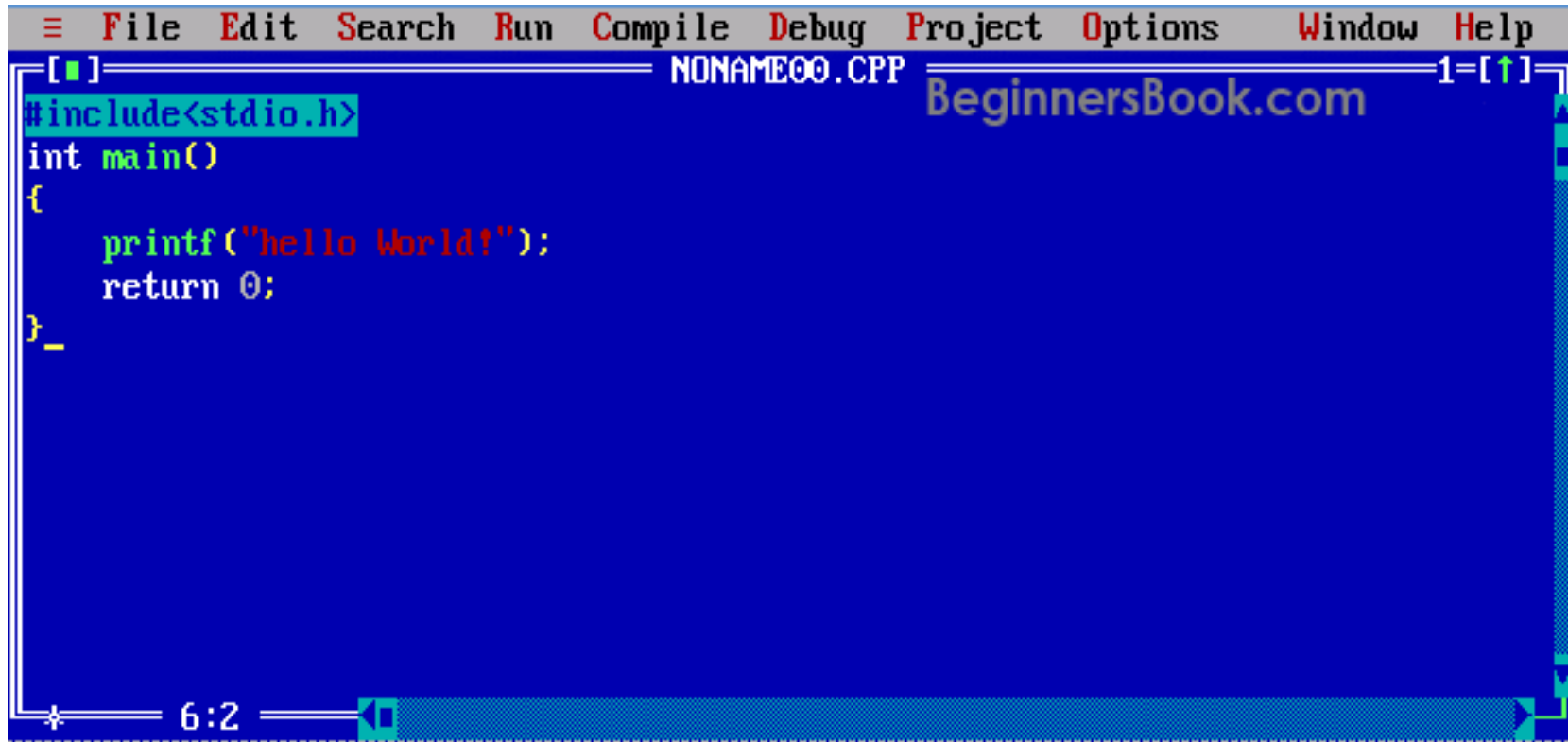
Double-click the shortcut icon **TURBOC++** on the desktop

Otherwise, Locate the TC.exe file and open it

Location **C:\TC\BIN\,** where the software is saved

How to create a file?

