

①

① Number Pyramid Pattern

① $n=4$

② No of rows = 4

③ No of cols = (vary)

④ Analysis

$n=4$

```

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

Spaces Digits $[j \in [1, \text{row}]]$

$$n=4 \quad \text{row}=1 \quad \text{Ist Row} \quad - \quad 3\text{spaces} + 1$$

$$n=4 \quad \text{row}=2 \quad \text{IInd Row} \quad - \quad 2\text{spaces} + 1 \ 2$$

$$n=4 \quad \text{row}=3 \quad \text{IIIrd Row} \quad - \quad 1\text{space} + 1 \ 2 \ 3$$

$$n=4 \quad \text{row}=4 \quad \text{IVth Row} \quad - \quad 0\text{spaces} + 1 \ 2 \ 3 \ 4$$

$$|| \quad (n - \text{row})$$

②

→ ② Symmetric Number Pyramid

① $n=4$

$\frac{1}{p} n=4$

② No of rows = 4

③ No of cols = (vary)

④ Analysis

$n=4$ row=1 Ist - 1

$n=4$ row=2 IInd - 12

$n=4$ row=3 IIInd - 1234

$n=4$ row=4 IVth - 1234

1 - - - - - 1

1 2 - - - - 2 1

1 2 3 - - 3 2 1

1 2 3 4 4 3 2 1

(Digits) + Spaces + (Digits) → $j \in [1 \rightarrow \text{Row}]$

6sp 1 Row → 1

4 2 1

2 3 2 1

0 4 3 2 1

↓

↓

$2(n-\text{row})$

(Row → 1)

// digits

for (int col=1; col<=row; col++)

{
cout<<"col";

}

// Spaces

for (int col=1; col<= $2 \times (n-\text{row})$; col++)

{

cout<<" ";

}

// numbers (digits)

* for (int col=1; col<= $2 \times (n-\text{row})$; col++)

{
cout<<"row";

③

③ Inverted Alphabet Triangle Pattern.

① $N = 5$

$\text{I/p} \rightarrow N = 5$

② No of rows = 5

A B C D E

③ No of columns = (vary)

A B C D

④ Analysis

A B C

A B

A

$N = 5$ Row = 1 - 1st Row - A B C D E

$N = 5$ Row = 2 - 2nd Row - A B C D

$N = 5$ Row = 3 - 3rd Row - A B C

$N = 5$ Row = 4 - 4th Row - A B

$N = 5$ Row = 5 - 5th Row - A

M-I

Reverse the Row loop in which

Row = 5 - 5 letter should print

Row = 4 - 4 letter should print

Row = 3 - 3 letter should print

Row = 2 - 2 letter should print

Row = 1 - 1 letter should print

(4)

