

## **LOOPS / ITERATIONS / REPETITIVE STATEMENTS**

**Loops are used to repeat a block/group of statements continuously until the given condition becomes false.**

**Loops reduce program size and improves performance.**

**In loops beginning and ending points are same.**

**C-Language supports basically 2 types of loops.**

- 1. Entry/pre controlled loops.**
- 2. Exit/post controlled loops.**

**In entry control loops, condition is tested first and it is true then only statements block is executed.**

**Under entry control loops we are having**

- i. While loop**
- ii. For loop**

**In exit control loop, the statements are executed first and later condition is tested.**

**Under exit control loop we are having**

- i. do while.**

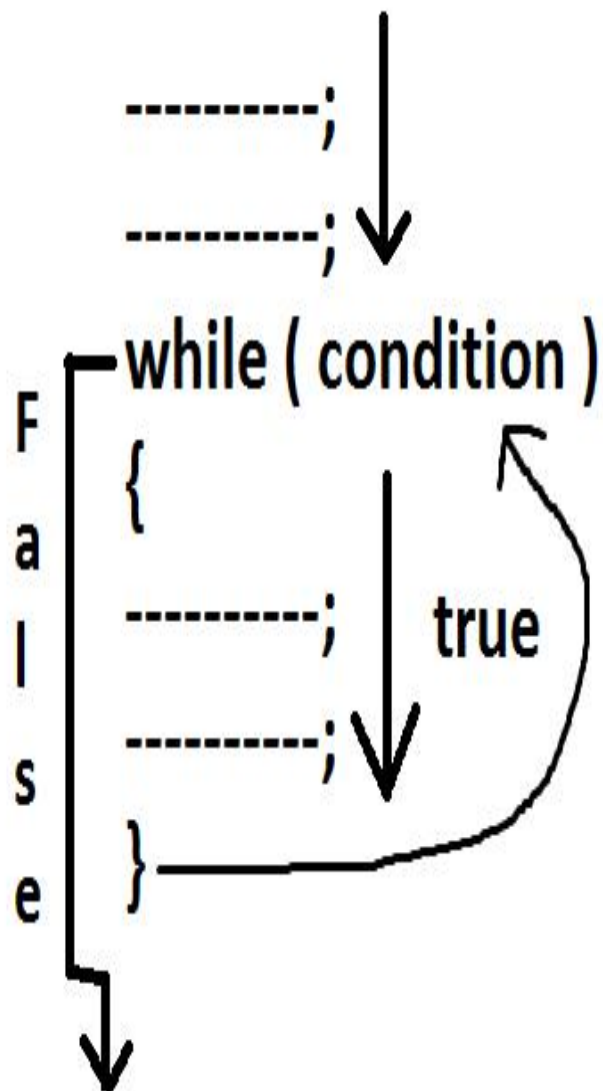
### **While loop:**

- **while is a keyword.**
- **In while loop condition is tested first and it is true then only while block statements are executed. After executing while block statements, the program execution automatically shifted/jumped to while condition at the beginning. If it is true then once again the while block statements are repeated. Like this the**

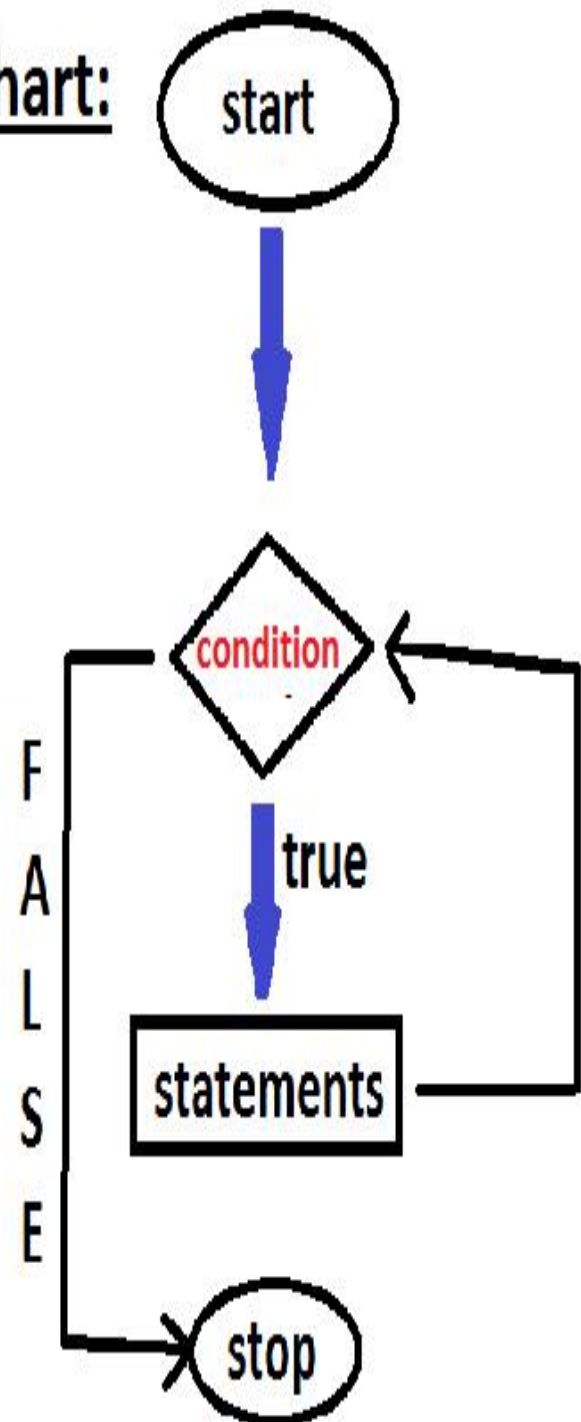
**process is continued until while condition becomes false.**

