

Computer Programming

- 1) Write an algorithm to find the various roots of quadratic equation.

→ Algorithm

Step 1 : Start

Step 2 : Input a, b, c

Step 3 : $d = b^2 - 4ac$

Step 4 : If $d > 0$

Else go to step 10

Step 5 : Print roots are real and different

Step 6 : $r_1 = \frac{-b + \sqrt{d}}{2a}$

Step 7 : $r_2 = \frac{-b - \sqrt{d}}{2a}$

Step 8 : Print r_1, r_2

Step 9 : Go to step 20

Step 10 : If $d = 0$

Else go to step 15

Step 11 : Print roots are real and equal.

Step 12 : $r_1 = r_2 = \frac{-b}{2a}$

Step 13 : Print r_1, r_2

Step 14 : Go to step 20

Step 15 : Print roots are imaginary and different.

Step 16 : $\text{real} = \frac{-b}{2a}$

Step 17 : $\text{img} = \frac{\sqrt{-d}}{2a}$

Step 18 : Print $\text{real} + \text{img}$

Step 19 : Print $\text{real} - \text{img}$

Step 20 : Stop

2) Explain the conditional operator. Draw a flowchart and write a program using a conditional operator to find the smallest of three numbers.

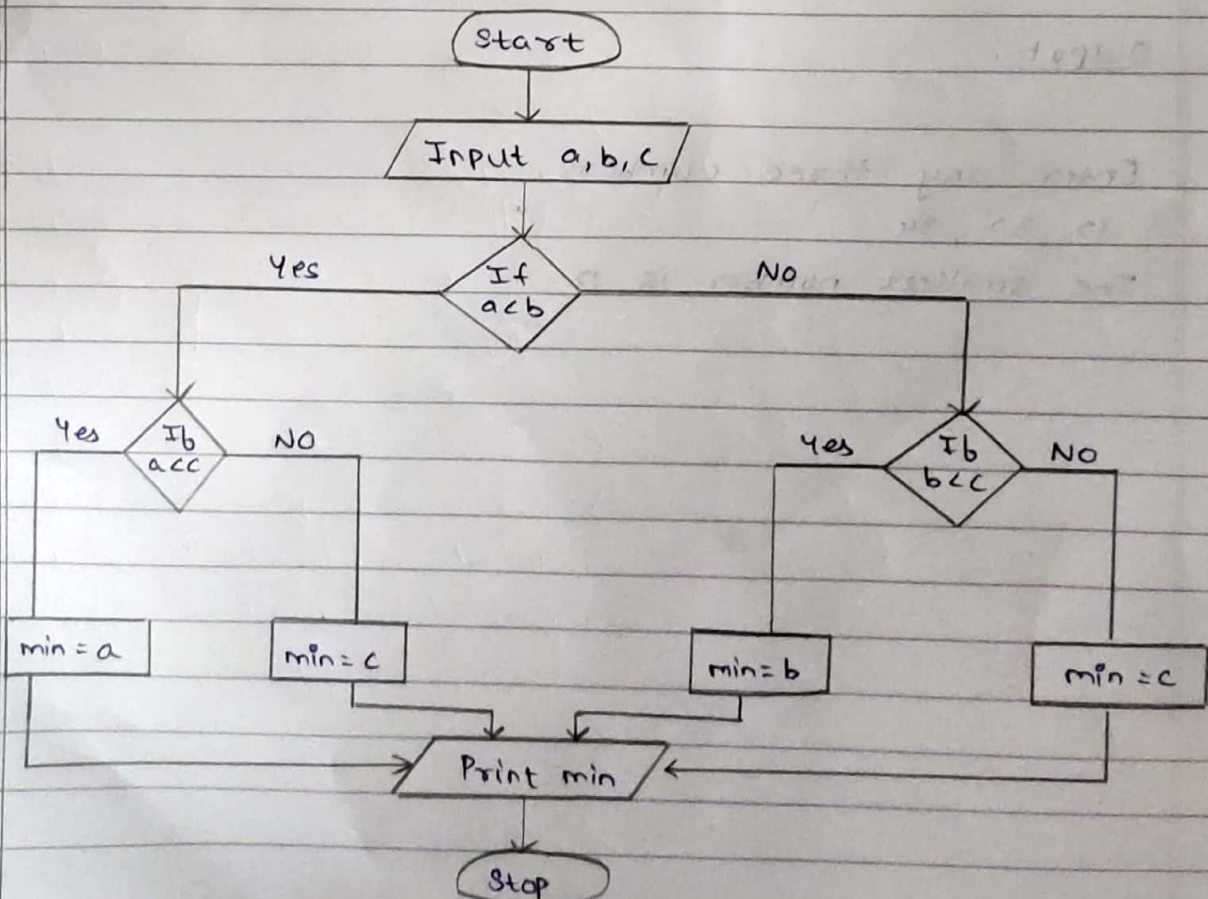
→ a) The conditional operator is also known as ternary operator. The conditional statements are the decision-making statements which depend upon the output of the expression. It is represented by two symbols i.e. '?' and ':'. Conditional operators, as it works on three operators, it is called as ternary operator.

