State Institute Of Engineering And Technology, Nilokheri (Karnal)

Department of CSE (AIML)

Lab Manual

"Programming For Problem Solving"

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Program-1a

Aim : Write a program for using the standard output function (printf()).

Program :

```
#include<stdio.h>
void main ()
{
        printf("Sumit Verma,8725189,CSE-B\n");
        printf("Hi this is execution of standard output function i.e. printf()");
}
```

Output:

```
Sumit Verma,8725189,CSE-B
Hi this is execution of standard output function i.e. printf()
```

Program-1b

Aim : Write a program to add two numbers.

Program :

```
#include<stdio.h>
void main ()
{
        int a,b,c;
        printf("Sumit Verma,8725189,CSE-B\n");
        printf("enter 1st value:");
        scanf("%d",&a);
        printf("enter 2nd value:");
        scanf("%d",&b);
        c=a+b;
        printf("sum of these two numbers is:%d",c);
}
```

Output:

```
Sumit Verma,8725189,CSE-B
enter 1st value: 12
enter 2nd value: 8
sum of these two numbers is:20
```

Program-1c

Aim : Write a program to show run time as well as compile time initialization of a variable.

Program :

```
#include<stdio.h>
void main ()
{
        int a=23,b;
        printf("Sumit Verma,8725189,CSE-B\n");
        printf("this is compile time initialization i.e %d \n",a);

        printf("enter a number:");
        scanf("%d",&b);
        printf("this is run time initialization i.e %d",b);
}
```

Output:

```
Sumit Verma,8725189,CSE-B
this is compile time initialization i.e 23
enter a number: 45
this is run time initialization i.e 45
```

Program-2a

Aim : Write a program to use all arithmetic operators(+ , - , * , / , %).

Program :

```
#include<stdio.h>
void main (){
        int a,b,c;
        printf("Sumit Verma,8725189,CSE-B\n");
        printf("enter 1st value:");
        scanf("%d",&a);
        printf("enter 2nd value:");
        scanf("%d",&b);
        printf("1.Addition(+)\n");
        c=a+b;
        printf("Addition of two values:%d\n",c);
        printf("2.Subtraction(-)\n");
        c=a-b;
        printf("Subtraction of two values:%d\n",c);
        printf("3.Multiplication(*)\n");
        c=a*b;
        printf("Multiplication of two values:%d\n",c);
        printf("4.Quotient(/)\n");
        c=a/b;
        printf("Quotient of two values:%d\n",c);
        printf("5.Remainder(%%)\n");
        c=a%b;
printf("Remainder of two values:%d\n",c);}
```

Output:

```
Sumit Verma,8725189,CSE-B
enter 1st value: 17
enter 2nd value: 5
1.Addition(+)
Addition of two values:22
2.Subtraction(-)
Subtraction of two values:12
3.Multiplication(*)
Multiplication of two values:85
4.Quotient(/)
Quotient of two values:3
5.Remainder(%)
Remainder of two values:2
```

Program-2b

Aim : Write a program to swap using temporary or third variable.

Program :

```
#include<stdio.h>
void main ()
{
        int x,y,t;
        printf("Sumit Verma,8725189,CSE-B\n");
        printf("enter any value:");
        scanf("%d",&x);
        printf("enter any value:");
        scanf("%d",&y);
        printf("\n values ofd x and y before sWrite a programping:%d  %d",x,y);
        t=x;
        x=y;
        y=t;
        printf("\n values ofd x and y after sWrite a programping:%d  %d",x,y);
}
```

Output:

```
Sumit Verma,8725189,CSE-B
enter any value: 10
enter any value: 20

values of x and y before swapping:10  20
values of x and y after swapping:20  10
```

Program-2c

Aim : Write a program to swap numbers without using temporary or third variable.

Program :

```
#include<stdio.h>
void main ()
{
        int x,y;
        printf("Sumit Verma,8725189,CSE-B\n");
        printf("enter any value:");
        scanf("%d",&x);
        printf("enter any value:");
        scanf("%d",&y);
        printf("values of x and y before sWrite a programping:%d  %d\n",x,y);
        x=x+y;
        y=x-y;
        x=x-y;
        printf("values of x and y after sWrite a programping:%d  %d",x,y);
}
```

Output:

```
Sumit Verma,8725189,CSE-B
enter any value: 7
enter any value: 3
values of x and y before swapping:7  3
values of x and y after swapping:3  7
```

Program-3a

Aim : Write a program to determine if a number is even or odd.

