Question 1:

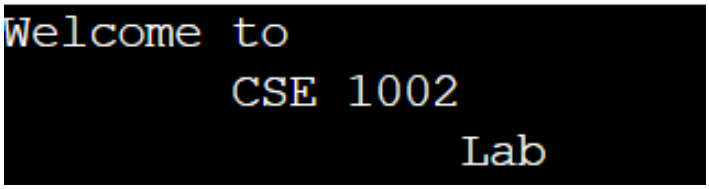
1) Write a program to display the following
   Hello
   Your Name
   Welcome to "CSE1002" Lab :)

Code:

```
#include <stdio.h>


void main(){
printf("Welcome to\n\tCSE 1002\n\t\tLab");
}
```

Output:



Question 2:

2) Write a program to read five numbers from the user and display their average.

Code:

```
#include<stdio.h>
void main(){
int a,b,c,d,e;
float sum=0;
printf("Enter 5 numbers\n");
scanf("%d",&a);
scanf("%d",&b);
scanf("%d",&c);
scanf("%d",&d);
scanf("%d",&e);
sum=(float)(a+b+c+d+e)/5;
printf("The average of 5 numbers is %f",sum);
}
```

Output:

```
Enter 5 numbers
1
3
5
7
9
The average of 5 numbers is 5.000000
```

Question 3:

3) Write a program to read and display the first character of your name and the cgpa.

Code:

```
#include<stdio.h>
void main(){
char name[50];
float cg;
printf("Enter name and cgpa\n");
scanf(" %s",&name);
scanf("%f",&cg);
```

```
printf("First character of name is %c and cgpa is %f",name[0],cg);
}
```

Output:

```
Enter name and cgpa
Pranay
9.2
First character of name is P and cgpa is 9.200000
```

Question 4:

4) Write a program to swap the values of two integers.
   a) using a third variable
   b) without using a third variable

Code:

4a)

```
#include <stdio.h>
void main(){
int a,b;
```

```
    printf("Enter 2 numbers\n");
   scanf("%d %d",&a,&b);
   printf("The value of a is %d and b is %d\n",a,b);
   a=a+b;
   b=a-b;
   a=a-b;
   printf("After swapping the value of a is %d and the value of b is %d",a,b);
}
```

4b)

```
#include <stdio.h>
void main(){
   int a,b,temp;
    printf("Enter 2 numbers\n");
   scanf("%d %d",&a,&b);
   printf("The value of a is %d and b is %d\n",a,b);
   temp=a;
   a=b;
   b=temp;
   printf("After swapping the value of a is %d and the value of b is %d",a,b);
```

}

Output:

4a:

```
Enter 2 numbers
1
3
The value of a is 1 and b is 3
After swapping the value of a is 3 and the value of b is 1
```

4b:

```
Enter 2 numbers
1
5
The value of a is 1 and b is 5
After swapping the value of a is 5 and the value of b is 1
```

Question 5:

5) Write a program to read an integer number and determine if it is an odd or an even number using conditional operator.

Code:

#include <stdio.h>

void main(){

```
int a;
printf("Enter a number\n");
scanf("%d",&a);
a%2==0? printf("The number is even") : printf("The number is odd");
}
```

Output:

```
Enter a number
3
The number is odd
```

Question 6:

6) Write a program to determine the minimum of three numbers of type float.

Code:

```
#include <stdio.h>
void main(){
   float a,b,c;
   printf("Enter the 3 numbers\n");
   scanf("%f %f %f",&a,&b,&c);
   if(c<=b && c<=a){
         printf("%f is lowest",c);
   }
   else if(b<=a && b<=c){
      printf("%f is lowest",b);
   }
   else{
      printf("%f is lowest",a);
   }
}
```

Output:

```
Enter the 3 numbers
7
9
4
4.000000 is lowest
```

Question 7:

7) Write a program to accept a character and check whether it is lower case or upper case.

Code

```
#include <stdio.h>
void main(){
char ch;
printf("Enter any character:\n");
scanf("%c",&ch);
if(ch>='A' && ch<='Z'){
   printf("%c is uppercase alphabet",ch);
```

```
}
else if(ch>='a' && ch<='z'){
   printf("%c is lowercase alphabet",ch);
}
else{
   printf("%c is not an alphabet",ch);
}
}
```

Output:

```
Enter any character:
d
d is lowercase alphabet
```

Question 8:

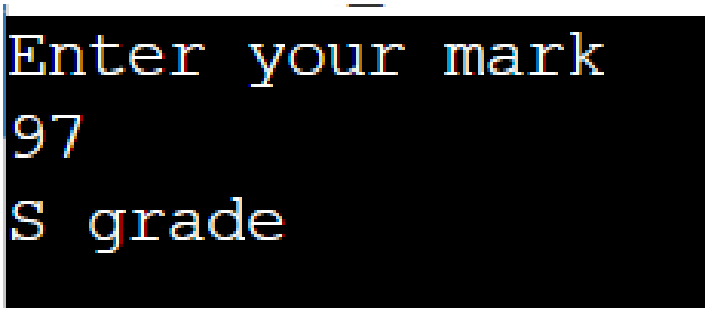
8) Write a program to read the mark of a student and display the grade. (Use the grading system followed in VIT).