➤ **While is entry control loop.**

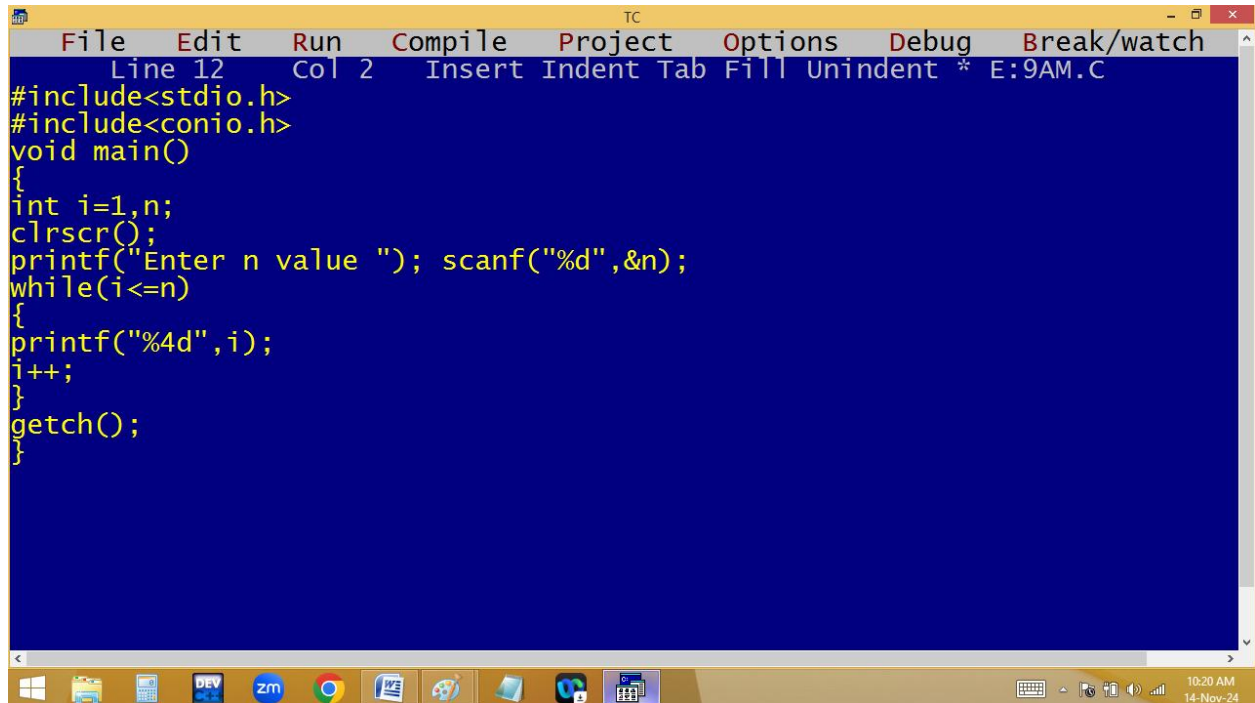
Syntax:



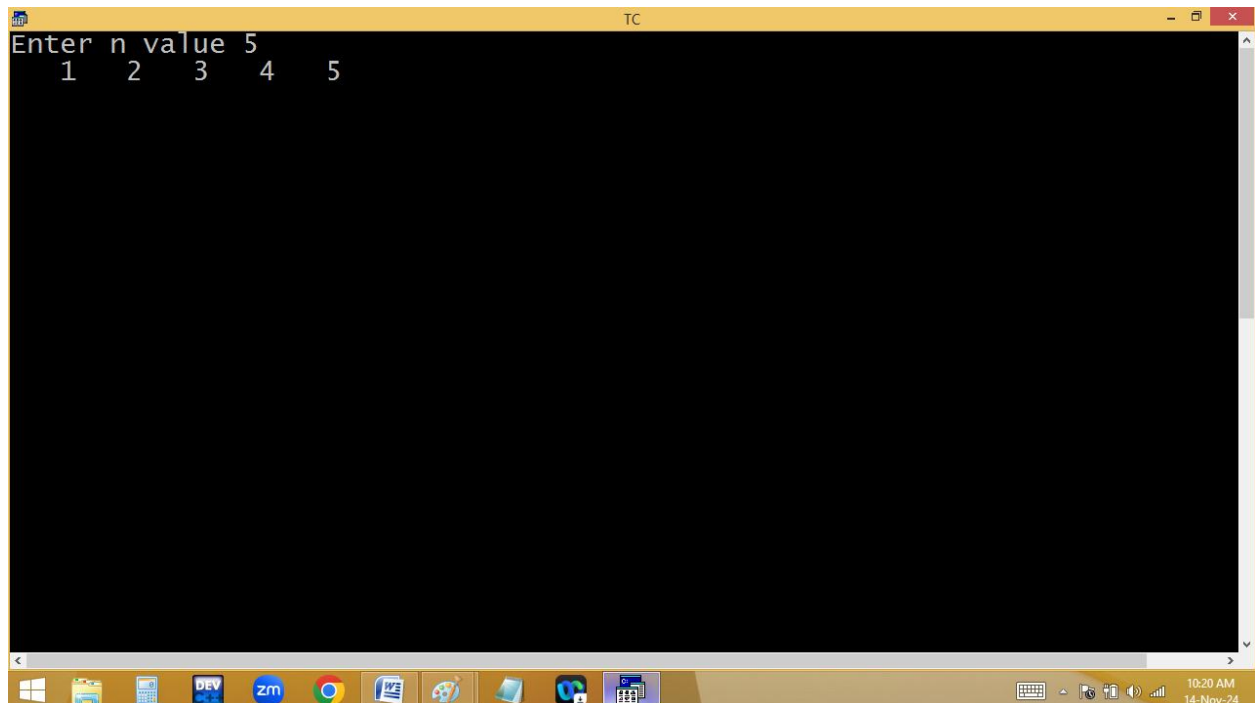
Flow chart:



## Printing 1..n natural numbers:



```
TC
File Edit Run Compile Project Options Debug Break/watch
Line 12 Col 2 Insert Indent Tab Fill Unindent * E:9AM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int i=1,n;
clrscr();
printf("Enter n value "); scanf("%d",&n);
while(i<=n)
{
printf("%4d",i);
i++;
}
getch();
}
```

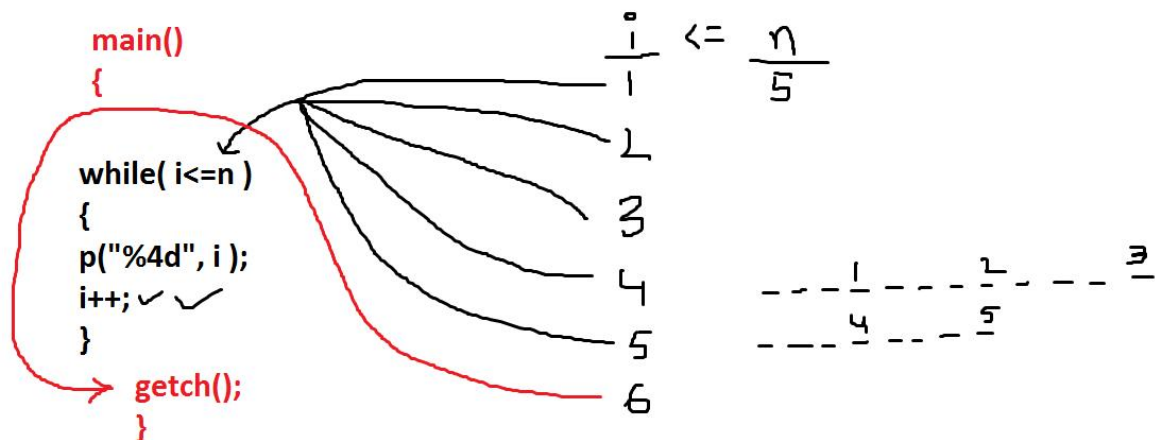


```
TC
Enter n value 5
1 2 3 4 5
```

```
Enter n value 100
 1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18
21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58
61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78
81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98
```