Program :

```
#include<stdio.h>
void main ()
{
        int n;
        printf("Sumit Verma,8725189,CSE-B\n");
        printf("enter any number:");
        scanf("%d",&n);
        if (n%2==0)
        {
                printf("number is even i.e %d",n);
        }
        else
        {
                printf("number is odd i.e %d",n);
        }
}
```

Output:

```
Sumit Verma,8725189,CSE-B
enter any number: 14
number is even i.e 14
```

Program-3b

Aim : Write a program to find maximum of two numbers.

Program :

```
#include<stdio.h>
void main ()
{
        int x,y;
        printf("Sumit Verma,8725189,CSE-B\n");
        printf("enter any value:");
        scanf("%d",&x);
        printf("enter any value:");
        scanf("%d",&y);
        if(x>y)
        {
                printf("value of x is greater i.e. %d",x);
        }
        else
        {
                printf("value of y is greater i.e. %d",y);
        }
}
```

Output:

```
Sumit Verma,8725189,CSE-B
enter any value: 25
enter any value: 42
value of y is greater i.e. 42
```

Program-3c

Aim : Write a program to find maximum of three numbers.

Program :

```
#include<stdio.h>
void main ()
{
        int x,y,z;
        printf("Sumit Verma,8725189,CSE-B\n");
        printf("enter three no.:");
        scanf("%d %d %d",&x,&y,&z);
        if(x>y){
        if(x>z)
        {
        printf("%d is largest",x);
        }
        else{
        printf("%d is largest ",z);
        }
        }
        else{
        if(y>z){
        printf("%d is largest",y);
                }
        else{
        printf("%d is largest",z);
        }
        }
       }
```

Output:

```
Sumit Verma,8725189,CSE-B
enter three no.: 12 55 38
55 is largest
```

Program-3d

Aim : Write a program to find roots of a quadratic equation.

Program :

```
#include<stdio.h>
#include<math.h>
void main ()
{
        int a,b,c,d,x,y;
        printf("Sumit Verma,8725189,CSE-B\n");
        printf("enter coff. of x^2:");
        scanf("%d",&a);
        printf("enter coff. of x:");
        scanf("%d",&b);
        printf("enter the constant value:");
        scanf("%d",&c);
        d=b*b-4*a*c;
        if(d>=0)
        {
                x=(-b+sqrt(d))/(2*a);
           y=(-b-sqrt(d))/(2*a);
           printf("roots of quadratic equations are:%d ,%d",x,y);
        }
        else
        {
                printf("Roots are imaginary");
        }
}
```

Output:

```
Sumit Verma,8725189,CSE-B
enter coff. of x^2: 1
enter coff. of x: -5
enter the constant value: 6
roots of quadratic equations are: 3 , 2
```

\

Program-4a

Aim : Write a program to find the sum of individual digits of a positive number.

Program :

```
#include<stdio.h>
void main ()
{
        int a,b,res=0;
        printf("Sumit Verma,8725189,CSE-B\n");
        printf("enter any no.:");
        scanf("%d",&a);
        while(a>0)
        {
                b=a%10;
                res=res+b;
                a=a/10;
        }
        printf("sum of digits is:%d",res);
}
```

Output:

```
Sumit Verma,8725189,CSE-B
enter any no.: 4729
sum of digits is:22
```

Program-4b

Aim : Write a program to find the sum of square of first n numbers.

Program :

```
#include <stdio.h>
int void main ()
{
        int n, sum=0, i = 1;
        printf("Sumit Verma,8725189,CSE-B\n");
        printf("Enter a positive integer: ");
        scanf("%d", &n);
        while (i<=n)
        {
                sum += i*i;
                i++;
        }
        printf("The sum of squares of first %d natural numbers is :%d\n", n, sum);
}
```

Output:

```
Sumit Verma,8725189,CSE-B
Enter a positive integer: 4
The sum of squares of first 4 natural numbers is :30
```

Program-4c

Aim : Write a program to generate the first n terms of Fibonacci series.