```
for (row=n; row>=1; row--)
```

```
{
```

```
    //method 1
```

```
    // char ch = 'A';
```

```
    // for (int col=1; col<=row; col++)
```

```
    // {
```

```
        cout<< ch;
```

```
    // }
```

```
    // method-2
```

```
    // char ch<='A'+row.
```

```
    for (char ch='A'; ch<='A'+row-1; ch++)
```

```
    {
```

```
        cout<< ch;
```

```
    }
```

```
    cout<<endl;
```

```
}
```

Dry Run of M-2 (69)

$i=5 \rightarrow ch = 'A' \rightarrow ch <= 'A' + 5 - 1 \rightarrow ch++$
65 (4)

A B C D E (69)

(68)

$i=4 \rightarrow ch = 'A' \rightarrow ch <= 'A' + 4 - 1 \rightarrow ch++$
A B C D

⑤

ABCD

$$i=3 \rightarrow ch='A' \rightarrow ch <= ('A' + \overset{2}{3-1}) \rightarrow ch++$$

ABC

$$i=2 \rightarrow ch='A' \rightarrow ch <= ('A' + \overset{66}{2-1}) \rightarrow ch++$$

AB

$$i=1 \rightarrow ch='A' \rightarrow ch <= ('A' + \overset{0}{1-1}) \rightarrow ch++$$

A

④

Alphabet Triangle Pattern

1/p n=4

A
A B
A B C

A B C D

① n=4

② No of rows = 4

③ No of cols = (vary)

④ Analysis

⑥

$n=5$ row=1 1st - A char ch='A'
 $n=5$ row=2 2nd - A B Col Loop $\rightarrow 1 \rightarrow \text{row}$
 $n=5$ row=3 3rd - A B C cout $\leq ch$
 $n=5$ row=4 4th - A B C D ch++;
 $n=5$ row=5 5th - A B C D E

⑤

→ Symmetric Alphabet Pattern

① $n=5$

② No of rows = 5

③ No of columns = (vary)

④ Analysis

1/p $n=5$

→ part I

				A					
				A	B	A			
			A	B	C	B	A		
		A	B	C	D	C	B	A	
A	B	C	D	E	D	C	B	A	

spaces = $(n - \text{row})$
 + letters

 $n=5$ Row=1 1st

4spaces

A

 $n=5$ Row=2 2nd

3spaces

AB

 $n=5$ Row=3 3rd

2spaces

ABC

 $n=5$ Row=4 4th

1spaces

ABCD

 $n=5$ Row=5 5th

0spaces

ABCDE

7

The value of ch after printing 1st part

r=1 - Ist — letter - 'ch'
 A — B

r=2 - IInd — B — C

r=3 - IIIrd — C — D

r=4 - IVth — D — E

r=5 - Vth — E — F

ie Part 2

- for printing remaining characters^x print the characters by

Subtracting '2'

ch=ch-2;

while(ch>='A')

{

cout<<ch;

ch--;

}

cout<<endl;

8

6

Reverse Alphabet Pyramid.

Imp

$n=5$

Loop \rightarrow

E
D E
C D E
B C D E
A B C D E

--- E
--- DE
--- CDE
--- BCDE
A B C D E

① $n=5$

② No of rows = 5

③ No of cols = (vary)

④ Analysis

			Characters	No of letters
$n=5$	$r=1$	I st Row	E	1
$n=5$	$r=2$	II nd Row	D E	2
$n=5$	$r=3$	III rd Row	C D E	3
$n=5$	$r=4$	IV th Row	B C D E	4
$n=5$	$r=5$	V th Row	A B C D E	5

$$A' + n - r$$

9

① Butterfly Pattern

I/p

n=5

→ O/p

Part I

```

x      - - - - - x
* *    - - - - - * *
* * *  - - - - - * * *
* * * * - - - - - * * * *
* * * * * - - - - - * * * * *
  
```

Part I

Part II

① n=5

② No of rows = 5

③ No of cols = (vary)

④ Analysis

```

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

n=5 row=1 - Ist Row - 1* + 8sp + 1*

n=5 row=2 - IInd Row - 2* + 6sp + 2*

n=5 row=3 - IIIrd Row - 3* + 4sp + 3*

n=5 row=4 - IVth Row - 4* + 2sp + 4*

n=5 row=5 - Vth Row - 5* + 0sp + 5*

(row) ↓ (row)
 2(n-row)


```

// part 2
for (int row = 1; row <= n; row++)
{
    // stars
    for (int col = 1; col <= row; col++)
    {
        cout << "x";
    }

    // spaces
    for (int col = 1; col <= 2(n - row); col++)
    {
        cout << " ";
    }

    // stars
    for (int col = 1; col <= row; col++)
    {
        cout << "x";
    }
}

```

Part 2

use for loop (int row = n; row >= 1; row--)