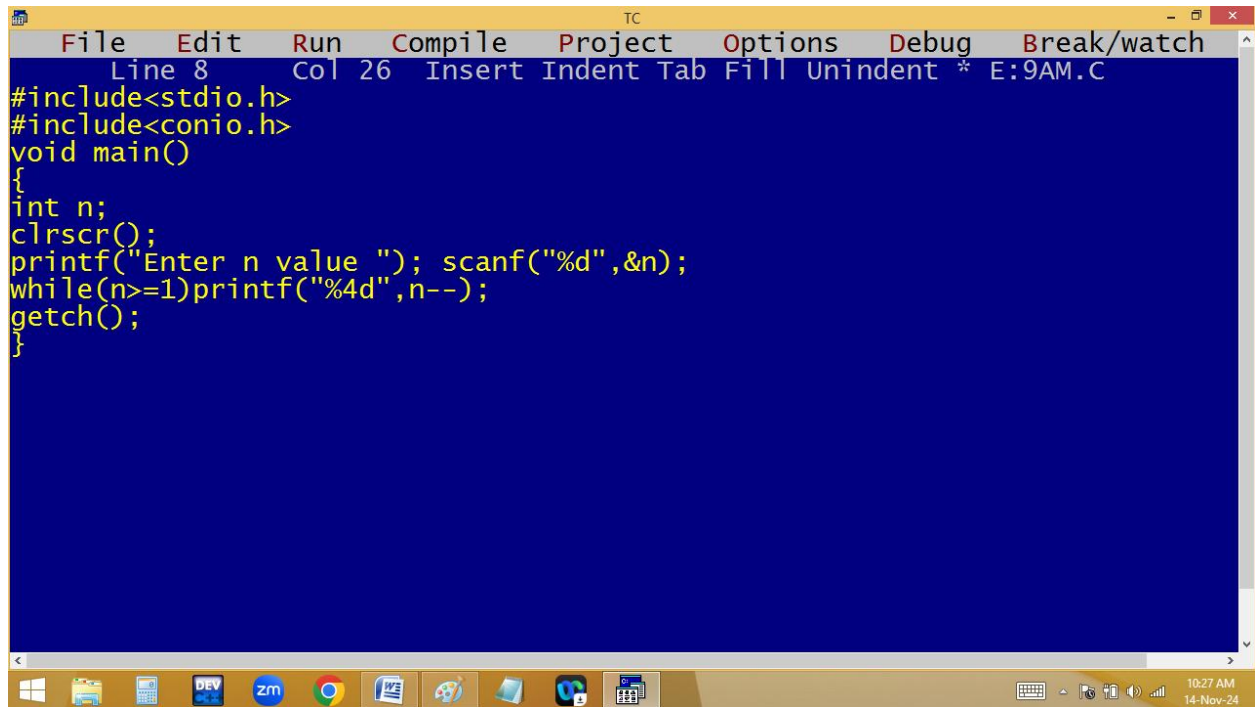
```
File Edit Run Compile Project Options Debug Break/watch
Line 8 Col 22 Insert Indent Tab Fill Unindent * E:9AM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int i=1,n;
clrscr();
printf("Enter n value "); scanf("%d",&n);
while(i<=n)printf("%4d",i++);
getch();
}
```

```
Enter n value 10
1 2 3 4 5 6 7 8 9 10
```