Code:

```
#include <stdio.h>
void main(){
int mark;
printf("Enter your mark\n");
scanf("%d",&mark);
if(mark>=90){
   printf("S grade");
}
else if(mark>=80 && mark<90){
   printf("A grade");
}
else if(mark>=70 && mark<80){
   printf("B grade");
}
else if(mark>=60 && mark<70){
   printf("C grade");
}
else if(mark>=55 && mark<60){
   printf("D grade");
```

```
}
else if(mark>=50 && mark<55){
    printf("E grade");
}
else {
    printf("F grade");
}
}
```

Output:



Question 9:

9) A bank charges commission on the issue of Demand Draft at the following rates.

DD amount	Commission
Up to Rs.500	Rs. 10
>Rs. 500 up to 1000/-	Rs.15
>Rs. 1000 up to 5000/-	Rs.20
>Rs. 5000 up to 10,000/-	Rs.25
>Rs.10,000	Rs.4 for every Rs.1000

Write a program to accept the DD amount and calculate the commission payable and print it along with the DD amount.

Code:

```
#include <stdio.h>
void main(){
int dd,com=0;
printf("Enter the amount:\n");
scanf("%d",&dd);
if(dd<=500){
   com=10;
   printf("The dd amount is %d and the commission is %d",dd,com);
}
else if(dd>500 && dd<=1000){
   com=15;
```

```
   printf("The dd amount is %d and the commission is
%d",dd,com);
}
else if(dd>1000 && dd<=5000){
   com=20;
   printf("The dd amount is %d and the commission is
%d",dd,com);
}
else if(dd>5000 && dd<=10000){
   com=25;
   printf("The dd amount is %d and the commission is
%d",dd,com);
}
else{
   int n = dd/1000;
   com=4*n;
   printf("The dd amount is %d and the commission is
%d",dd,com);

}
}
```

Output:

```
Enter the amount:
50000
The dd amount is 50000 and the commission is 200
```

Question 10:

10) Write a program to perform the arithmetic operation on two numbers as per user's choice. (Use characters +, -, *, / and % to represent the operation).

Code:

```
#include <stdio.h>

int main(){

int a,b;

char c;

printf("Enter the 2 numbers\n");
```

```
scanf("%d %d",&a,&b);
printf("Enter the operation to be performed: + or - or * or / or %% \n");
scanf(" %c",&c);
float quo = (float) a/b;
switch(c){
case '+':
printf("The sum of the two numbers is %d",a+b);
break;
case '-':
printf("The difference of the two numbers is %d",a-b);
break;
case '*':
printf("The product of the two numbers is %d",a*b);
break;
case '/':
printf("The quotient of the two numbers is %f",quo);
break;
case '%':
printf("The modulus of the two numbers is %d",a%b);
```

```
break;
default:
printf("Invalid Input");
break;
}
return 0;

}
```

Output:

```
Enter the 2 numbers
3
7
Enter the operation to be performed: + or - or * or / or %
*
The product of the two numbers is 21
```

Question 11:

11) Write a program to determine the area of a circle, rectangle and a triangle depending on user's choice. (Use 1 for Circle, 2 for Rectangle and 3 for Triangle).

Code:

```
#include <stdio.h>
void main(){
   int r,b,h,l,t;
   float area;
   printf("Enter 1 for circle 2 for triangle and 3 for rectangle\n");
   scanf("%d",&t);
   switch(t){
   case 1:
      printf("Enter the radius of the circle\n");
      scanf("%d",&r);
      area=3.14*r*r;
      printf("The area is %f units",area);
      break;
```

```
    case 2:
        printf("Enter the base and height of the
triangle\n");
        scanf("%d %d",&b,&h);
        area=0.5*b*h;
        printf("The area is %f units",area);
        break;
    case 3:
        printf("Enter the length and breadth of the
rectangle\n");
        scanf("%d %d",&l,&b);
        area=b*l;
        printf("The area is %f units",area);
        break;
    default:
        printf("Invalid Input");
        break;
    }

}
```

Output:

```
Enter 1 for circle 2 for triangle and 3 for rectangle
2
Enter the base and height of the triangle
4
5
The area is 10.000000 units
```

Question 12:

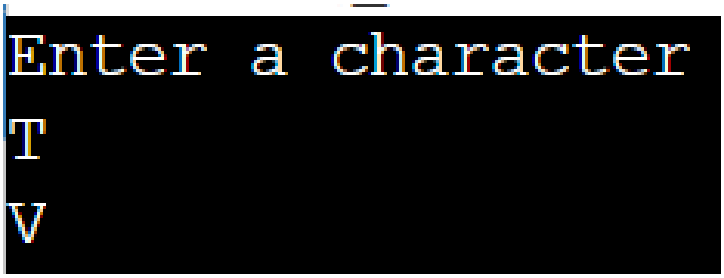
12) Write a program to read a character. Display the character that is 2 position ahead of it if the read input is an alphabet (a – c, b – d . . . y – a, z – b or A – C, B – D . . . Y – A, Z – B). If the read input is not an alphabet, display it as such.

