

KJ's Educational Institutes
K J College Of Engineering & Management Research, Pune.
 Department of E & TC

CLASS: S. E. (E & TC)

SUBJECT:-DSA

Ex. No: 6

Date:

AIM

Write a program in C to display the following patterns like

Right Angle
Triangle with
Numbers

```
1
12
123
1234
```

Diamond shape
with numbers

```
  1
 2 2
3 3 3
4 4 4 4
 3 3 3
  2 2
   1
```

Pyramid with an
asterisk

```
  *
 * *
* * *
* * * *

```

Pyramid using the
alphabet

```
  A
 A B A
A B C B A
A B C D C B A
```

OBJECTIVES

- i) To write a C program that prints a right angle triangle with numbers
- ii) To write a C program that prints a diamond shape with numbers
- iii) To write a C program that prints a Pyramid with an asterisk
- iv) To write a C program that prints a Pyramid using the alphabet

THEORY

Right Angle Triangle with Number

In C programming, loops are used to create patterns. By using nested loops, we can print a specific pattern of numbers. A right-angled triangle pattern increases the number of elements in each row by one until the desired number of rows is reached.

Algorithm:

- Start the program.
- Use a loop for rows (e.g. from 1 to 4).
- Inside the row loop, use another loop to print numbers from 1 to the current row number.

- Print the numbers continuously without spaces for each row.
- Move to the next line after each row.
- End the program.

Input:

- No. of rows

Output:

- The program successfully prints a right-angled triangle with numbers incrementing in each row.

Diamond shape with Number

A diamond pattern consists of two parts: an upper part and a lower part. The upper part prints numbers increasing in count from 1 up to the user-defined number of rows. The lower part prints the numbers in reverse order to complete the diamond shape. Spaces are printed before the numbers to center-align the diamond.

The key concepts involved are:

- Nested loops for controlling rows and columns
- Printing spaces for alignment
- Repeating numbers per row

Algorithm:

1. Take input for the number of rows from the user.
2. For the upper half of the diamond (rows 1 to rows):
 - Print spaces to align the pattern centrally.
 - Print the current row number repeatedly.
3. For the lower half of the diamond (rows rows-1 down to 1):
 - Repeat the space and number printing logic to mirror the upper half.
4. End the program.

Input:

- No. of rows for the diamond (odd number recommended)

Output:

- The program successfully prints a diamond-shaped pattern with numbers based on the user's input, correctly handling spacing and repetition of numbers.

Pyramid with an Asterik

The program should take the number of rows as input and print a pyramid pattern using asterisks. Each row should have an increasing number of asterisks aligned symmetrically in the shape of a pyramid. Example (for rows = 5):

Algorithm:

1. Start the program.
2. Declare variables: rows, i, j, and spaces.
3. Input the number of rows from the user.
4. Loop through each row (i = 1 to rows).
 - Print spaces (rows - i).
 - Print stars (2 * i - 1).
 - Move to the next line.
5. End the program.

Input:

- No. of rows for the pyramid.

Output:

- The program successfully prints a pyramid of asterisks based on user input using nested loops.

Pyramid using the alphabet

The program should take the number of rows as input and print a pyramid pattern using alphabets. Each row should begin with 'A' and increase up to a peak character, then decrease symmetrically.

Algorithm

1. Start the program.
2. Declare rows (number of pyramid levels).
3. Input the number of rows from the user.
4. Loop ($i = 1$ to rows) to print each row:
 - Print leading spaces (rows - i).
 - Print alphabets in increasing order (A to A + ($i - 1$)).
 - Print alphabets in decreasing order (back down to A).
5. Move to the next line after each row.
6. End the program.

Input:

- No. of rows for the pyramid.

Output

- The program successfully prints a pyramid of alphabets, symmetrically aligned, based on user input.

CONCLUSION:-