**1..n in reverse order:**

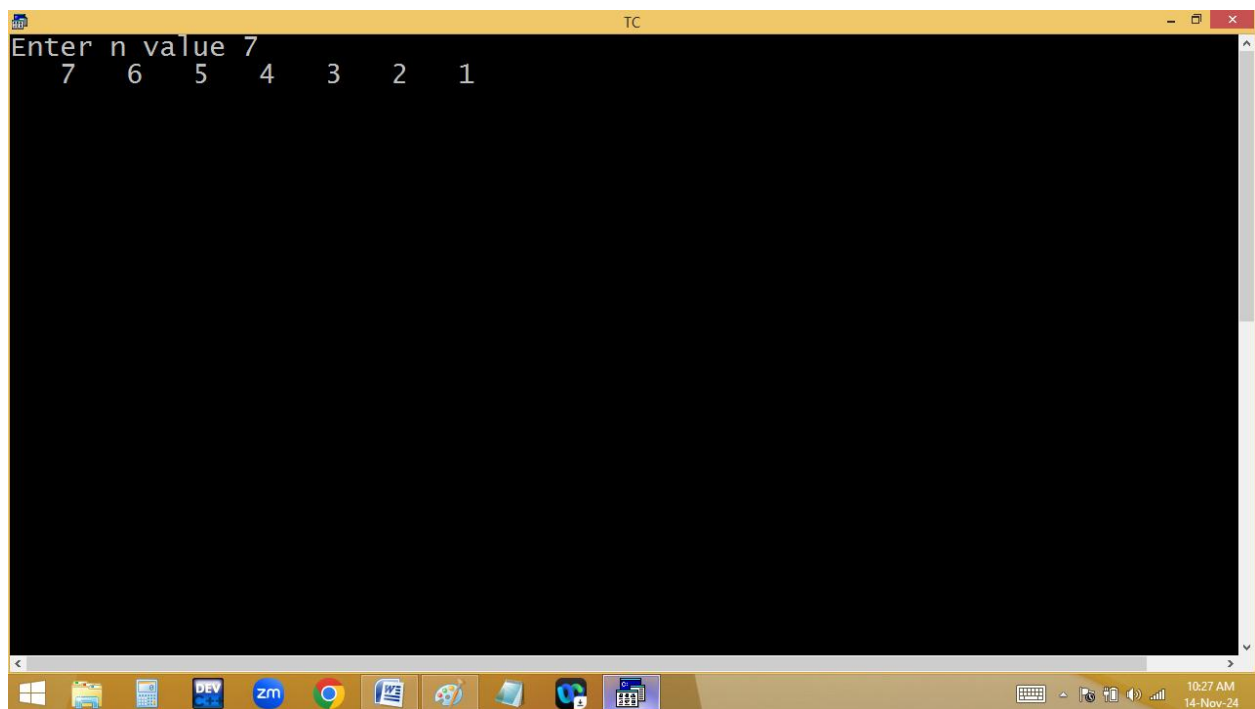
**N=5 → 5 4 3 2 1**



The screenshot shows the Turbo C++ (TC) IDE with a blue background. The menu bar includes File, Edit, Run, Compile, Project, Options, Debug, and Break/watch. The status bar at the top indicates 'Line 8 Col 26' and 'Insert Indent Tab Fill Unindent \* E:9AM.C'. The code in the editor is as follows:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int n;
    clrscr();
    printf("Enter n value "); scanf("%d",&n);
    while(n>=1)printf("%4d",n--);
    getch();
}
```

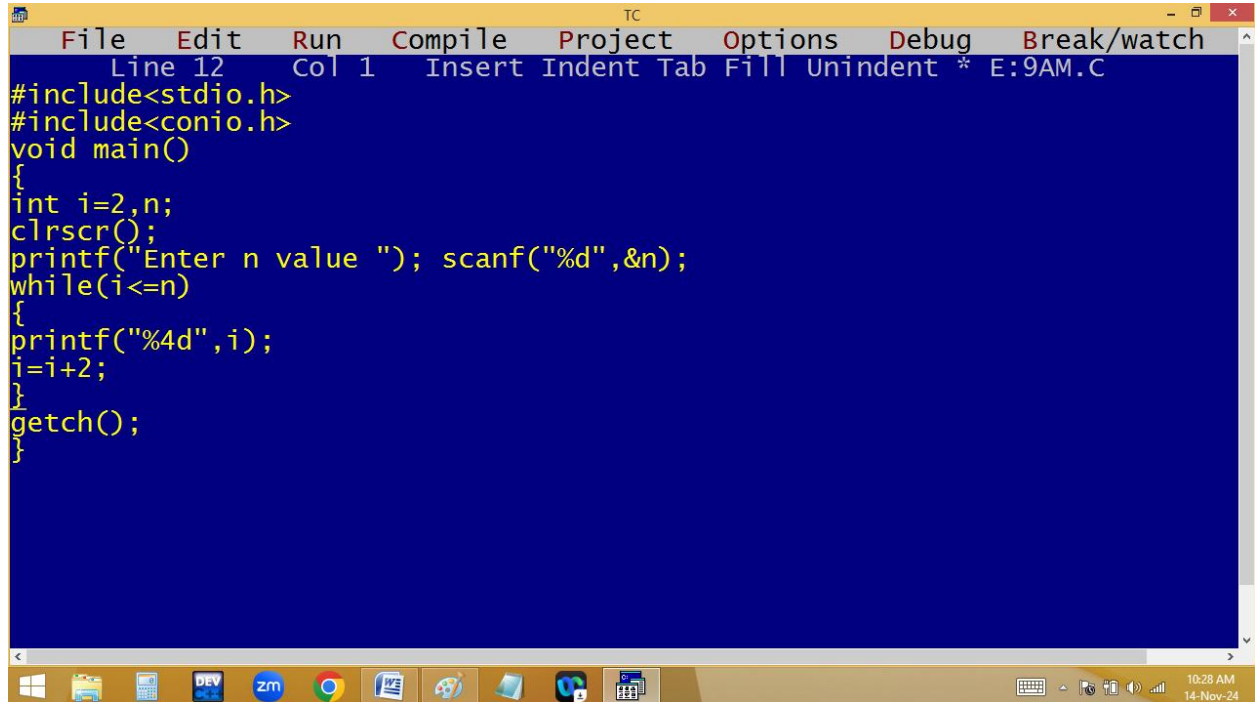
The Windows taskbar at the bottom shows various application icons, including DEV, zm, and Chrome, along with the system clock displaying 10:27 AM on 14-Nov-24.



The screenshot shows the Turbo C++ (TC) IDE with a black background, displaying the output of the program. The text 'Enter n value 7' is on the first line, and the descending sequence of numbers '7 6 5 4 3 2 1' is on the second line. The Windows taskbar at the bottom is identical to the first screenshot, showing the same application icons and system clock.

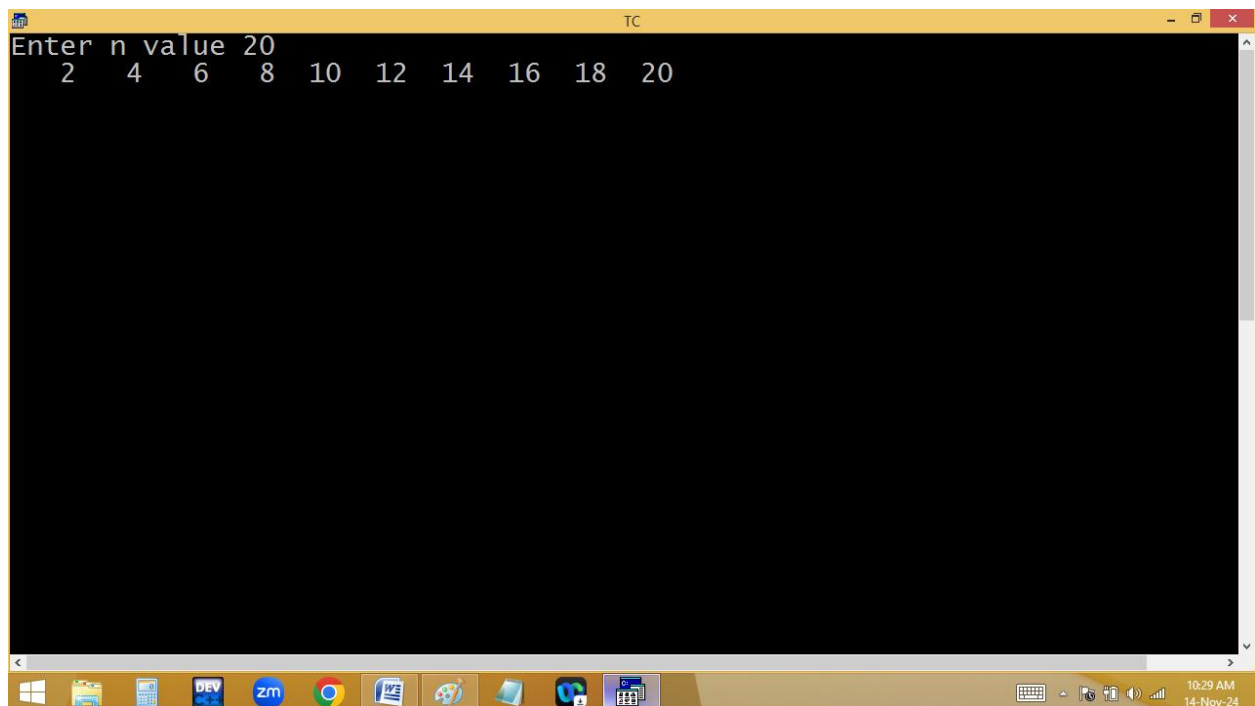


## Print 1 .. n even no's:



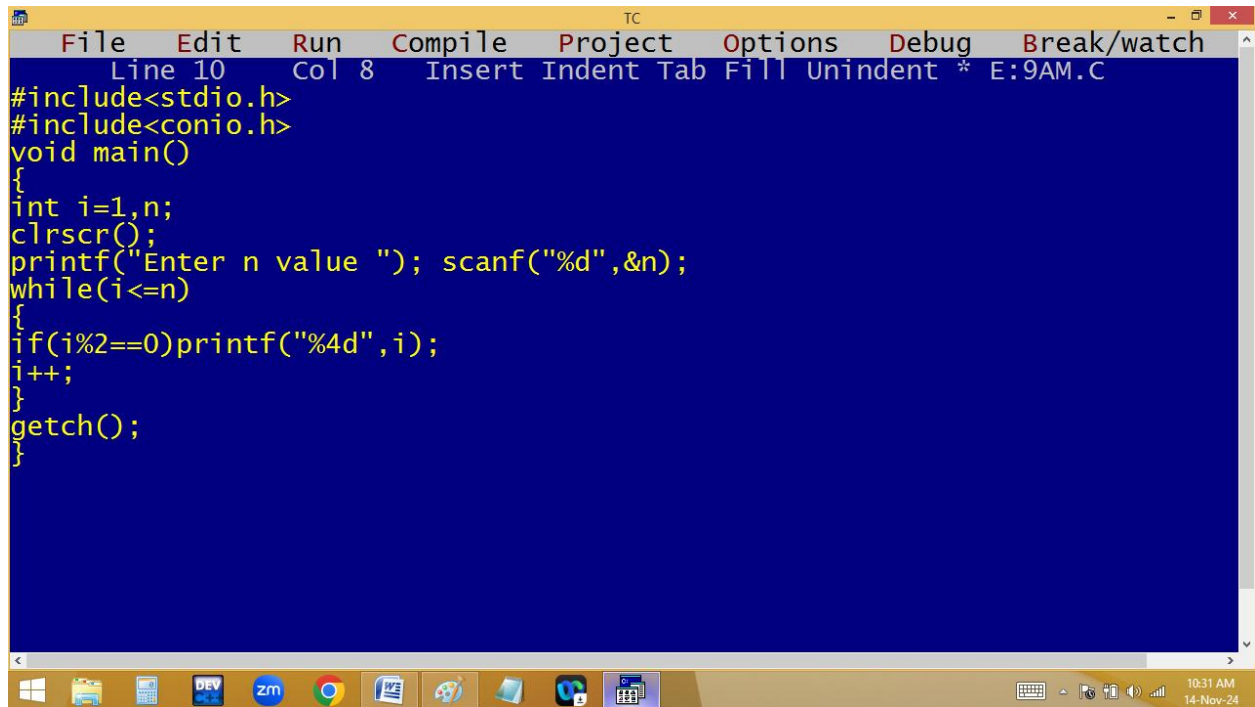
```
TC
File Edit Run Compile Project Options Debug Break/watch
Line 12 Col 1 Insert Indent Tab Fill Unindent * E:9AM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int i=2,n;
clrscr();
printf("Enter n value "); scanf("%d",&n);
while(i<=n)
{
printf("%4d",i);
i=i+2;
}
getch();
}
```

The screenshot shows the Turbo C++ IDE with a blue background. The code is written in yellow text. The menu bar includes File, Edit, Run, Compile, Project, Options, Debug, and Break/watch. The status bar at the bottom shows the time as 10:28 AM on 14-Nov-24.