Program :

```
#include <stdio.h>
void main ()
{
   int n;
   unsigned long long int first = 0, second = 1, next;
   printf("Sumit Verma,8725189,CSE-B\n");
   printf("Enter the number of terms: ");
   scanf("%d", &n);
   printf("Fibonacci Series:\n");
   for (int i = 0; i < n; i++) {
      if (i <= 1)  {
         next = i;
      }
      else{
         next = first + second;
         first = second;
         second = next;
      }
      printf("%llu\n", next);
   }
}
```

Output:

```
Sumit Verma,8725189,CSE-B
Enter the number of terms: 7
Fibonacci Series:
0
1
1
2
3
5
8
```

Program-4d

Aim : Write a program to check whether a number is a palindrome or not.

Program :

```
#include<stdio.h>
void main ()
{
	int a,b=0,c,d;
	printf("enter any no.:");
	scanf("%d",&a);
	d=a;
	while(a>0)
	{
		c=a%10;
		b=b*10+c;
		a=a/10;
	}
	if(d!=b)
	{
		printf("it is not a palindrome");
	}
	else
	{
		printf("it is a palindrome");
	}
}
```

Output:

```
Sumit Verma,8725189,CSE-B
enter any no.: 1221
it is a palindrome
```

```
Sumit Verma,8725189,CSE-B
enter any no.: 123
it is not a palindrome
```

Program-4e

Aim : Write a program to generate a pascal's triangle.

Program :

```
#include<stdio.h>
void main ()
{
	int ncr,rows,space,n,r;
	printf("Sumit Verma,8725189,CSE-B\n");
	printf("enter no. of rows:");
	scanf("%d",&rows);
	for(n=0;n<rows;n++){
		for(space=1;space<rows-n;space++){
			printf(" ");
		}
		for(r=0;r<=n;r++){
			if(n==0 || r==0){
				ncr=1;
				printf("%d ",ncr);
			}
			else{
				ncr=(ncr* (n-r+1)/r);
				printf("%d ",ncr);
			}
		}

		printf("\n");
	}
}
```

Output:

```
Sumit Verma,8725189,CSE-B
enter no. of rows: 5
    1
   1 1
  1 2 1
 1 3 3 1
1 4 6 4 1
```

Program-4f

Aim : Write a program to find prime numbers between 1 and n ,where n is the value entered by user.

Program :

```
#include<stdio.h>
void main ()
{
	int a,c=0,i,j;
	printf("Sumit Verma,8725189,CSE-B\n");
	printf("enter a no. to which you want prime no.'s:");
	scanf("%d",&a);
	for(i=2;i<=a;i++)
	{
		for(j=i-1;j>1;j--)
		{
			if(i%j==0)
			{
				c=2;
				break;
			}
			else{
				c=1;
			}
		}

		if(c!=2){
			printf("%d\n",i);
		}
}
```

Output:

```
Sumit Verma,8725189,CSE-B
enter a no. to which you want prime no.'s: 20
2
3
5
7
11
13
17
19
```

Program-5a

Aim: Write a program to traverse in a linear array.

Program:

```
#include<stdio.h>
void main ()
{
	int i,n;
	printf("Sumit Verma,8725189,CSE-B\n");
	printf("enter no. of elements:");
	scanf("%d",&n);
	int a[n];
	for(i=0;i<n;i++)
	{
		scanf("%d",&a[i]);
	}
	printf("!!Elements of array are!!\n");
	for(i=0;i<n;i++)
	{
		printf("%d ",a[i]);
	}
}
```

Output:

```
Sumit Verma,8725189,CSE-B
enter no. of elements: 5
1 2 3 4 5
!!Elements of array are!!
1 2 3 4 5
```

Program-5b

Aim: Write a program for inserting an element in a linear array.