Code:

```
#include <stdio.h>
void main(){
char t;
printf("Enter a character\n");
```

```
scanf(" %c",&t);
int z=t+2;
if(z>90){
      z=65+z-90-1;
}
if(z>122){
      z=97+z-122-1;
}
   printf("%c",z);
}
```

Output:



Question 13:

13) Read n characters containing alphabets (uppercase/lowercase), numeric values and special characters. Display the uppercase and lowercase characters reversed and all other characters intact.

Code:

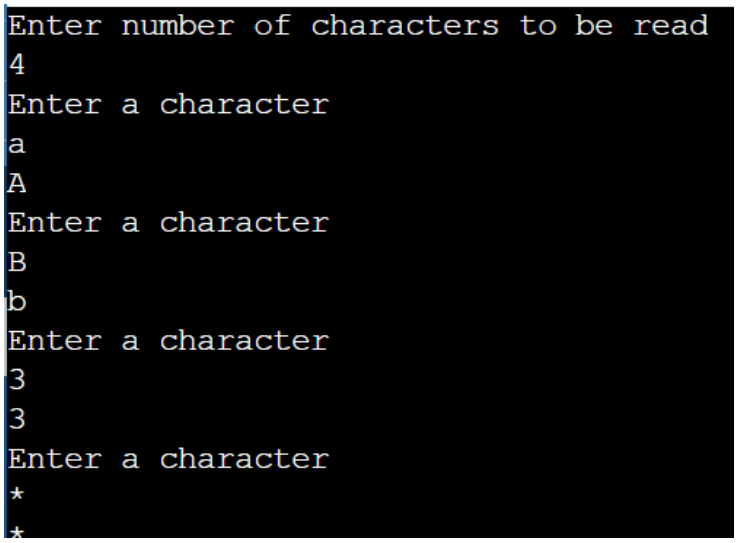
```
#include <stdio.h>

int main() {
   int n,k=0;
   printf("Enter number of characters to be read\n");
   scanf("%d",&n);

   char ch;
line:
   printf("Enter a character\n");
   scanf(" %c",&ch);
   if(ch>=65&&ch<=90){
```

```
        int t = ch+32;
        printf("%c\n",t);
        k++;
    }
    else if(ch>=97&&ch<=122){
        int t = ch-32;
        printf("%c\n",t);
        k++;
    }
    else{
        printf("%c\n",ch);
        k++;
    }
    if(k<n) {
        goto line;
    }
    return 0;
}
```

Output:



Question 14:

14) Assume three students A, B and C of M.Tech(SE) contest for the PR election. Also assume there are 'n' students in the programme. Simulate the vote casting process by 'n' and determine the PR. The number of votes cast for each contestant is to be counted and also the number of invalid votes should be counted. Finally determine and print the PR based on the votes received. [Note: Use switch case to count the votes received for each contestant and also invalid votes. Use 'go to' to repeat the steps until all the 'n' students cast their votes]

Code:

```
#include<stdio.h>
void main(){
int n,t=0,a=0,b=0,c=0,inv=0;
```

```
char ch;
printf("Enter the number of students\n");
scanf("%d",&n);
line:
   t+=1;
   printf("Enter 'A' to vote for candidate A\n'B' to vote for candidate A\n'C' to vote for candidate A \n");
   scanf(" %c",&ch);
   switch(ch){
   case 'A':
      a+=1;
      break;
   case 'B':
      b+=1;
      break;
   case 'C':
      c+=1;
      break;
   default:
      inv+=1;
```

```
        break;
    }
    if(t==n){
        goto line1;
    }
goto line;
line1:
    if(a>b&&a>c){
        printf("Candidate A is the PR");
    }
    else if(b>a&&b>c){
        printf("Candidate B is the PR");
    }
    else if(c>a&&c>b){
        printf("Candidate C is the PR");
    }
    else{
        printf("No Candidate is the PR due to equal
number of votes");
    }
```

```
}
```

Output:

```
Enter the number of students
5
Enter 'A' to vote for candidate A
'B' to vote for candidate A
'C' to vote for candidate A
A
Enter 'A' to vote for candidate A
'B' to vote for candidate A
'C' to vote for candidate A
B
Enter 'A' to vote for candidate A
'B' to vote for candidate A
'C' to vote for candidate A
C
Enter 'A' to vote for candidate A
'B' to vote for candidate A
'C' to vote for candidate A
A
Enter 'A' to vote for candidate A
'B' to vote for candidate A
'C' to vote for candidate A
A
Candidate A is the PR
```

Question 15:

15) Write a program to determine the sum of first 'n' natural numbers.