```
TC
Enter n value 20
2 4 6 8 10 12 14 16 18 20
```

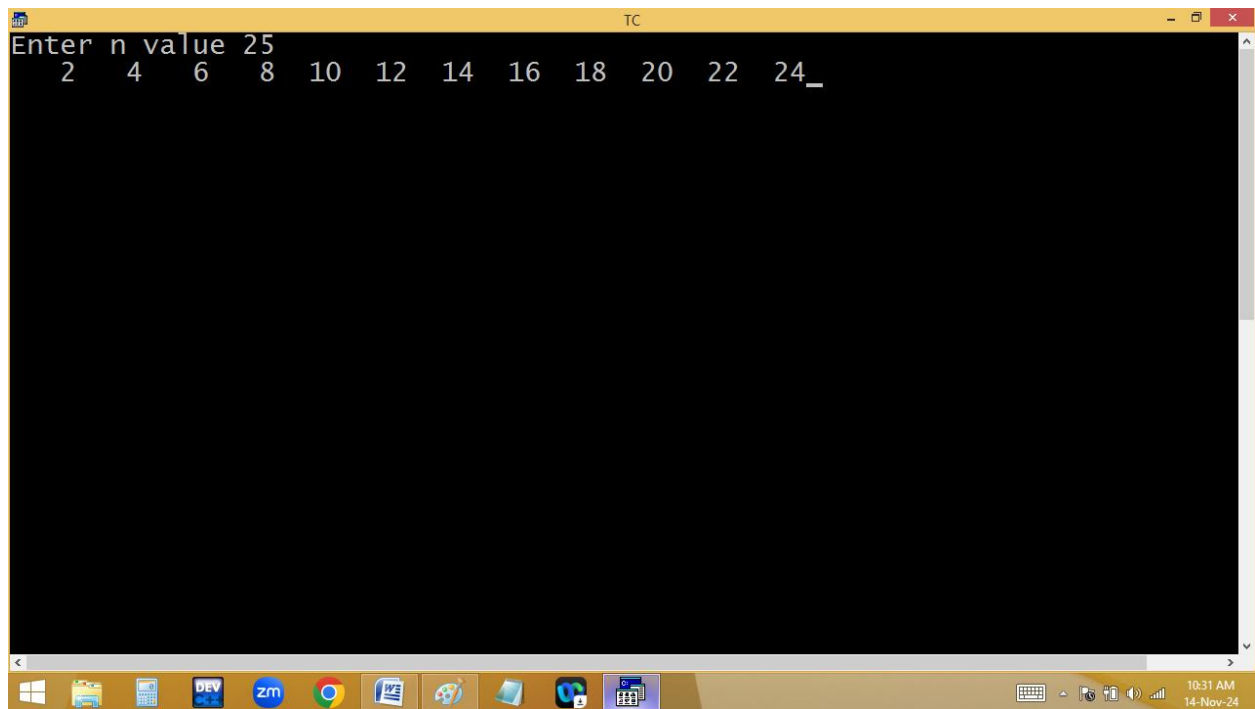
The screenshot shows the Turbo C++ IDE with a black background. The output of the program is displayed in white text. The user has entered '20' for 'n', and the program has printed the even numbers from 2 to 20: '2 4 6 8 10 12 14 16 18 20'. The status bar at the bottom shows the time as 10:29 AM on 14-Nov-24.



The screenshot shows the Turbo C++ (TC) IDE with a menu bar (File, Edit, Run, Compile, Project, Options, Debug, Break/watch) and a status bar (Line 10, Col 8, Insert Indent Tab Fill Unindent \* E:9AM.C). The code in the editor is as follows:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int i=1,n;
    clrscr();
    printf("Enter n value "); scanf("%d",&n);
    while(i<=n)
    {
        if(i%2==0)printf("%4d",i);
        i++;
    }
    getch();
}
```

The Windows taskbar at the bottom shows various application icons and the system clock indicating 10:31 AM on 14-Nov-24.