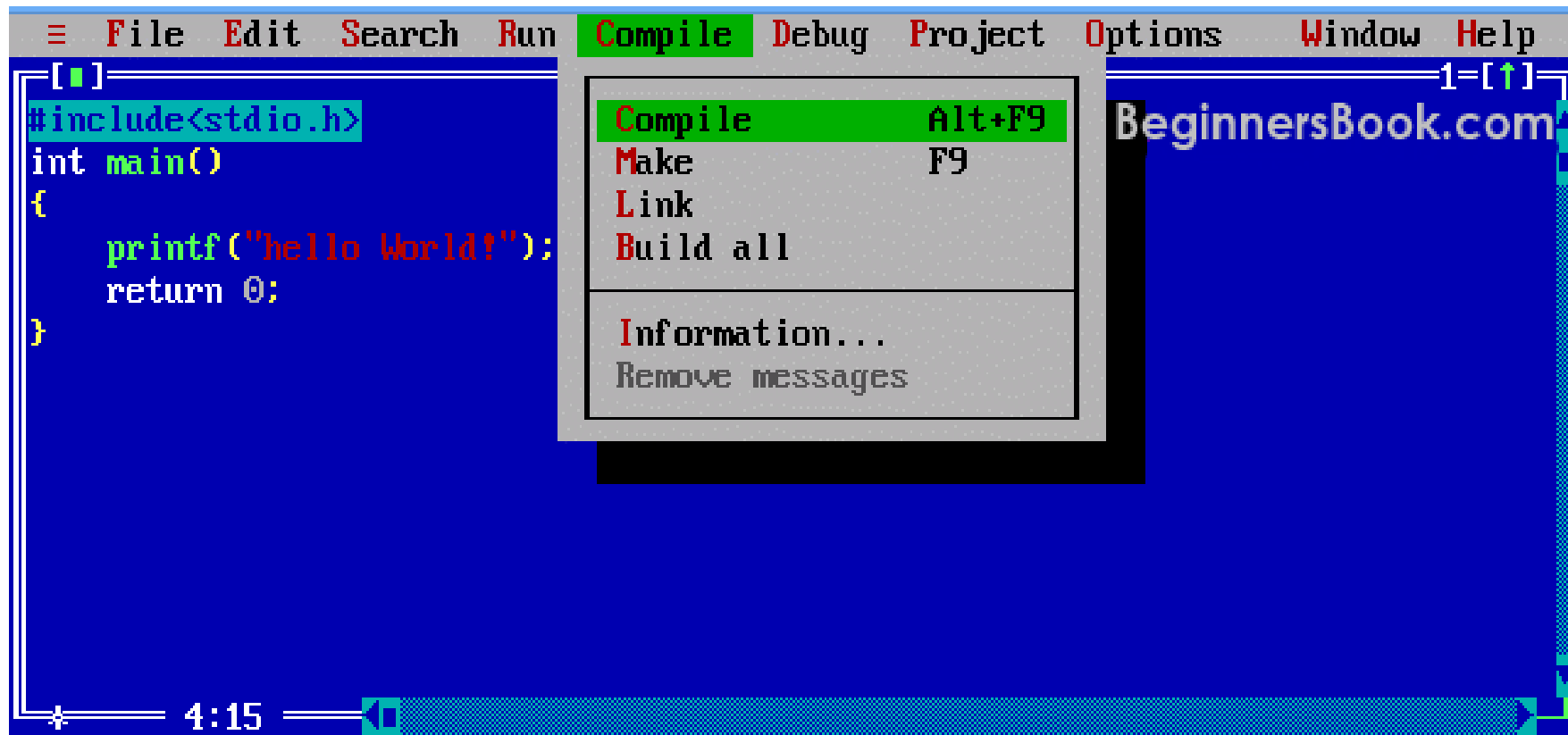- **Step 2:** File > New, and then write C program:

How to save?