Code:

```
#include<stdio.h>
void main(){
int n,sum=0;
printf("Enter the till which number you want the sum\n");
scanf("%d",&n);
for(int i=1;i<=n;i++){
   sum+=i;
}
printf("The sum of natural numbers till %d is %d",n,sum);
}
```

Output:

```
Enter the till which number you want the sum
10
The sum of natural numbers till 10 is 55
```

Question 16:

16) Write a program to print the sum of the series 1 + 4 + 9 +..... n.

Code:

```
#include<stdio.h>
void main(){
int n,sum=0;
printf("Enter the number of terms of the series\n");
scanf("%d",&n);
for(int i=1;i<=n;i++){
   sum+=i*i;
```

```
}
printf("The sum of the series is %d",sum);
}
```

Output:

```
Enter the number of terms of the series
5
The sum of the series is 55
```

Question 17:

17) Write a program to reverse a given number.

Code:

```
#include<stdio.h>
void main(){
   int n,rev=0;
```

```
    printf("Enter the number to reverse\n");
    scanf("%d",&n);
    while(n!=0){
        rev=rev*10+n%10;
        n/=10;
    }
    printf("The reversed number is %d",rev);
}
```

Output:

```
Enter the number to reverse
123
The reversed number is 321
```

Question 18:

18) Write a program to print the Fibonacci sequence up to 'n' values.

Code:

```
#include<stdio.h>
void main(){
int n,a=0,b=1,c;
printf("Enter the number of values in the series\n");
scanf("%d",&n);
printf("The fibonacci series is:\n");
if(n==1){
   printf("0");
   exit(0);
}
if(n==2){
   printf("0\t1");
   exit(0);
}
printf("0\t1\t");
for(int i=1;i<=(n-2);i++){
   c=a+b;
   printf("%d\t",c);
```

```
    a=b;
    b=c;
}
}
```

Output:

```
Enter the number of values in the series
6
The fibonacci series is:
0       1       1       2       3       5
```

Question 19:

19) Write a program to check if a given number is an
    a) Armstrong number
    b) Prime number
    c) Perfect number

Code:

```
#include<stdio.h>
void main(){
int n,n1,sum=0,sum1=1,fac=0;
printf("Enter a number\n");
scanf("%d",&n);
n1=n;
while(n1!=0){
   int t=n1%10;
   sum+=t*t*t;
   n1=n1/10;
}
if(sum==n){
   printf("The number is an Armstrong Number\n");
}
else{
   printf("The number is not an Armstrong
Number\n");
```

```
}
sum=0;
if(n<2){
   printf("The number is not prime\n");
}
else{
      for(int i=2;i<n;i++){
         if(n%i==0){
            fac+=1;
            sum1+=i;
         }
      }
      if(fac>0){
         printf("The number is not prime\n");
      }
      else{
         printf("The number is prime\n");
      }
}
if(sum1==n){
```

```
    printf("The number is a perfect number");
}
else{
    printf("The number is not a perfect number");
}
```

```
}
```

Output:

```
Enter a number
113
The number is not an Armstrong Number
The number is prime
The number is not a perfect number
```

Question 20:

20) Write a program to print the following patterns.

a)

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

b)

```
1
1   3
1   3   5
1   3   5   7
```

c)

```
1
1   2   1
1   2   3   2   1
1   2   3   4   3   2   1
1   2   3   4   5   4   3   2   1
```

Code:

```
#include<stdio.h>
void main(){
   for(int i=1;i<=4;i++){
      for(int j=1;j<=i;j++){
         printf("%d\t",j);
      }
      printf("\n");
   }
   for(int i=1;i<=4;i++){
      for(int j=1;j<=2*i-1;j+=2){
```

```
            printf("%d\t",j);
        }
        printf("\n");
    }
    for(int i=1;i<=5;i++){
        for(int j=1;j<=i;j++){
            printf("%d\t",j);
        }
        for(int j=i-1;j>=1;j--){
            printf("%d\t",j);
        }
        printf("\n");
    }
}
```

Output:

```
1
1       2
1       2       3
1       2       3       4
1
1       3
1       3       5
1       3       5       7
1
1       2       1
1       2       3       2       1
1       2       3       4       3       2       1
1       2       3       4       5       4       3       2       1
```

Question 21:

21) Write a program to determine the minimum and maximum in an array of 'n' elements of type integer.