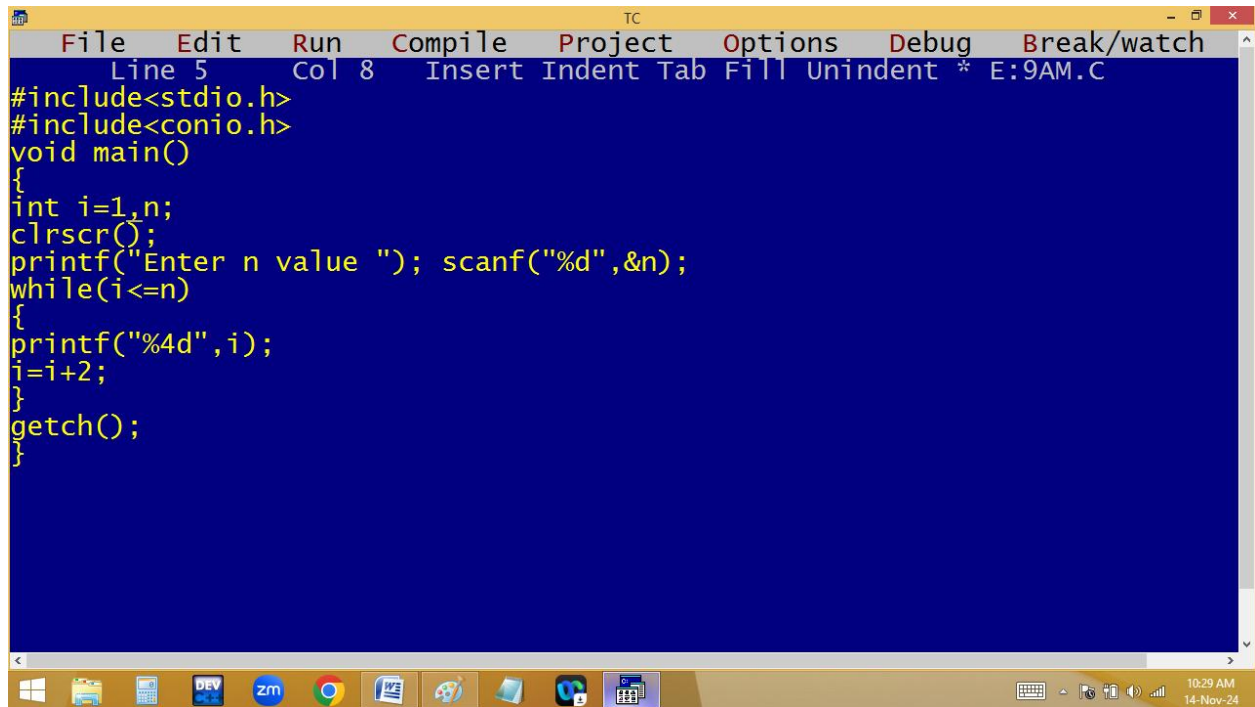


The screenshot shows the Turbo C++ (TC) IDE with the same menu bar and status bar. The output window displays the result of the program execution:

```
Enter n value 25
2    4    6    8    10   12   14   16   18   20   22   24_
```

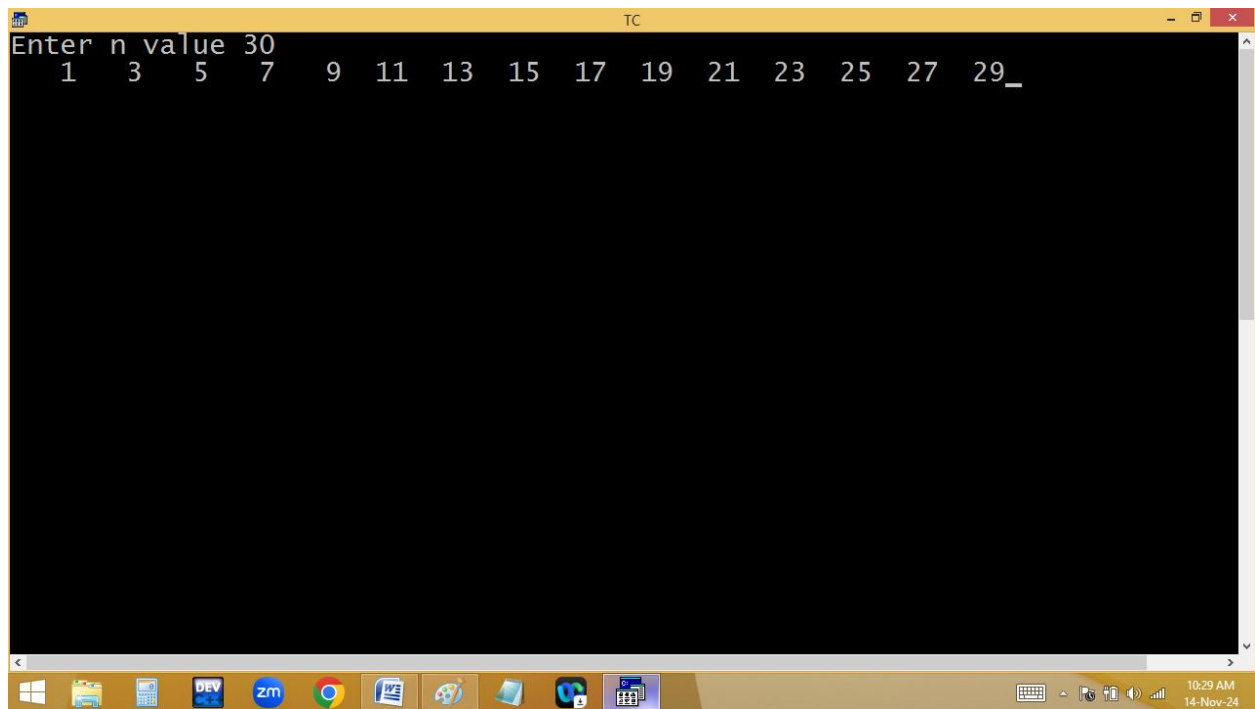
The Windows taskbar at the bottom is identical to the first screenshot, showing the system clock at 10:31 AM on 14-Nov-24.