and logic inside for loop of part I is same as for part II

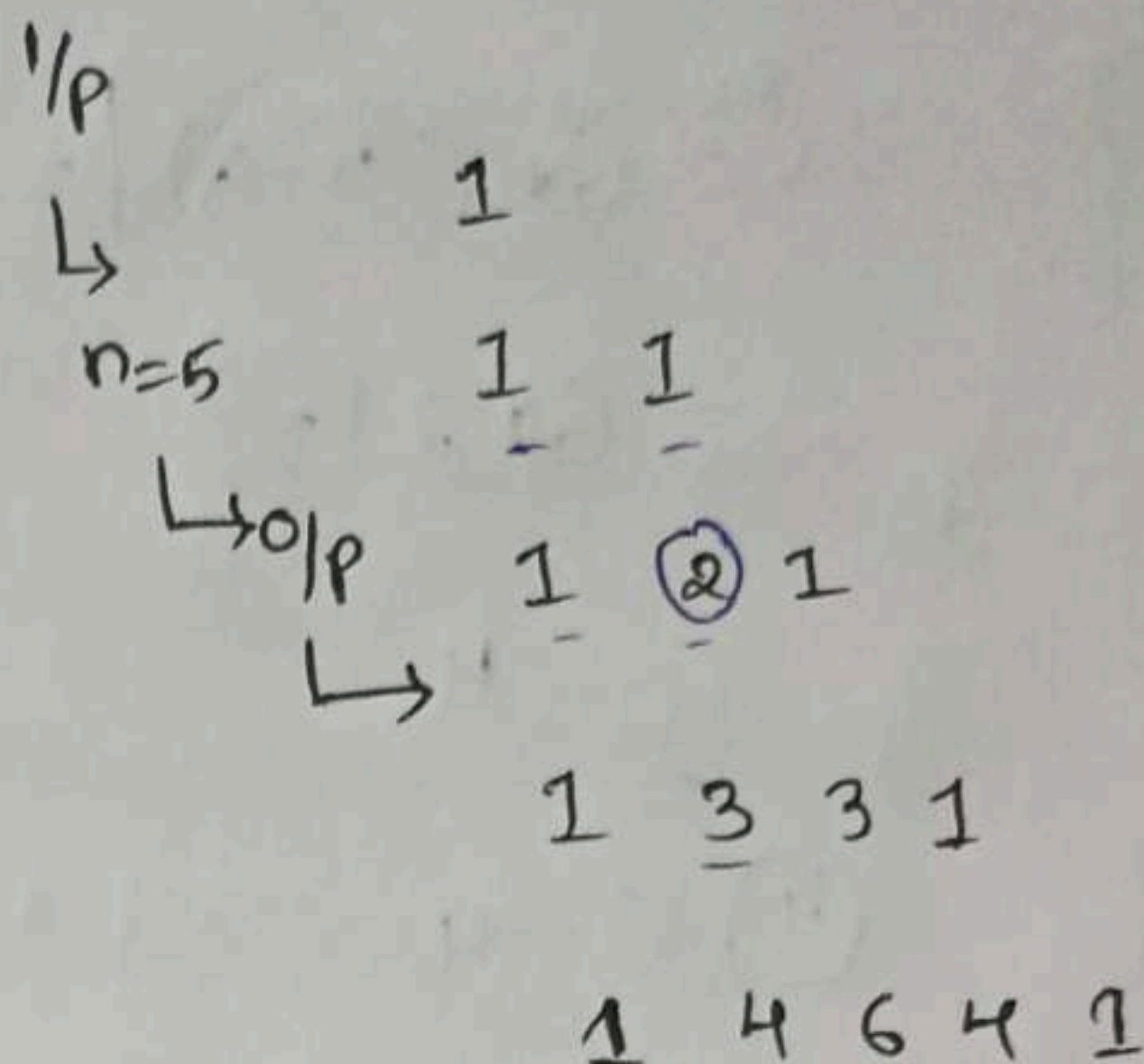
8) Pascals Triangle Pattern

① $n=5$

② No of rows = 5

③ No of Columns = (vary)

④ Analysis



$n=5$ $r=1$ Ist

$n=5$ $r=2$ IInd

$n=5$ $r=3$ IIIrd

$n=5$ $r=4$ IVth

$n=5$ $r=5$ Vth

$$C = C * (i - j) / j$$

$$i = [1 \rightarrow N]$$

rows

$$j = [1 \rightarrow i]$$

↓
rows

Dry Run

$i=5, j=1 - C=1 \rightarrow$ ① print C

② $C = C * (i - j) / j$

for $j=1$

$$= 1 * (5 - 1) / 1$$

$$= 1 * 4 = 4$$

③ $C = 4$

for $j=2$

$$C = C * (i - j) / j = 4 * (5 - 2) / 2$$

$$= 6$$

③ $C = 6$

$$C = 6 * (5 - 3) / 3$$

$$= 6 * 2 / 3$$

$$= 4$$

- for $i = 5$ $j = 1 \rightarrow 5$

1 4 6 4 1

④ $C = 4$

$$C = 4 * (5 - 4) / 4$$

$$= 1$$

⑤ $C = 1$

$$C = 1 * (5 - 5) / 5$$

$$= \textcircled{1}$$

- for $i = 4$ $j = 1 \rightarrow 4$ 1 3 3 1

- for $i = 3$ $j = 1 \rightarrow 3$ 1 2 1

- for $i = 2$ $j = 1 \rightarrow 2$ 1 1

- for $i = 1$ $j = 1$ 1