UNIT 6

CONTROL STRUCTURE

A. Decision Making Statements (if, if…else, if…else if, switch)

1. WAP to check whether entered number is negative.

```
#include<stdio.h>
int main(){
        int n;
        printf("Enter a number to be tested:");
        scanf("%d",&n);
        if(n<0){
                printf("The number %d is negative.",n);
        }
        return 0;
}
```

2. WAP to determine whether the entered number is even or odd.

```
#include<stdio.h>
int main(){
    int n;
        printf("Enter a number:");
        scanf("%d",&n);
        if(n%2==0){
                printf("The number %d is even.",n);
```

```
        }
        else{
                printf("The number %d is odd.",n);
        }
        return 0;
}
```

3. WAP that input cost price (CP) and selling price (SP) and determine whether there is gain or loss.

```
#include<stdio.h>
int main(){
        int cp,sp,profit,loss;
        printf("Enter Cost Price(CP):");
        scanf("%d",&cp);
        printf("Enter Selling Price(SP):");
        scanf("%d",&sp);
        if(sp>cp){
                profit=sp-cp;
                printf("The profit amount=%d",profit);
        }
        else{
                loss=cp-sp;
                printf("The loss amount=%d",loss);
        }
        return 0;
}
```

4. WAP to determine the roots of quadratic equation $ax^2+bx+c=0$.

```
#include<stdio.h>
#include<math.h>
int main(){
        float a,b,c,d,real,img,root1,root2;
        printf("Enter values of a, b and c:");
        scanf("%f%f%f",&a,&b,&c);
        d=b*b-4*a*c;
        if(d<0){
                printf("Roots are imaginary:");
                d=sqrt(fabs(d));
                real=-b/(2*a);
                img=d/(2*a);
                printf("\nRoot1 = %.2f + i %.2f",real,img);
                printf("\nRoot2 = %.2f - i %.2f",real,img);
        }
        else{
                printf("Roots are real:");
                d=sqrt(d);
                root1=(-b+d)/(2*a);
                root2=(-b-d)/(2*a);
                printf("\nRoot1 = %.2f",root1);
                printf("\nRoot2 = %.2f",root2);
        }
```

```
    return 0;
}
```

5. WAP to find the smallest among three numbers using nested if else statement.

```
#include<stdio.h>
int main(){
    int a,b,c;
    printf("Enter three numbers:");
    scanf("%d%d%d",&a,&b,&c);
    if(a<b){
        if(a<c){
            printf("%d is the smallest number.",a);
        }
        else{
            printf("%d is the smallest number.",c);
        }
    }
    else{
        if(b<c){
            printf("%d is the smallest number.",b);
        }
        else{
            printf("%d is the smallest number.",c);
        }
    }
```

```
    return 0;
}
```

6. WAP to read the marks of four subjects of a student from the user and compute percentage and grade of the student using the following conditions:

percentage>=80 grade = A

percentage<80 and per>=60 grade = B

percentage<60 and per>=50 grade = C

percentage<50 and per>=40 grade = D

percentage<40 grade = F

```
#include<stdio.h>
int main(){
    float m1,m2,m3,m4,percentage;
    char grade;
    printf("Enter marks of 4 subjects:");
    scanf("%f%f%f%f",&m1,&m2,&m3,&m4);
    percentage=(m1+m2+m3+m4)/4;
    if(percentage>=80)
        grade = 'A';
    else if(percentage>=60)
        grade = 'B';
    else if(percentage>=50)
        grade = 'C';
    else if(percentage>=40)
        grade = 'D';
    else
```

```
            grade = 'F';
        printf("Percentage is %.2f. \nGrade is %c.",percentage,grade);
        return 0;
}
```

7. WAP that finds the largest among three numbers using logical operator and else if statement.

```
#include<stdio.h>
int main(){
        int a,b,c;
        printf("Enter three numbers:");
        scanf("%d%d%d",&a,&b,&c);
        if(a>b && a>c){
                printf("%d is the largest number.",a);
        }
        else if(b>a && b>c){
                printf("%d is the largest number.",b);
        }
        else{
                printf("%d is the largest number.",c);
        }
        return 0;
}
```