**Printing 1..n odd numbers:**



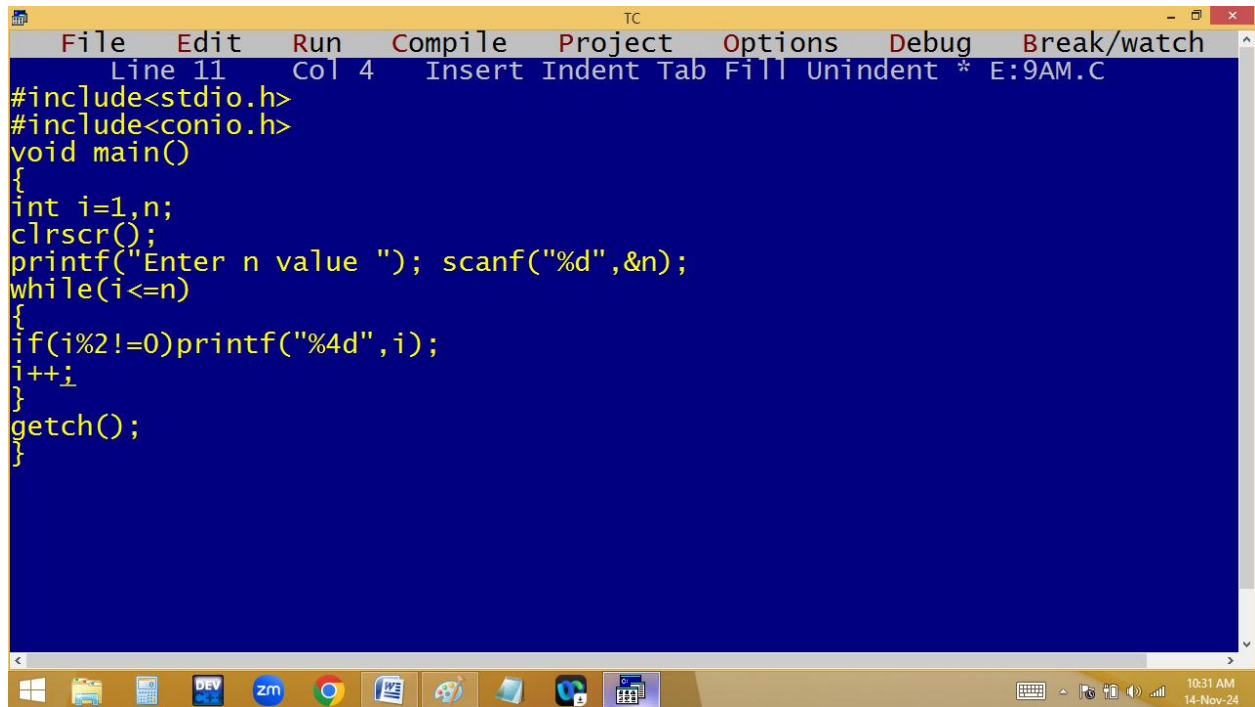
The screenshot shows the Turbo C++ (TC) IDE with a blue background. The menu bar includes File, Edit, Run, Compile, Project, Options, Debug, and Break/watch. The status bar at the bottom indicates 'Line 5', 'Col 8', and 'E:9AM.C'. The code being edited is as follows:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int i=1,n;
    clrscr();
    printf("Enter n value "); scanf("%d",&n);
    while(i<=n)
    {
        printf("%4d",i);
        i=i+2;
    }
    getch();
}
```

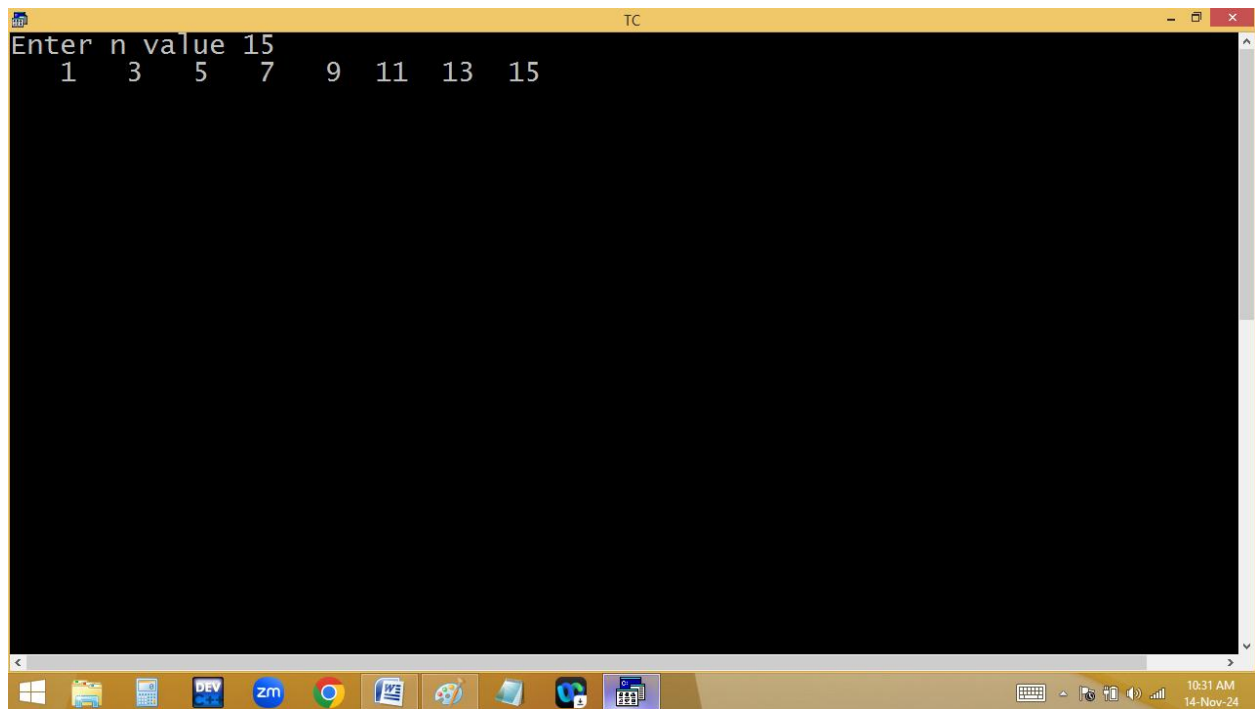


The screenshot shows the Turbo C++ (TC) IDE with a black background, displaying the output of the program. The prompt 'Enter n value 30' is visible at the top left. Below it, the odd numbers from 1 to 29 are printed in a row, separated by spaces, with a trailing underscore character. The status bar at the bottom indicates '10:29 AM' and '14-Nov-24'.