Syntax for conditional operator:

[Expression 1 ? Expression 2 : Expression 3]

This is a shorter substitute to if-else statements.

b) Flowchart.



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Program :

```
#include <stdio.h>
#include <conio.h>

int main ()
{
    int a, b, c, min ;
    printf ("Enter any three numbers\n");
    scanf ("%d %d %d", &a, &b, &c);
    min = (a < b) ? (a < c) ? a : c : (b < c) ? b : c;
    printf ("The smallest number is %d", min);
    return 0 ;
}
```

Output :

Enter any three numbers,

12, 32, 34

The smallest number is 12.

- 3) Write a program to print the following pattern based on user input value.

```

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

```

```

→ #include <stdio.h>
int main()
{
    int i, j, n;
    printf("Enter number of lines\n");
    scanf("%d", &n);
    for (i=1; i<=n; i++)
    {
        for (j=1; j<=n-i; j++)
        {
            printf(" ");
        }
        for (char k=1; k<=i; k++)
        {
            printf("%c", k+64);
        }
        for (char m=i-1; m>=1; m--)
        {
            printf("%c", m+64);
        }
        printf("\n");
    }
    return 0;
}

```

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Output

Enter number of lines.

5

```
      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
```


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4) Write a program to find the sum of digits, product of digits and reverse of a number entered by a user. using while loop.

→ Program :

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

```
int main ()
```

```
{
```

```
int n, i, d, sum=0, prod=1, rev=0;
```

```
printf ("Enter a number \n");
```

```
scanf ("%d", &n);
```

```
while (n>0)
```

```
{
```

```
    d = n%10;
```

```
    sum = sum + d;
```

```
    prod = prod * d;
```

```
    rev = rev * 10 + d;
```

```
    n = n/10;
```

```
}
```

```
printf ("The sum of digits is %d \n", sum);
```

```
printf ("The product of digits is %d \n", prod);
```

```
printf ("The reverse of the number is %d \n", rev);
```

```
return 0;
```

```
}
```

Output

Enter a number:

25

The sum of digits is 7

The product of digits is 10

The reverse of the number is 52.

DATE:

- 5) Write a program for the scenario given below using if-else. A telecomm company has following tariff for its customer as follows.

Consumed time (sec)	Traff charges
1 - 59	₹ 0.25 Paisa Per unit
60 - 179	₹ 0.50 paisa per unit for additional time above 60
180 - 239	₹ 1.00 Per unit for additional time above 180
240 - 299	₹ 2.00 per unit for additional time above 240
300 and above	₹ 3.00 per unit for additional time above 240 300

The program should take the units consumed by the customer and accordingly calculate the total bill.

Program:

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

```
int main ( )
```

```
{
```

```
    float t, bill;
```

```
    printf("Enter the time consumed");
```

```
    scanf("%f", &t);
```

```
    if (t >= 300) {
```

```
        bill = (t - 299) * 3.0 + 60 * 2 + 60 * 1 + 120 * 0.5 + 59 * 0.25;
```

```
    }
```

```
    else if (t >= 240) {
```

```
        bill = (t - 239) * 2 + 60 * 1 + 120 * 0.5 + 59 * 0.25;
```

```
    else if (t >= 180) {
```

```
        bill = (t - 179) * 1 + 120 * 0.5 + 59 * 0.25;
```

```
    }
```

```
    else if (t >= 60) {
```

```
        bill = (t - 59) * 0.5 + 59 * 0.25;
```

```
    }
```

```
    else {
```

```
        bill = t * 0.25;
```

```
    }
```

```
    printf("The total bill amount : %.f", bill);
```

```
}
```

Output:

Enter the time consumed : 277

The total bill amount : 210.75