8. Write the output of the program.

```
#include<stdio.h>
int main(){
	int n;
	printf("Enter a number:");
	scanf("%d",&n);
	switch(n){
		case 1:
		case 2:
			printf("1 or 2?");
			break;
		case 3:
		case 4:
			printf("3 or 4?");
		case 5:
		case 6:
			printf("5 or 6?");
			printf("or may be 3 or 4?");
			break;
		default:
			printf("Invalid choice.");
	}
	return 0;
}
```

9. WAP that demonstrates the use of switch statement.

```
#include<stdio.h>
int main(){
	int n;
	printf("Which of the following websites you visit the most?");
	printf("\nSelect 1 for FACEBOOK, 2 for TWITTER and 3 for INSTAGRAM.");
	printf("\nEnter your choice:");
	scanf("%d",&n);
	switch(n){
		case 1:
			printf("You use FACEBOOK.");
			break;
		case 2:
			printf("You use TWITTER.");
			break;
		case 3:
			printf("You use INSTAGRAM.");
			break;
		default:
			printf("You have entered an invalid option.");
	}
	return 0;
}
```

10. WAP that performs the arithmetic operation using switch statement.

```
#include<stdio.h>
int main(){
        int a,b;
        char c;
        printf("Enter two numbers:");
        scanf("%d%d",&a,&b);
        printf("Select + to add, - to subtract, * to multiply and / to divide.");
        printf("Enter your choice:");
        scanf(" %c",&c);
        switch(c){
                case '+':
                        printf("Sum of two numbers=%d",a+b);
                        break;
                case '-':
                        printf("Difference of two numbers=%d",a-b);
                        break;
                case '*':
                        printf("Product of two numbers=%d",a*b);
                        break;
                case '/':
                        printf("Division of two numbers=%d",a/b);
                        break;
                default:
```

```
                printf("Invalid choice.");


        }
        return 0;
}
```

B. Iteration (Looping/Repetitive) Statement (for, while, do…while)

11. WAP to print out all numbers from 1 to 10 using for loop.

```
#include<stdio.h>
int main(){
        int i;
        for(i=1;i<=10;i++){
                printf("%d\t",i);
        }
        return 0;
}
```

12. WAP to calculate the factorial of a positive number read from user using for loop.

```
#include<stdio.h>
int main(){
        int i,num;
        long fac=1;
        printf("Enter a number:");
        scanf("%d",&num);
```

```
        for(i=1;i<=num;i++){
                fac=fac*i;
        }
        printf("Factorial of %d is %d.",num,fac);
        return 0;
}
```

13. WAP to sum all integers from 1 to 100 using for loop.

```
#include<stdio.h>
int main(){
        int i,sum=0;
        for(i=1;i<=100;i++){
                sum=sum+i;
        }
        printf("Sum is %d.",sum);
        return 0;
}
```

14. WAP to find the sum and average of the marks of five subjects using for loop.

```
#include<stdio.h>
int main(){
        float marks,total=0,average;
        for(int i=1;i<=5;i++){
                printf("Enter marks in %d th subject:",i);
                scanf("%f",&marks);
                total+=marks;
```

```
    }
    printf("Total marks = %.2f",total);
    printf("\nAverage marks = %.2f",total/5);
    return 0;}
```

15. WAP to find the sum of digits of any number supplied by the user using while loop.

```
#include<stdio.h>
int main(){
    int num,rem,sum=0;
    printf("Enter a number:");
    scanf("%d",&num);
    while(num!=0){
        rem=num%10;
        sum+=rem;
        num/=10;
    }
    printf("Sum of digits = %d",sum);
    return 0;
}
```

16. WAP that check whether the entered number is Armstrong Number.

```
#include<stdio.h>
int main(){
	int num,rem,sum=0,check;
	printf("Enter a number:");
	scanf("%d",&num);
	check=num;
	while(num!=0){
		rem=num%10;
		sum+=rem*rem*rem;
		num/=10;
	}
	if(check==sum){
		printf("%d is Armstrong Number.",check);
	}
	else{
		printf("%d is not Armstrong Number.",check);
	}
	return 0;
}
```