Code:

```
#include<stdio.h>
void main(){
int n,max,min;
printf("Enter the number of elements in the array\n");
scanf("%d",&n);
int arr[n];
printf("Enter the array elements\n");
for(int i=0;i<n;i++){
   scanf("%d",&arr[i]);
}
min=max=arr[0];
for(int i=1;i<n;i++){
   if(arr[i]<min){
      min=arr[i];
```

```
    }
    if(arr[i]>max){
        max=arr[i];
    }
}
printf("The minimum element is %d and the
maximum element is %d",min,max);
}
```

Output:

```
Enter the number of elements in the array
5
Enter the array elements
2
1
7
6
5
The minimum element is 1 and the maximum element is 7
```

Question 22:

22) Write a program to search for an elements in array of 'n' elements of type float.

Code:

```
#include<stdio.h>
void main(){
int n,flag=0;
printf("Enter the number of elements in the array\n");
scanf("%d",&n);
float arr[n],t;
printf("Enter the array elements\n");
for(int i=0;i<n;i++){
   scanf("%f",&arr[i]);
}
printf("Enter the element to be searched\n");
scanf("%f",&t);
```

```
for(int i=0;i<n;i++){
   if(arr[i]==t){
      flag=1;
      printf("The element is found at index %d",i);
      break;
   }
}
if(flag==0){
   printf("Element not found");
}
}
```

Output:

```
Enter the number of elements in the array
5
Enter the array elements
2
1
7
6
5
Enter the element to be searched
6
The element is found at index 3
```

Question 23:

23) Write a program to insert an element at the desired position in an array.

Code:

```
#include<stdio.h>
void main(){
int w,n,t;
printf("Enter the size of the array\n");
scanf("%d",&n);
int arr[n];
int arr1[n+1];
printf("Enter the array elements\n");
for(int i=0;i<n;i++){
   scanf("%d",&arr[i]);
}
```

```
printf("Enter the index of where the element is to be inserted\n");
scanf("%d",&t);
printf("Enter the element to be inserted\n");
scanf("%d",&w);
if(t<0){
   printf("The array index has to be greater than or equal to 0");
}
else if(t>=n){
      printf("The array index has to be less than %d",n);
}
else{
for(int i=0;i<t;i++){
   arr1[i]=arr[i];
}
for(int i=t;i<n;i++){
   arr1[i+1]=arr[i];
}
arr1[t]=w;
printf("The array after inserting the element is:\n");
```

```
for(int i=0;i<=n;i++){
   printf("%d  ",arr1[i]);
}
}


}
```

Output:

```
Enter the elements
1
2
3
4
The sum of left diagonal elements is 5
The sum of right diagonal elements is 5
```

Question 24:

24) Write a program to determine the sum of both diagonal elements in a square matrix.

Code:

```
#include<stdio.h>
void main(){
int m,n,sum=0,sum1=0;
printf("Enter number of columns\n");
scanf("%d",&m);
printf("Enter number of rows\n");
scanf("%d",&n);
int arr[m][n];
printf("Enter the elements\n");
for(int i=0;i<m;i++){
      for(int j=0;j<n;j++){
   scanf("%d",&arr[i][j]);
   if(i==j){
      sum+=arr[i][j];
```

```
    }
    if((i+j)==(m-1)){
        sum1+=arr[i][j];
    }
}
}
printf("The sum of left diagonal elements is %d
\n",sum);
printf("The sum of right diagonal elements is
%d",sum1);
}
```

Output:

```
Enter the elements
1
2
3
4
The sum of left diagonal elements is 5
The sum of right diagonal elements is 5
```

Question 25:

25) Write a program using 2D array to store the 6 subject marks of 5 students. Display the following details:
i) Total marks scored by each individual student
ii) Average marks scored by all the students in each subject.

Code:

```
#include<stdio.h>
void main(){
int arr[6][5];
int sum=0;
int tsum=0;
for(int i=0;i<6;i++){
   printf("Enter the subject marks in subject %d for 5 students\n",i+1);
      for(int j=0;j<5;j++){
```

```
    scanf("%d",&arr[i][j]);
}
}
for(int i=0;i<5;i++){
    printf("Total marks of student %d is:\n",i+1);
    for(int j=0;j<6;j++){
    sum+=arr[j][i];
    tsum+=arr[j][i];
}
printf("%d marks\n",sum);
float avg1=(float)sum/6;
printf("The average marks of student %d is:\n",i+1);
printf("%f marks\n",avg1);
sum=0;

}
float avg = (float) tsum/30;
printf("The average marks of all the students in all the
subjects is %f\n",avg);
}
```