```
Enter n value 30
1  3  5  7  9 11 13 15 17 19 21 23 25 27 29_
```



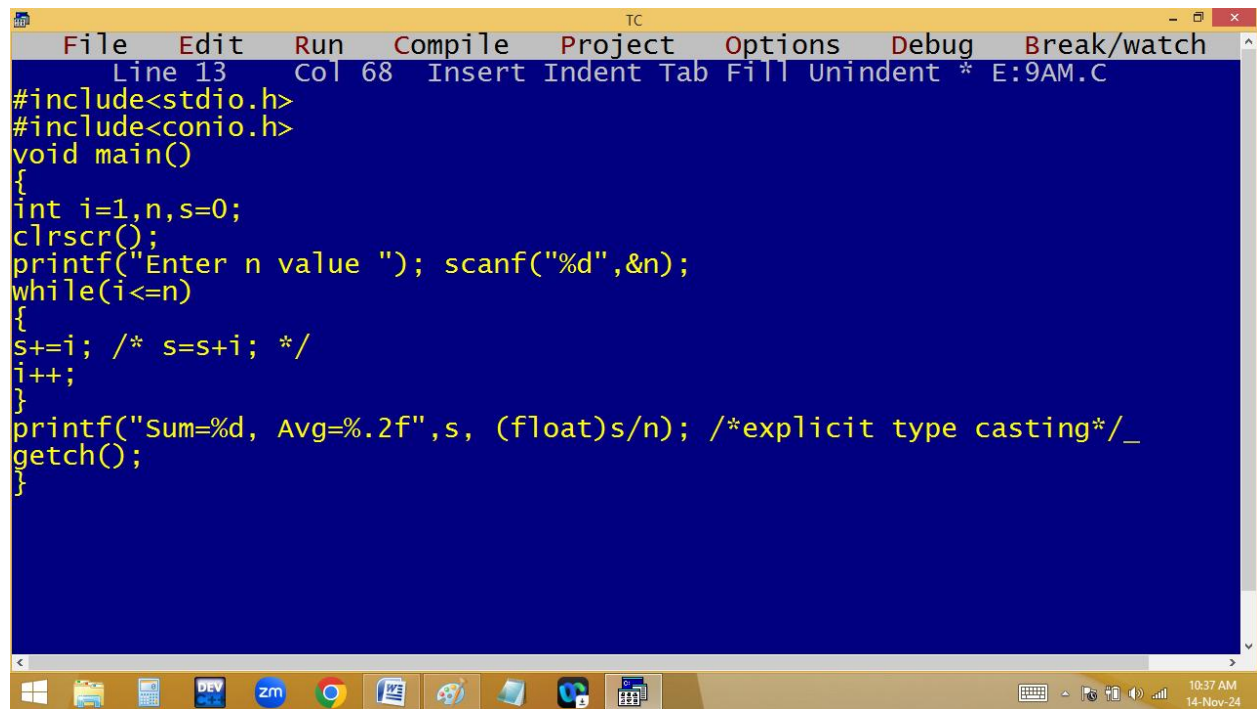
```
File Edit Run Compile Project Options Debug Break/watch
Line 11 Col 4 Insert Indent Tab Fill Unindent * E:9AM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int i=1,n;
clrscr();
printf("Enter n value "); scanf("%d",&n);
while(i<=n)
{
if(i%2!=0)printf("%4d",i);
i++;
}
getch();
}
```



```
Enter n value 15
1 3 5 7 9 11 13 15
```

**Finding 1..n numbers sum and avg [mean]:**

**$n=4 \rightarrow 1 + 2 + 3 + 4 = 10 \leftarrow \text{sum} \rightarrow 10/4=2.5 \leftarrow \text{avg}$**

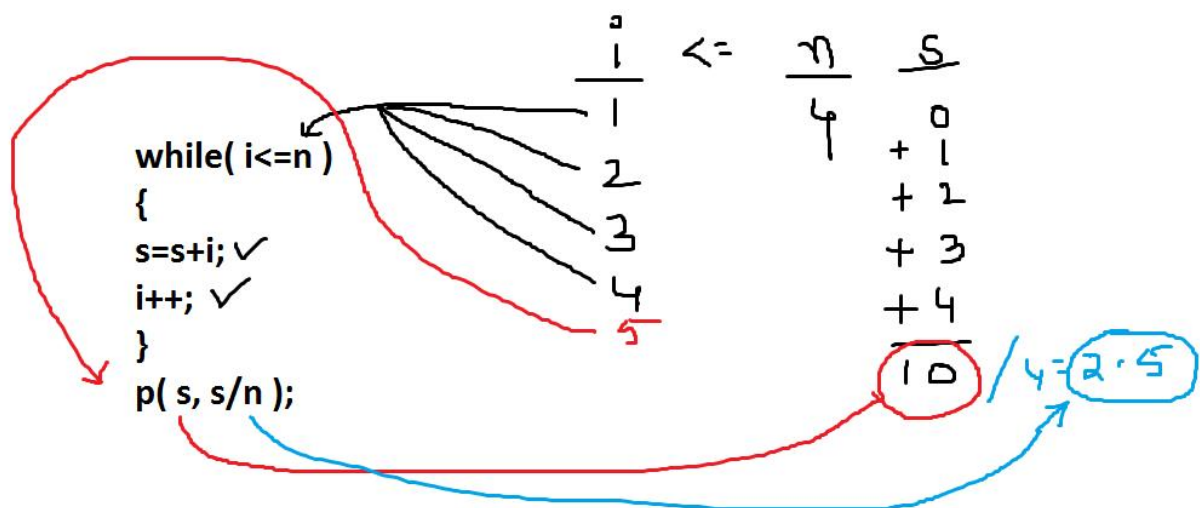


The image shows a screenshot of a Turbo C++ (TC) IDE window. The window has a yellow title bar with the text "TC" and standard window controls. The menu bar includes "File", "Edit", "Run", "Compile", "Project", "Options", "Debug", and "Break/watch". The status bar at the top indicates "Line 13", "Col 68", and "Insert Indent Tab Fill Unindent \* E:9AM.C". The main editing area has a blue background and contains the following C code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
int i=1,n,s=0;
clrscr();
printf("Enter n value "); scanf("%d",&n);
while(i<=n)
{
s+=i; /* s=s+i; */
i++;
}
printf("Sum=%d, Avg=%.2f",s, (float)s/n); /*explicit type casting*/_
getch();
}
```

The Windows taskbar is visible at the bottom, showing icons for various applications including a file explorer, a calculator, a terminal (DEV), a messaging app (zm), a web browser (Chrome), a text editor (WE), a paint application, a folder, a game (Minecraft), and a system tray with icons for keyboard, mouse, volume, and network. The system clock in the bottom right corner shows "10:37 AM" and "14-Nov-24".

```
Enter n value 4
Sum=10, Avg=2.50_
```



Without using loop:

$$4 \times 5 = 20 / 2 = 10$$
$$s = n * (n+1) / 2;$$

Find 1..n even , odd numbers sum:

$$n = 5 \begin{cases} 1 + 3 + 5 = 9 \\ 2 + 4 = 6 \end{cases}$$

```
TC
File Edit Run Compile Project Options Debug Break/watch
Line 15 Col 1 Insert Indent Tab Fill Unindent * E:9AM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int n,es=0,os=0;
clrscr();
printf("Enter n value "); scanf("%d",&n);
while( n>=1 )
{
if(n%2==0)es+=n;
else os+=n;
n--;
}
printf("Even Sum=%d, Odd Sum=%d",es,os);
getch();
}
```

```
TC
Enter n value 5
Even Sum=6, Odd Sum=9_
```