17. WAP to read a number and find and display its reverse.

```
#include<stdio.h>
int main(){
	int num,rem,rev=0;
	printf("Enter a number:");
	scanf("%d",&num);
	while(num!=0){
		rem=num%10;
		rev=rev*10+rem;
		num/=10;
	}
	printf("Reverse number = %d",rev);
	return 0;
}
```

18. WAP to read a number from keyboard and check whether it is a palindrome or not.

```
#include<stdio.h>
int main(){
	int num,rem,rev=0,check;
	printf("Enter a number:");
	scanf("%d",&num);
	check=num;
	while(num!=0){
		rem=num%10;
		rev=rev*10+rem;
```

```
        num/=10;
    }
    if(check==rev){
        printf("%d is a palindrome number.",check);
    }
    else{
        printf("%d is not a palindrome number.",check);
    }
    return 0;
}
```

19. WAP to print out all numbers from 1 to 10 using do-while loop.

```
#include<stdio.h>
int main(){
    int x=1;
    do{
        printf("%d\t",x);
        x++;
    }while(x<=10);
    return 0;
}
```

20. WAP to find the Fibonacci sequence: 1,1,2,3,5,8,13,…..

```
#include<stdio.h>
int main(){
        int a=1,b=1,c,num;
        printf("Enter number upto which you want Fibonacci sequence:");
        scanf("%d",&num);
        printf("%d",a);
        do{
                printf(",%d",b);
                c=a+b;
                a=b;
                b=c;
        }while(num>b);
        return 0;}
```

C. Jumping Statements (break, continue and goto)

21. WAP to illustrate the use of break within loop.

```
#include<stdio.h>
int main(){
	for(int i=1;i<=10;i++){
		if(i==4){
			break;
		}
		printf("%d\t",i);
	}
	return 0;
}
```

22. WAP to illustrate the use of continue statement.

```
#include<stdio.h>
int main(){
	for(int i=1;i<=10;i++){
		if(i==2){
			continue;
		}
		printf("%d\t",i);
	}
	return 0;
}
```

23. WAP to print numbers 1 to 10 using goto statement (without using loop) and label.

```
#include<stdio.h>
int main(){
        int x=1;
        label1:
                printf("%d\t",x);
                x++;
        if(x<=10)
        goto label1;
        return 0;
}
```

D. Extra Practice

1. WAP to display your name 5 time using for loop.

```
#include<stdio.h>
int main(){
	for(int i=1;i<=5;i++){
		printf("Sharat Maharjan\n");
	}
	return 0;
}
```

2. WAP to display "C Programming" 5 times using while loop.

```
#include<stdio.h>
int main(){
	int i=1;
	while(i<=5){
		printf("C Programming\n");
		i++;
	}
	return 0;
}
```

3. WAP to display "Tribhuvan University" 5 times using do-while loop.

```
#include<stdio.h>
int main(){
	int i=1;
	do{
		printf("C Programming\n");
		i++;
	}while(i<=5);
	return 0;
}
```

4. WAP to calculate sum of first 10 even numbers.

```
#include<stdio.h>
int main(){
	int sum=0;
	for(int i=2;i<=10;i=i+2){
		sum+=i;
	}
	printf("Sum of first 10 even numbers = %d",sum);
	return 0;
}
```