Output:

```
Enter the subject marks in subject 1 for 5 students
95
94
93
92
91
Enter the subject marks in subject 2 for 5 students
85
84
83
82
81
Enter the subject marks in subject 3 for 5 students
75
74
73
72
71
Enter the subject marks in subject 4 for 5 students
65
64
63
62
61
Enter the subject marks in subject 5 for 5 students
55
54
53
52
51
```

```
Enter the subject marks in subject 6 for 5 students
65
64
63
62
61
Total marks of student 1 is:
440 marks
The average marks of student 1 is:
73.333336 marks
Total marks of student 2 is:
434 marks
The average marks of student 2 is:
72.333336 marks
Total marks of student 3 is:
428 marks
The average marks of student 3 is:
71.333336 marks
Total marks of student 4 is:
422 marks
The average marks of student 4 is:
70.333336 marks
Total marks of student 5 is:
416 marks
The average marks of student 5 is:
69.333336 marks
The average marks of all the students in all the subjects is 71.333336
```

Question 26:

26) Write a function to accept a number from main() and return 1 if the given number is a buzz number and 0 otherwise.
(Note: Buzz number is a number which is either completely divisible by 7 or extreme right side digit of the number is 7.)

Code:

```
#include<stdio.h>
int buzz(int a){
if(a%7==0 || a%10==7){
   return 1;
}
else{
   return 0;
}
}
void main(){
   int n;
   printf("Enter a number \n");
```

```
    scanf("%d",&n);
    printf("%d",buzz(n));
}
```

Output:

```
Enter a number
107
1
```

Question 27:

27) Write a program to evaluate the following expression using function.

$$\frac{n!}{r!\,(n-r)!}$$

Code:

```
#include<stdio.h>
int fact(int t){
```

```
int fact1=1;
for(int i=2;i<=t;i++){
    fact1*=i;
}
return fact1;
}
void main(){
int n,r,x,w;
printf("Enter the value for n and r\n");
scanf("%d",&n);
scanf("%d",&r);
w=n-r;
x=fact(n)/(fact(w)*fact(r));
printf("The value is %d",x);
}
```

Output:

```
Enter the value for n and r
4
2
The value is 6
```

Question 28:

28) Write a program to read the three sides of a triangle and pass it to a function isTriangle() to check whether the three sides form a triangle or not. The function should return 1 if the three sides form a triangle and 0 otherwise. If the function returns 1, pass the three sides to another function typeOfTriangle() that displays whether it is an isosceles, equilateral or scalene triangle. If the function returns 0, display "The three sides does not form a triangle". Use the following information.
Note: The 3 values form a triangle, only if the sum of any 2 sides is greater than the third side. If all the three sides are equal display "It is an Equilateral Triangle". If any two sides all equal display "It is an Isosceles Triangle". Otherwise display "It is a Scalene Triangle"

Code:

```
#include<stdio.h>
int isTriangle(int a,int b,int c){
if((a+b)>c && (b+c)>a && (a+c)>b){
   typeOfTriangle(a,b,c);
```

```
    return 1;
}
else{
    printf("The sides do not form a triangle\n");
    return 0;
}

}
int typeOfTriangle(int a,int b,int c){
if(a==b && b==c){
    printf("It is an equilateral triangle\n");
}
else if(a==b||a==c||b==c){
    printf("It is an isosceles triangle\n");
}
else{
    printf("It is a scalene triangle\n");
}
}
void main(){
```

```
int a,b,c;
printf("Enter the sides of the triangle\n");
scanf("%d %d %d",&a,&b,&c);
isTriangle(a,b,c);
}
```

Output:

```
Enter the sides of the triangle
3
4
5
It is a scalene triangle
```

Question 29:

29) Write a function by name Sort that takes as arguments an integer array and the size of the array and sorts the elements of the array in ascending order.

Code:

```
#include<stdio.h>
void sort(int arr[],int n){
for(int i=0;i<n-1;i++){
int min=i;
for(int j=i+1;j<n;j++){
if(arr[j]<arr[min]){
min=j;
}
}
int temp=arr[i];
arr[i]=arr[min];
arr[min]=temp;
}
}
```

```
void main(){
int n;
printf("Enter the number of elements in the array\n");
scanf("%d",&n);
int arr[n];
printf("Enter the array elements\n");
for(int i=0;i<n;i++){
   scanf("%d",&arr[i]);
}
sort(arr,n);
printf("The array in sorted form is:\n");
for(int i=0;i<n;i++){
   printf("%d  ",arr[i]);
}
}
```

Output:

```
Enter the number of elements in the array
5
Enter the array elements
5
4
1
3
2
The array in sorted form is:
1  2  3  4  5
```

Question 30:

30) Write a program to pass a matrix to a function which determines the transpose of the matrix and display the resultant matrix in the main function.
Note: The transpose of a matrix is obtained by changing its rows into columns (or equivalently, its columns into rows).
Example

Matrix =	1	2	3
	4	5	6
	7	8	9

Transpose =	1	4	7
	2	5	8
	3	6	9

Code:

#include<stdio.h>

```
void main(){
int n;
printf("Enter the order of the matrix\n");
scanf("%d",&n);
int mat[n][n];
int tran[n][n];
printf("Enter the matrix elements\n");
for(int i=0;i<n;i++){
   for(int j=0;j<n;j++){
      scanf("%d",&mat[i][j]);
      tran[j][i]=mat[i][j];
   }
}
printf("The matrix is:\n");
for(int i=0;i<n;i++){
   for(int j=0;j<n;j++){
      printf("%d ",mat[i][j]);
   }
   printf("\n");
}
```

```
printf("The transposed matrix is:\n");
for(int i=0;i<n;i++){
    for(int j=0;j<n;j++){
        printf("%d ",tran[i][j]);
    }
    printf("\n");
}
}
```

Output:

```
Enter the order of the matrix
2
Enter the matrix elements
1
2
3
4
The matrix is:
1 2
3 4
The transposed matrix is:
1 3
2 4
```

Question 31:

31) Write a program to calculate the sine of an angle inputted in degrees using the formula
$X - X^3 / 3! + X^5 / 5! - X^7 / 7! + \ldots$
(Write functions for power (X,n) and fact(n)).

Code:

```
#include<stdio.h>
float fact(int n){
float res=1;
for(int i=2;i<=n;i++){
   res*=i;
}
return res;
}
float power(float x,float n){
if(n==0){
   return 1;
}
else{
```

```
float res=1;
for(int i=0;i<n;i++){
   res*=x;
}
return res;
}
}
float sine(float x, float t){
float res=0;
float k=0;
for(float i=1;i<=2*t-1;i+=2){
   res+=power(-1,k)*power(x,i)/fact(i);
   k++;
}
printf("The sine of the angle is %f",res);
}
void main(){
float x,t;
printf("Enter the angle for calculating the sine and the number of terms of the series you want\n");
```

```
scanf("%f",&x);
scanf("%f",&t);
sine(x,t);
}
```

Output:

```
Enter the angle for calculating the sine and the number of terms of the series you want
3.141
10
The sine of the angle is 0.000593
```

Question 32:

32) Write a program to accept a line of text and replace all blank space with '$' symbol.

Code:

```
#include<stdio.h>
#include<string.h>
void main(){
int n;
printf("Enter the length of text\n");
scanf("%d",&n);
char str[n+1];
printf("Enter the text\n");
scanf(" %[^\n]s",str);
for(int i=0;i<n;i++){
   if(str[i]==' '){
      str[i]='$';
   }
}
printf("The updated string is %s",str);
}
```

Output:

```
Enter the length of text
20
Enter the text
Pra  nay
The updated string is Pra$$nay
```

Question 33:

33) Write a program to read a string and display the count of upper case and lower case letters. Also print the string in reverse order. (Note: do not use strrev()).

Code:

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

```
int n,u=0,l=0;
printf("Enter the length of text\n");
scanf("%d",&n);
char str[n+1];
printf("Enter the text\n");
scanf(" %[^\n]s",str);
int w = strlen(str);
char str1[w];
for(int i=0;i<w;i++){
   int t=str[i];
   if(t>=65 && t<=90){
      u+=1;
   }
   if(t>=97 && t<=122){
      l+=1;
   }
   str1[w-1-i]=str[i];
}
printf("Number of Uppercase alphabets in string is
%d\n",u);
```

```
printf("Number of Lowercase alphabets in string is %d\n",l);
printf("The reversed string is:   %s",str1);
}
```

Output:

```
Enter the length of text
20
Enter the text
Pranay Agrawal
Number of Uppercase alphabets in string is 2
Number of Lowercase alphabets in string is 11
The reversed string is:   lawargA yanarP
```

Question 34:

34) Write a program to add 2 complex numbers. Use structures to represent the complex numbers.

Code:

```
#include<stdio.h>
struct Complex{
int real;
int imag;
};
void main(){
struct Complex s1;
struct Complex s2;
printf("Enter the real and imaginary part of first complex number\n");
scanf("%d %d",&s1.real,&s1.imag);
printf("Enter the real and imaginary part of second complex number\n");
scanf("%d %d",&s2.real,&s2.imag);
int t=s1.real+s2.real;
int t1=s1.imag+s2.imag;
printf("The sum of the 2 complex numbers is %d + %di",t,t1);
}
```

Output:

```
Enter the real and imaginary part of first complex number
1
3
Enter the real and imaginary part of second complex number
2
4
The sum of the 2 complex numbers is 3 + 7i
```

Question 35:

35) Create a structure by name Book with members - book name, author name and price. Let the author name be another structure with members – first name and last name. Create an array of size 'n' of structure of type Book and display the details of the most expensive book.