Program:

```
#include<stdio.h>
void main (){
        int n,i,pos,nid,k,j;
        printf("Sumit Verma,8725189,CSE-B\n");
        printf("Enter total no. of id's:");
        scanf("%d",&n);
        int a[n];
        for(i=0;i<n-1;i++){
                printf("Enter value:");
                scanf("%d",&a[i]);
        }
        printf("Enter the position at which u want to insert value:");
        scanf("%d",&pos);
        printf("Enter the id:");
        scanf("%d",&nid);
        for(j=n-1;j>=pos-1;j--){
                a[j+1]=a[j];
        }
        a[pos-1]=nid;
        for(k=0;k<n;k++){
                printf("%d ",a[k]);
        }
```

Output:

```
Sumit Verma,8725189,CSE-B
Enter total no. of id's: 5
Enter value: 10
Enter value: 20
Enter value: 30
Enter value: 50
Enter the position at which u want to insert value: 4
Enter the id: 40
10 20 30 40 50
```

Program-5c

Aim: Write a program for deleting an element in a linear array.

Program:

```
#include<stdio.h>
void main ()
{
	int a[20],p,i,n;
	printf("Sumit Verma,8725189,CSE-B\n");
	printf("Enter total no. of elements in array:");
	scanf("%d",&n);
	for(i=0;i<n;i++)
	{
		printf("Enter value:");
		scanf("%d",&a[i]);
	}

	printf("Enter the position where the element has to be deleted:");
	scanf("%d",&p);
	if(p>=n+1)
	{
		printf("Deleteion not possible.");
	}
	else
	{
		for(i=p-1;i<n-1;i++)
		{
			a[i]=a[i+1];
		}
		printf("Resultant array\n");
		for(i=0;i<n-1;i++)
		{
			printf("%d ",a[i]);
		}
	}
```

}

Output:

```
Sumit Verma,8725189,CSE-B
Enter total no. of elements in array: 5
Enter value: 11
Enter value: 22
Enter value: 33
Enter value: 44
Enter value: 55
Enter the position where the element has to be deleted: 3
Resultant array
11 22 44 55
```

Program-6a

Aim: Write a program for addition of two matrices.

Program:

```
#include<stdio.h>
void main ()
{
	int a[3][3],b[3][3],i,j,c[3][3],v;
	printf("Sumit Verma,8725189,CSE-B\n");
	printf("Enter the first matrix\n");
	for(i=0;i<3;i++)
	{
		for(j=0;j<3;j++)
		{
			printf("value of [%d][%d]",i,j);
			scanf("%d",&a[i][j]);
		}
	}
	printf("Enter the second matrix\n");
	for(i=0;i<3;i++)
	{
		for(j=0;j<3;j++)
		{
			printf("value of [%d][%d]",i,j);
			scanf("%d",&b[i][j]);
		}
	}
	for(i=0;i<3;i++)
	{
		for(j=0;j<3;j++)
		{
			c[i][j]=a[i][j]+b[i][j];
		}
	}
	printf("!!Added Matrix is!!\n");
```

```
        for(i=0;i<3;i++)
        {
                for(j=0;j<3;j++)
                {
                        printf("%d \t",c[i][j]);
                }
                printf("\n");
        }
}
```

Output:

```
Sumit Verma,8725189,CSE-B
Enter the first matrix
value of [0][0] 1
value of [0][1] 2
value of [0][2] 3
value of [1][0] 4
value of [1][1] 5
value of [1][2] 6
value of [2][0] 7
value of [2][1] 8
value of [2][2] 9
Enter the second matrix
value of [0][0] 9
value of [0][1] 8
value of [0][2] 7
value of [1][0] 6
value of [1][1] 5
value of [1][2] 4
value of [2][0] 3
value of [2][1] 2
value of [2][2] 1
!!Added Matrix is!!
10  10  10
10  10  10
10  10  10
```

Program-6b

Aim: Write a program for matrix multiplication by checking compatibility.