5. WAP to display the following menu

1. To find area of circle

2. To check the given number is odd or even

3. To find the sum of N numbers

4. Exit

```
#include<stdio.h>
#include<stdlib.h>
#define TRUE 1
#define PI 3.14
int main(){
    int choice,n,N,sum;
    float r;
    printf("1. Find area of circle.");
    printf("\n2. Check the given number is odd or even.");
    printf("\n3. Find the sum of N numbers.");
    printf("\n4. Exit.");
    while(TRUE){
        printf("\nEnter a choice:");
        scanf("%d",&choice);
        switch(choice){
            case 1:
                printf("\nEnter a radius:");
                scanf("%f",&r);
                printf("Area of circle = %.2f",PI*r*r);
```

```
            break;
        case 2:
            printf("\nEnter a number to check even or odd:");
            scanf("%d",&n);
            if(n%2==0)
                printf("%d is even number.",n);
            else
                printf("%d is odd number.",n);
            break;
        case 3:
            sum=0;
            printf("\nHow many numbers do you want to add?");
            scanf("%d",&N);
            printf("Enter %d numbers:",N);
            for(int i=1;i<=N;i++){
                scanf("%d",&n);
                sum+=n;
            }
            printf("Sum = %d",sum);
            break;
        case 4:
            exit(0);
        default:
            printf("\nInvalid choice. Please try again.");
```

```
            }
        }
        return 0;
}
```

6. WAP to print the following outputs using for loops.

```
1
2       2
3       3       3
4       4       4       4
5       5       5       5       5
#include<stdio.h>
int main(){
        int i,j;
        for(i=1;i<=5;i++){
                for(j=1;j<=i;j++){
                        printf("%d\t",i);
                }
                printf("\n");
        }
return 0;
}
```

7. WAP to display following

1

2 3

3 4 5

4 5 6 7

5 6 7 8 9

```
#include<stdio.h>
int main(){
	int i,j;
	for(i=1;i<=5;i++){
		for(j=1;j<=i;j++){
			printf("%d\t",(i+j-1));
		}
		printf("\n");
	}
	return 0;
}
```

8. WAP to display following:

5 10 15 20 25

10 15 20 25 30

15 20 25 30 35

20 25 30 35 40

25 30 35 40 45

```
#include<stdio.h>
int main(){
        int i,j;
        for(i=1;i<=5;i++){
                for(j=1;j<=5;j++){
                        printf("%d\t",(i+j-1)*5);
                }
                printf("\n");
return 0;}}
```

9. WAP to display the following

1	2	3	4	5	6	7	8	9	10
2	4	6	8	10	12	14	16	18	20
3	6	9	12	15	18	21	24	27	30
4	8	12	16	20	24	28	32	36	40
5	10	15	20	25	30	35	40	45	50

```
#include<stdio.h>
int main(){
	int i,j;
	for(i=1;i<=5;i++){
		for(j=1;j<=10;j++){
			printf("%d\t",(i*j));
		}
		printf("\n");
	}
	return 0;
}
```

10. WAP to display the following

1

1 1

1 1 1

1 1 1 1

1 1 1 1 1

```
#include<stdio.h>
int main(){
	int i,j;
	for(i=1;i<=5;i++){
		for(j=1;j<=i;j++){
			printf("%d\t",1);
		}
		printf("\n");
	}
	return 0;
}
```

11. WAP to read a positive integer less than 20 and display its multiplication table.

```
#include<stdio.h>
int main(){
	int n,i;
	printf("Enter a positive number less than 20: ");
	scanf("%d",&n);
	if(n>0&&n<20){
		for(i=1;i<=10;i++){
			printf("%d * %d = %d\n",n,i,n*i);
		}
	}
	else{
		printf("You have entered either a negative number or a number greater than 20 or zero.");
	}
	return 0;
}
```

12. WAP to read a four digits number and display it in reverse order.

```
#include<stdio.h>
int main(){
	int num,rem,rev=0,a;
	printf("Enter four digits number:");
	scanf("%d",&num);
	a=num;
	if(num>=1000 && num<=9999){
		while(num!=0){
			rem=num%10;
			rev=rev*10+rem;
			num/=10;
		}
		printf("Reverse number of %d is %d.",a,rev);
	}
	else{
		printf("%d is not four digits number.",num);
	}
	return 0;
}
```

13. WAP to input an integer number and check whether it is prime number or not.

```
#include<stdio.h>
int main(){
	int num,i;
	printf("Enter a number:");
	scanf("%d",&num);
	for(i=2;i<num;i++){
		if(num%i==0){
			printf("%d is not a prime number.",num);
			break;
		}
	}
	if(num==i){
		printf("%d is a prime number.",num);
	}
	return 0;
}
```