Step 3: Save the program using F2 (OR file > Save), remember the extension should be ".c".
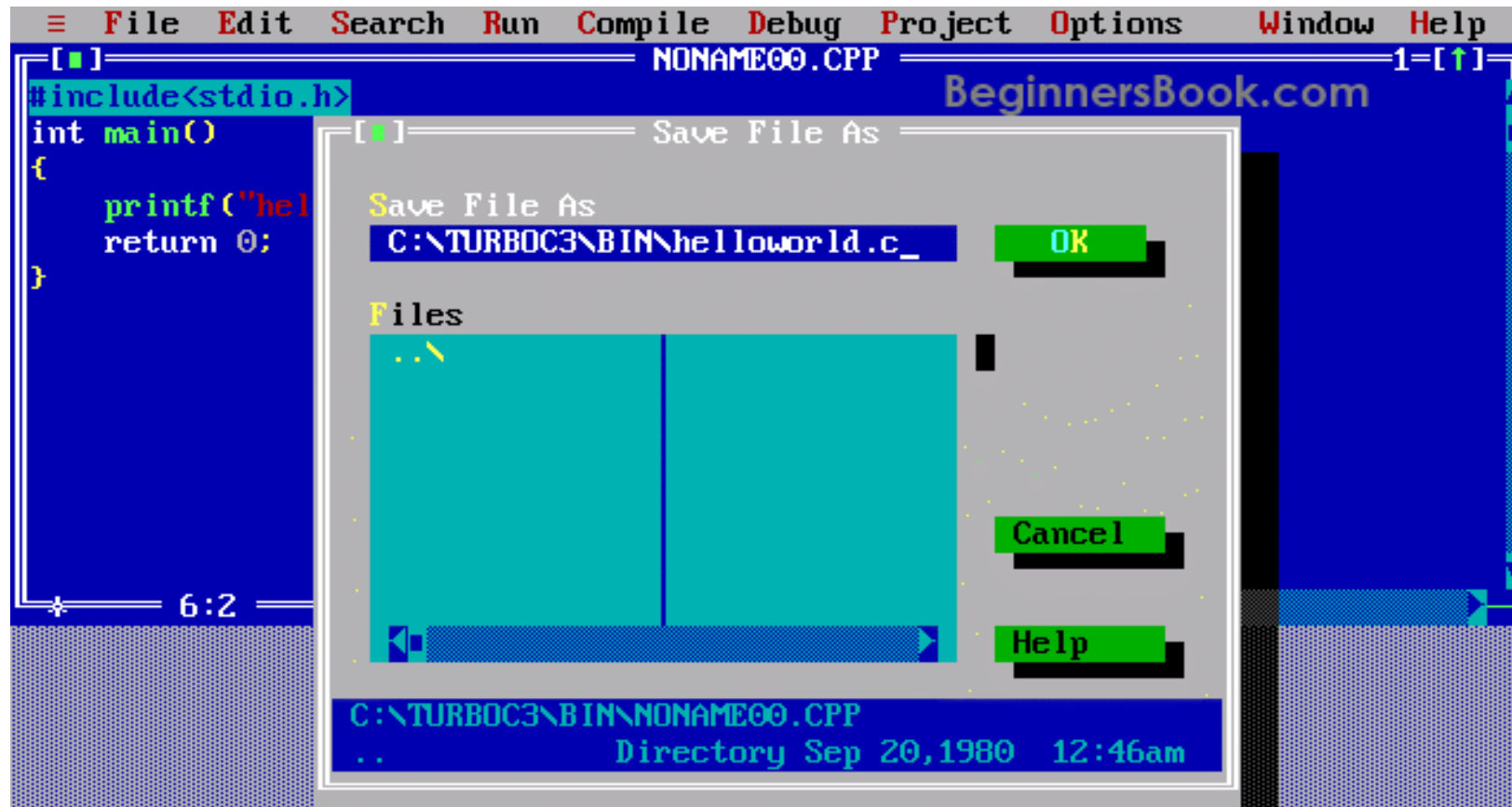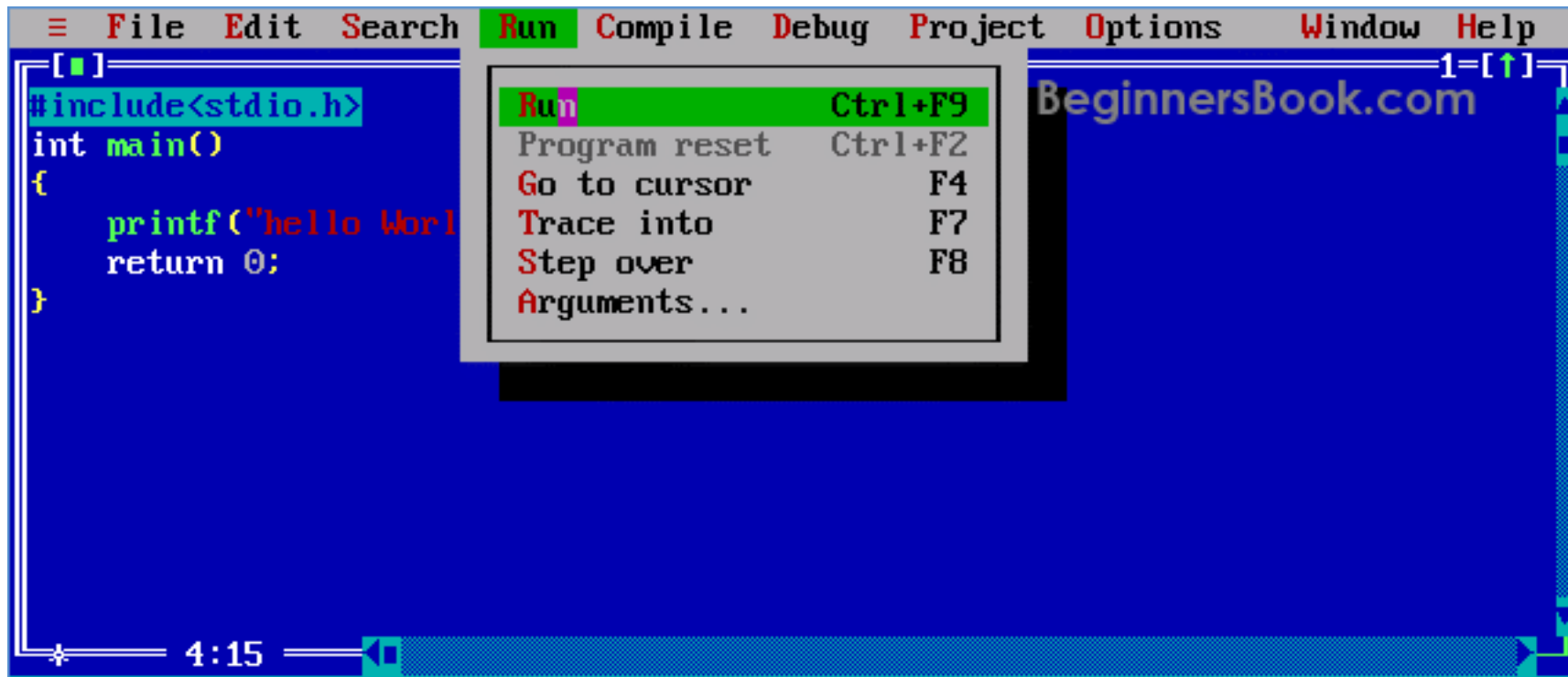
How to compile?