Program:

```
#include<stdio.h>
#define N 50
void main ()
{
	int a[N][N],b[N][N],i,j,c[N][N],k,m,n,p,q;
	printf("Sumit  Verma,8725189,CSE-B\n");
	printf("Enter the value of rows and columns in 1st matrix:");
	scanf("%d %d",&n,&m);
	printf("Enter the first matrix\n");
	for(i=0;i<n;i++)
	{
		for(j=0;j<m;j++)
		{
			printf("value of [%d][%d]",i,j);
			scanf("%d",&a[i][j]);
		}
	}
	printf("Enter the value of rows and columns in 2nd matrix:");
	scanf("%d %d",&p,&q);
	printf("Enter the second matrix\n");
	for(i=0;i<3;i++)
	{
		for(j=0;j<3;j++)
		{
			printf("value of [%d][%d]",i,j);
			scanf("%d",&b[i][j]);
		}
	}

	if(m!=p)
```

```
	{
		printf("Sorry! Cannot Multiply");

	}
	else
	{
		for(i=0;i<n;i++)
		{
			for(j=0;j<q;j++)
			{
				c[i][j]=0;
				for(k=0;k<=n;k++)
				{
					c[i][j]=c[i][j]+a[i][k]*b[k][j];
				}
			}
		}
	}

	printf("Resultant Matrix\n");
	for(i=0;i<n;i++)
	{
		for(j=0;j<q;j++)
		{
			printf("%d \t",c[i][j]);
		}
		printf("\n");
	}
}
```

Output:

```
Sumit Verma,8725189,CSE-B
Enter the value of rows and columns in 1st matrix: 2 3
Enter the first matrix
value of [0][0] 1
value of [0][1] 2
value of [0][2] 3
value of [1][0] 4
value of [1][1] 5
value of [1][2] 6
Enter the value of rows and columns in 2nd matrix: 3 2
Enter the second matrix
value of [0][0] 7
value of [0][1] 8
value of [1][0] 9
value of [1][1] 10
value of [2][0] 11
value of [2][1] 12
Resultant Matrix
58  64
139     154
```

Program-7a

Aim: Write a program to concatenate two strings.

Program:

```
#include<stdio.h>
#include<string.h>
void main ()
{
        char a[100],b[100];
        int i,j;
        printf("Sumit Verma,8725189,CSE-B\n");
        printf("Enter 1st string:");
        gets(a);
        printf("Enter 2nd string:");
        gets(b);
        j=strlen(a);
        for(i=0;b[i]!='\0';i++)
        {
                a[i+j]=b[i];
        }
        a[i+j]='\0';
        printf("Combined string:%s",a);
}
```

Output:

```
Sumit Verma,8725189,CSE-B
Enter 1st string: Hello
Enter 2nd string: World
Combined string:HelloWorld
```

Program-7b

Aim: Write a program to check whether a string is palindrome or not.

Program:

```
#include<stdio.h>
#include<string.h>
void main (){
        char a[100],b[100],temp;
        int l,lin,rin,i;
        printf("Sumit Verma,8725189,CSE-B\n");
        printf("Enter the string:");
        scanf("%s",a);
        strcpy(b,a);
        l=strlen(a);
        lin=0;
        rin=l-1;
        for(i=lin;i<rin;i++){
                temp=a[i];
                a[i]=a[rin];
                a[rin]=temp;
                rin--;
        }
         if(strcmp(a,b)==0){
                printf("Given string is a palindrome");
         }
         else {
                printf("Given string is not a palindrome");
         }
}
```

Output:

```
Sumit Verma,8725189,CSE-B
Enter the string: radar
Given string is a palindrome
```

Program-7c

Aim: Write a program to reverse a string.

Program:

```
#include<stdio.h>
#include<string.h>
void main ()
{
        char a[100],temp;
        int l,lin,rin,i;
        printf("Sumit Verma,8725189,CSE-B\n");
        printf("Enter the string:");
        scanf("%s",a);
        l=strlen(a);
        lin=0;
        rin=l-1;
        for(i=lin;i<rin;i++)
        {
                temp=a[i];
                a[i]=a[rin];
                a[rin]=temp;
                rin--;
        }
        printf("Reversed string:%s",a);
}
```

Output:

```
Sumit Verma,8725189,CSE-B
Enter the string: programming
Reversed string:gnimmargorp
```

Program-8

Aim: Write a program to demonstrate the concept of simple functions.