Code:

```
#include<stdio.h>
struct authorName{
char firstName[20];
char lastName[20];
```

```
};



struct Book{
char bookName[20];
struct authorName authorName1;
int price;
};

void main(){
int n,maxCost=-1,t=0;
printf("Enter number of books\n");
scanf("%d",&n);
struct Book Books[n];
for(int i=0;i<n;i++){
   printf("Enter book name\n");
   scanf(" %[^\n]s",&Books[i].bookName);
   printf("Enter first name of author\n");
```

```
   scanf("
%[^\n]s",&Books[i].authorName1.firstName);
   printf("Enter last name of author\n");
   scanf("
%[^\n]s",&Books[i].authorName1.lastName);
   printf("Enter price of book\n");
   scanf("%d",&Books[i].price);
   if(Books[i].price>maxCost){
      maxCost=Books[i].price;
      t=i;
   }
}
printf("The details of the most expensive book
are\n");
printf("Name of book is %s\n",Books[t].bookName);
printf("Name of author is %s
%s\n",Books[t].authorName1.firstName,Books[t].aut
horName1.lastName);
printf("The price of the book is %d",Books[t].price);
}
```

Output:

```
Enter number of books
3
Enter book name
Harry Potter
Enter first name of author
JK
Enter last name of author
Rowling
Enter price of book
1000
Enter book name
Atomic Habits
Enter first name of author
James
Enter last name of author
Clear
Enter price of book
500
Enter book name
Tinkle
Enter first name of author
Subba
Enter last name of author
Rao
Enter price of book
```

```
Enter price of book
3000
The details of the most expensive book are
Name of book is Tinkle
Name of author is Subba  Rao
The price of the book is 3000
```

Question 36:

---

36) Write a program to create a structure by name STUDENT with members – Register Number, Name and CGPA. In the main(), create an array of size 'n' of structure type STUDENT and read input. Also include the following functions.
   a) function highestCGPA() that takes an array of structure of type STUDENT and displays the details of the student with the highest CGPA.
   b) function display() that takes an array of structure of type STUDENT and displays the details of all the students whose name begins with 'A'.
   c) function above9CGPA() that takes an array of structure of type STUDENT and displays the details of all the students whose CGPA is greater than 9.

Code:

```
#include<stdio.h>
struct Student{
char regno[10];
char name[50];
float cgpa;
};
void highestCGPA(struct Student d[],int n){
int t=0;
for(int i=1;i<n;i++){
```

```
    if(d[i].cgpa>d[t].cgpa){
        t=i;
    }
}
printf("The details of the student with the highest cgpa are:\n");
printf("\nName: %s\n",d[t].name);
printf("Registration No: %s\n",d[t].regno);
printf("The cgpa is: %f\n",d[t].cgpa);
}
void display(struct Student d[],int n){
int t=-1;
for(int i=0;i<n;i++){
    if(d[i].name[0]=='A'||d[i].name[0]=='a'){
        t=i;
    }
}
if(t==-1){
    printf("No student exists whose name starting with A\n");
}
```

```
else{
printf("The details of the student with name starting with A are:\n");
printf("Name: %s\n",d[t].name);
printf("Registration No: %s\n",d[t].regno);
printf("The cgpa is: %f\n",d[t].cgpa);
}
}
void above9CGPA(struct Student d[],int n){
printf("The details of the students whose CGPA exceeds 9 are:\n");
for(int i=0;i<n;i++){
   if(d[i].cgpa>9){
      printf("Name: %s\n",d[i].name);
      printf("Registration No: %s\n",d[i].regno);
      printf("The cgpa is: %f\n",d[i].cgpa);
      printf("\n");
   }
}
}
void main(){
```

```
    int n;
    printf("Enter the number of students\n");
    scanf("%d",&n);
    struct Student st[n];
    for(int i=0;i<n;i++){
        printf("Enter register number, name and cgpa
of student %d\n",i+1);
        scanf(" %[^\n]s",&st[i].regno);
        scanf(" %[^\n]s",&st[i].name);
        scanf("%f",&st[i].cgpa);
    }
    highestCGPA(st,n);
    display(st,n);
    above9CGPA(st,n);
}
```

Output:

```
Enter the number of students
3
Enter register number, name and cgpa of student 1
22MIS0172
Pranay
9.1
Enter register number, name and cgpa of student 2
22MIS0007
Sharan
9.0
Enter register number, name and cgpa of student 3
22MIS0107
Animesh
8.9
The details of the student with the highest cgpa are:

Name: Pranay
Registration No: 22MIS0172
The cgpa is: 9.100000
The details of the student with name starting with A are:
Name: Animesh
Registration No: 22MIS0107
The cgpa is: 8.900000
The details of the students whose CGPA exceeds 9 are:
Name: Pranay
Registration No: 22MIS0172
The cgpa is: 9.100000
```