Step 4: Compile the program using Alt + F9 **OR** Compile > Compile

How to run?

Step 5: Press Ctrl + F9 to Run (or select Run > Run in menu bar) the C program

How to view the output?

- **Step 6**: Alt+F5 to view the output of the program at the output screen.

Question 1

Write a C Program to Print Your Own Name

Solution 1

Write a C Program to Print Your Own Name

```c
#include <stdio.h>
void main() {
    printf("Shweta Sharma");
}
```

Question 2

Temperature of a city in Fahrenheit degrees is input through the keyboard. Write a program to convert this temperature into Celsius.

Solution 2

```c
#include<stdio.h>
#include<conio.h>
int main()
{
float fr, cel;
clrscr();
printf("\nEnter the temperature(F): ");
scanf("%f",&fr);
cel=5.0/9.0*(fr-32);
printf("\nTemperature in celsius=%.3f",cel);
printf("\n\n\nPress any key to exit...");
getch();
return 0;
}
```

Question 3

Write a program to calculate the area & perimeter of the rectangle and the area & circumference of the circle. The length & breadth of a rectangle and radius of a circle are input through the keyboard.

Solution 3

```c
#include<stdio.h>
#include<conio.h>
int main()
{
int l,b,r,area1,perimeter;
float area2,circum;
clrscr();
printf("\nEnter Length & Breadth of a Rectangle: ");
scanf("%d %d", &l, &b);
area1=l*b;
perimeter=2*l+2*b;
printf("\nArea of the Rectangle is=%d",area1);
printf("\nPerimeter of the Rectangle is=%d",perimeter);
printf("\n\nEnter Radius of a circle: ");
scanf("%d",&r);
area2=3.14*r*r;
circum=2*3.14*r;
printf("\nArea of the Circle is=%.2f",area2);
printf("\nCircumference of a Circle is=%.2f",circum);
printf("\n\n\nPress any key to exit...");
getch();
return 0;
}
```

Question 4

Write a C program to find the simple interest

```c
#include <stdio.h>
void main() {
    float P = 100, R = 10, T = 1;
    float SI = (P * T * R) / 100;
    printf("Simple Interest = %f\n", SI);
}
```

Question 5

Write a C Program to Swap Two Numbers

```c
#include <stdio.h>
int main() {
    int a = 10, b = 20, temp;
    temp = a;
    a = b;
    b = temp;
    printf("a = %d, b = %d\n", a, b);
    return 0;
}
```

List of other programs

- Calculate average mark of a student whose phy_mark=70,Che_mark=90 and Bio_mark=95
- C Program to Find the Size of int, float, double and char

Thank You!