Program:

```
#include<stdio.h>
int add(int,int);
int mul(int,int);
int quo(int,int);
void main (){
        int x,y,z;
        printf("Sumit Verma,8725189,CSE-B\n");
        x=add(10,5);
        y=mul(10,5);
        z=quo(10,6);
        printf("Sum is:%d\nMultiplication is:%d\nQuotient is:%d",x,y,z);
}
int add(int a,int b){
        int sum=0;
        sum=a+b;
        return(sum);
}
int mul(int a,int b){
        int mul=1;
        mul=a*b;
        return(mul);
}
int quo(int a,int b){
        int quo;
        quo=a/b;
        return(quo);
}
```

Output:

```
Sumit Verma,8725189,CSE-B
Sum is:15
Multiplication is:50
Quotient is:1
```

Program-9

Aim: Write a program to solve numerical method problems (prefix and postfix operations).

Program:

```
#include<stdio.h>
void main ()
{
        int a=20,b=35;
        printf("Sumit Verma,8725189,CSE-B\n");
        a=b++;
        printf("%d %d\n",a,b);
}
```

Output:

```
Sumit Verma,8725189,CSE-B
35 36
```

```
#include<stdio.h>
void main ()
{
        int a=20,b=35;
        printf("Sumit Verma,8725189,CSE-B\n");
        a=++b;
        printf("%d %d\n",a,b);
}
```

Output:

```
Sumit Verma,8725189,CSE-B
36 36
```

```
#include<stdio.h>
void main ()
{
        int a=20,b=35;
        printf("Sumit Verma,8725189,CSE-B\n");
        a=b--;
        printf("%d %d\n",a,b);
}
```

Output:

```
Sumit Verma,8725189,CSE-B
35 34
```

```
#include<stdio.h>
void main ()
{
        int a=20,b=35;
        printf("Sumit Verma,8725189,CSE-B\n");
        a=--b;
        printf("%d %d\n",a,b);
}
```

Output:

```
Sumit Verma,8725189,CSE-B
34 34
```

Program-10a

Aim: Write a program to find factorial using recursion.

Program:

```
#include<stdio.h>
int facto(int);
void main ()
{
        int a,b;
        printf("Sumit Verma,8725189,CSE-B\n");
        printf("Enter no.:");
        scanf("%d",&a);
        b=facto(a);
        printf("Factorial of %d is:%d",a,b);
}

int facto(int x)
{
        int fact;
        if(x==1)
        {
                return 1;
        }
        else
        {
                fact=x*facto(x-1);
                return fact;
        }
}
```

Output:

```
Sumit Verma,8725189,CSE-B
Enter no.: 5
Factorial of 5 is:120
```

Program-10b

Aim: Write a program to generate Fibonacci series upto n terms using recursion.

Program:

```
#include<stdio.h>
int fib(int);
void main ()
{
	int i,n,res;
	printf("Sumit Verma,8725189,CSE-B\n");
	printf("Enter no. of term in fibonacci series:");
	scanf("%d",&n);
	printf("!!Fibonacci Series!!\n");
	for(i=0;i<n;i++){
		res=fib(i);
		printf("%d ",res);
	}
}

int fib(int n){
	if(n==0){
		return 0;
	}
	else if(n==1){
		return 1;
	}
	else{
		return fib(n-1)+fib(n-2);
	}
}
```

Output:

```
Sumit Verma,8725189,CSE-B
Enter no. of term in fibonacci series: 8
!!Fibonacci Series!!
0 1 1 2 3 5 8 13
```

Program-11

Aim: Write a program to print elements of a structure using pointers.

Program:

```
#include<stdio.h>
struct student
{
        int id;
        char name[30];
        float percentage;
};

void main ()
{
        struct student record={1,"Sumit ",90.2};
        struct student *ptr;
        printf("Sumit ,8725189,CSE-B\n");
        ptr=&record;
        printf("!!Record of student!!\n");
        printf("Student id:%d\n",ptr->id);
        printf("Student name:%s\n",ptr->name);
        printf("Student percentage:%f",ptr->percentage);
}
```

Output:

```
Sumit Verma,8725189,CSE-B
!!Record of student!!
Student id:1
Student name:Heybhagwan
Student percentage:90.200000
```